A DELPHI APPLICATION IN THE DEVELOPING OF A PATTERN LANGUAGE APPROACH TO HEALTH FACILITIES DESIGN GUIDELINES

by

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ABSTRACT

The use of Standards to reduce the complexity of Health Facilities Design has become an indispensable and integral part of the planning process. Unfortunately the structure of present Standards is inflexible, and while this structure may have been acceptable in the past, the standards it produces have become ineffective. Such Standards have been unable to adapt to the changing attitudes and needs of the planning participants who respond to the societal changes around them. It is our objective to develop a method which can build better Standards.

In the first chapter we examine the structural problems of Standards and find that there is a fundamental difference between the positive purpose of Standards as used by hospitals and planners and the restrictive purposes of Standards used by government. We have used the terms Guidelines and Standards to denote these different contexts. Having established that a good Standard is one which is similar to a Guideline, we then explore an alternative structure developed at Berkeley, California, called a "Pattern" which we observe will satisfy the requirements for "good" Standards. Since Pattern formats are admirably suited to developing societally-responsive Guidelines and Standards we evolve a method to assemble these new Standards.

This method is based upon the Delphi Technique. It uses the technique's inherent advantages to establish communication between two groups of experts (Planners and Medical) who then interact to explore problems and solutions in planning Newborn Nurseries and Neonatal Intensive Care Units. The methodology which is described in Chapter 2 uses the classical components of a Policy Delphi with three rounds of questionnaires sent to Medical Experts (Physicians and Nurses) in various parts of British Columbia and Alberta. It adds such variations as the including of input from the Planner Experts as one method for the feed back of information. This special Delphi design anticipates effects from independent variables and builds in compensatory steps. One of the steps included is a Mini-Survey of a larger group of potential participants, to evaluate the Patterns resulting from the Delphi Study. This larger group was sixteen hospitals in British Columbia and ten hospitals in Alberta.

Chapter 3 descibes the details in carrying out the three questioning rounds of this modified Delphi method, and its success in assisting the production of a series of Nursery Patterns which are usable as Guidelines. In the methodology is the inherent capability for retaining flexibility, and there are a series of process adjustments that occur. Evaluation of the method in Chapter 4 shows that despite weaknesses, both anticipated and unantici-

pated, the results provide an important starting point that helps create better, more usable Standards. Possible future developments are briefly mentioned in the hope that evaluation and change will occur as the planning environment changes about us.

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CHAPTER 1: AN APPROACH TO THE PROBLEM OF STANDARDS

1.0 Introduction

When dealing with the complexities which occur in Health Facilities Design, it is reasonable to assume that those participants involved in the decision-making will where possible seek to simplify the process. An easy way to do this is to standardize the details of as many issues as possible, so that recurrent decisions about many complex problems are avoided. The decision-making focusses on the discussion of variations and not details of the issues. This occurs because the various participants involved in Health Planning have typically stereotyped the role referents which they use to decide the objectives that have priority. Therefore the results of most decisions are likely to become predictable because the objectives chosen and the roles performed are so stable that the decision process becomes typical of all hospital planning applications. People select their preferred solutions from the point of view of Government Regulators, Physicians, Nurses, Architects, and Hospital Planners, regardless of which project, which province, or which country the process is occurring. Simplification through standardization of building issues is usually successful

where there is a high degree of consensus among the participants as to the value of certain objectives when presented for decision-making. Without such consensus, each issue must be repeatedly addressed.

Understandably, as the number of issues which need to be addressed by these participants become more numerous and more difficult to resolve, there is a desire to ensure that more standardization occurs. It is clear that historically this process of standardization has reduced the need to constantly address similar issues time and time again. An additional benefit has been the improved communication which has resulted between the participants, enabling concurrent objectives to bring progress and benefit to all parties.

Now, this is now no longer the situation. There is evidence to indicate that the standards being used in Health Facilities Planning are not representative of common objectives, that they are causing antagonism between the participants, and that they are thereby reducing communication and the achievement of good results. There is evidence that a major factor having an effect on the process is the change in priorities occurring in our society. This inevitably starts changing the priorities of the role-participants themselves. Existing Standards

have not changed to meet new needs and are being unilaterally enforced without consensus and in some cases totally disregarded. Specifically, Standards have not adapted to changes in the medical and social environment, and to the very significant changes from a "Growth Economy" to a "No-Growth", fiscally-constrained economy. These environmental changes influence the roles of the participants in the following ways: Governments now view standards as fiscal control devices rather than a means to improve quality of care or service; Hospitals have begun to view Standards as merely simplifying tools, to reduce the impact resulting from the flood of information demanded of them in dealing with planning and not to ensure quality of space; Architects and Planners use the Standards to speed up communication between users of the Standards, to assist in quickly resolving the impact of changes in hospital systems, while speeding up decision-making. Architects tend to disregard their societal obligations to ensure Standards reflect desirable aspects of the space they create, not just the expediency of its creation.

At one time, Standards were capable of simplifying decision-making and, through consistency of application, improving the quality of the health facilities they produced. Today, they complicate decision-making and are

afforded little opportunity for consistent application because they can not respond to the diverse and complex needs of those who use them.

In this chapter we examine the present Standards to determine their problems, and then proceed to develop new responsive Standards. Once we have these elements in place, we can concentrate on our primary objective, the development of a method to build these new responsive Standards. We explore the principles of such a method in the latter part of Chapter 1 and develop it in Chapter 2. This method is a variation of the Delphi Technique, which is an iterative inquiring process using multiple questionnaires with groups of experts as the information resource. In Chapter 3 we carry out the study to ensure that it will produce usable Standards.

Before we begin to examine the subject in depth, an underlying principle must be stated. The use of Standards is important, and if they are again made useful in future years they will be powerful tools in improving the quality of health facilities. It should be clear that rejection of Standards is not an acceptable option. The use of Standards in health care planning has become so integral a part of the process of planning that as Peckham suggests, Standards are "the process of the planning process".[1]

Since rejecting them is unacceptable they must be renewed and made purposeful. Unless we collectively address this problem, it appears they will continue to be used as negative instruments of desperate Funding Agencies which will result in poorly designed facilities.

We now proceed to explore some problems which become apparent when one asks such questions as: Who uses the Standards?; How reliable are they?; and How are they being used in Canada? These aspects are examined sequentially.

1.1 Who Uses the Standards?

Beginning with a report in October of 1980, the America Institute of Architects (AIA), Committee on Architecture for Health, undertook through a sub-committee[2] to do a comprehensive review of space Standards in the United States. This move was prompted by the fact that the members, who are health facility architects and planners from all over the United States of America (USA), believed very few Standards are being consistently used in the USA and those that are in use could be as much as ten years out of date.

When this sub-committee reported back in March of 1981,[3] some significant facts were provided. They were able to say that there exists a body of accurate knowledge which encompasses some new Standards and methodologies and these are being used by planners themselves, but few Regulatory Agencies are in fact using them. In a sample of 29 states, the committee discovered that 61 percent of the Health Service Agencies (HSA) which are the State Regulatory Agencies, have no established Standards for projecting gross space requirements. It appeared however that most states had some published national references, such as those from the Department of Health, Education and Welfare (HEW), which describe room sizes in special departments. These are most often used when making checks on license applications. It was also noted that 24 percent of the HSA's had nominal Standards and that 15 percent had detailed Standards. There appears to be a very real concern in the USA about the lack of consistency in the application of Standards. The AIA noted in its report:

> "A glaring failure of the regulations which cannot be dismissed is the seeming lack of concern, at the State level particularly, over establishing specific guidelines or methodologies to serve as a benchmark for projection."[4]

Clearly in question, where there are no consistent

benchmarks, is the concern as to how hospitals and planners can know what will be acceptable to regulators.

While no similar study has been undertaken in Canada, we believe planners and hospitals, when dealing with the Provincial Government review agencies, have similar problems. The question is simply whether all hospitals across Canada can expect to be planned from a comparable data base. In Canada, the health system has been a Provincial responsibility from the start of Confederation, therefore no central (Federal) planning authority exists. Beginning with increased hospital building in the late 1950's, but especially since the mid-1960's (with the introduction of Federally supported Health Insurance), the existing review agencies have attempted to make use of Standards. In this instance we differ from the USA because Standards do exist. However, each province has always had separate responsibility for health care delivery, therefore the sharing of current planning methods have been informal and not very effective. The result is that, as in examples from the USA, consistency in Planning Standards being used across Canada is not extensive. Ontario, as the "Senior Province", (certainly the one having the largest population,) appears to have maintained a relatively current set of Planning Standards. The Federal Government, through the Health

Facilities Design Group in the Health Services and Promotion Branch of Health and Welfare Canada, has been instrumental in developing various planning standards for use by all Provinces. These are not mandatory and usually have been modified or adapted to conditions thought to be different by each Province. The latest Federal Government guide is a Functional Program Guideline method for use in most major departments in hospitals. This was developed with the involvement of Canadian Health Planning Agencies by Chi Systems, a company from Ann Arbour, Michigan. The method focusses upon the creation of formulae which translate projected workloads into space needs and is dependent upon agreement about certain broad assumptions regarding hospital operations. This operations agreement is not complete and once again the Provinces are making modifications to the guidelines. Prior to this effort, there have been Maternal Guidelines,[5] and Special Care Unit Guidelines,[6] both produced through the efforts of the Federal Government, and not universally applied by Provinces.

Our problem, despite these special efforts at guiding the planning for newly introduced programs, remains the same as that of the USA. There has been no real improvement in the development of a common group of Standards across the country. Even the new Functional Program

Guides have been made Province-specific. In answering the question of who uses Standards, it is clear there are the Hospitals, the Planners, and the Regulators. The former two groups have accumulated a body of knowledge to assist them in developing their plans, while the Funding or Planning Regulators use Standards to check those plans when presented. One of the concerns which the AIA sub-committee has remains unanswered; are the Standards which do exist and are being used by these groups, reliable?

1.2 How Reliable are the Standards?

The best way to discuss the problem of reliability is to look briefly at the historical development of the Standards currently in use. This is first to discover what in fact they are and, secondly, how they have changed to accurately reflect current practice.

With the thrust of building for social programs, particularly in North America after the Second World War, hospitals were high on the agenda. With the introduction of the Canadian National Health Grants Program in 1948, funds flowed to the provinces from the Federal Government to the encourage building of hospital beds. In British Columbia, James A. Hamilton[7] prepared a report on the

needs of the hospitals of the Province, this being a requirement of the new act. This helped start the first assessment of programs, space and facilities, as well as providing a definitive statement of objectives.

Typified by the Hamilton report, the early planning Standards were publications describing hospital requirements, written by various experts who had built their considerable expertise through the building or planning of hospitals. In the USA such Standards came from individuals who, like Rosenfield,[8] published a hospital planning book in 1947, or from government departments which had central planning roles, and thus published Planning Standards. Early examples in the USA include the Department of Health, Education and Welfare who published guides in 1953 and in Canada the Ministry of Health in Ontario produced some in 1954. These early Standards were very prescriptive in approach, with diagrams of typical planned solutions for hospital departments and often diagrams of whole hospitals. The result was that smaller hospitals, or less fiscally well supported agencies in North America (and elsewhere in the world), readily adopted the guidelines as an economical planning approach but without critical evaluation. The hospitals' sizes and designs reflected the latest North American systems and technology. This resulted in hospitals having difficulty operat-

ing with less sophisticated methods or their requiring much modification from the guidelines with unforeseen consequences resulting.

By the early 1960's, a more appropriate methodology was developed. Two books appeared which became milestones in hospital planning; Estimating Space Needs and Costs in General Hospital Construction by James J. Souder,[9] was published in 1963; and Hospital Design and Function by E. Todd Wheeler,[10] was published in 1964. These publications talked about space related aspects of the functions taking place in hospitals and provided, from the authors' own research into numerous hospitals, recommended sizes for hospital departments. The sizing formula they proposed created projections of space, based on a recommended amount of area (square feet) per bed. This meant, very simplistically, that a hospital of a certain size (in terms of the bed complement) could determine the space needs for each department, or in some cases the rooms, by simply multiplying a suggested area by the number of beds. This methodology was adopted in both the United States and Canada. In both countries, the role of the Regulatory Agencies involved, was to review and approve overall areas for the purpose of funding estimates, so the "Souder-Wheeler" numbers were most useful.

For approximately ten years into the early 1970's these guides proved to be appropriate for the level of review given by agencies. In British Columbia, a number of hospitals built between 1964 and 1979 used these Guidelines in determining departmental sizes. However, as the AIA-CAH sub-committee discovered,[11] hospitals of 200 to 300 beds between 1972 and 1979 should have had many departmental spaces increased by as much as 50 percent over these Guidelines, and typically, from approximately 700 sq.ft. of gross area to just less than 1,000 sq.ft. gross per bed, for the whole hospital. The increase was necessary to reflect changes that had occurred in programs and Support Space areas. Unfortunately, the AIA discovered that the Regulatory Agencies in the USA, which do have Planning Standards in most instances, are still reflecting 1972 sizes which means these Standards are as much as ten years out of date.

The problem is only marginally better in British Columbia. It is only now, since 1980 and 1981, that the Ministry of Health, Hospital Programs, has formally recognized larger space needs in hospitals, i.e., above the 700 sq.ft. overall areas, for other than teaching hospitals. For certain individual hospitals, specific departments have been enlarged where new equipment has recently been developed and where justification for unusual sizes could

be made by the individual hospital. It is the experience of B.C. hospital planners that many new departments have been planned to inadequate sizes.

It should be remembered that it is from the Hospital Review Agencies in each Province of Canada that planners must seek approval for all of the areas that they wish to build. Typically, if a hospital department can be shown to require a certain number of rooms and their combined areas amount to the overall acceptable area assigned by the particular government standard, (using the area per bed formula), there is no problem with acceptability of the space. If, however, the hospital looks at its method of operation and decides that certain additional spaces are needed to reflect some new philosophy, they will have a problem. If they are not prepared to relinquish other spaces to meet the overall area given by the Standards, they are likely to have their space request rejected. It should be realized, however, that rejection per se is not automatically a bad thing as it is well recognized that hospitals, when planning, receive pressures from special interest groups to oversize spaces, and clearly the curtailment of this oversizing is the prime purpose of Government Review.

The major concern is one of principle. If Standards

are to be used to determine acceptance of planned areas in hospitals, and consequently their related methods of operation, the Standards must be current and reliable. It is true that in some instances the areas per bed have eventually been upgraded to include space for more modern systems or to reflect differences in hospital size and role, however, there is still the problem recognized in the AIA study, that the process takes too long. It is evident that in the Canadian Health Facilities Planning process, a review of a Standard only occurs after there has been numerous attempts by hospitals, hospital planners and medical users, to have a change in approach recognized. Once this review occurs it still takes years to be accepted. This kind of delay may have been acceptable fifteen years ago, or even ten years ago, but not now. When it takes from three to eight years to design and build facilities for which planning must predict the needs five years past their completion date, it is not possible to accept design Standards which are up to ten years out of date at the starting point.

The initial question we posed was related to the reliability of the Planning Standards. The unfortunate answer is they are not reliable because they do not always reflect current operational concerns and therefore spaces assigned by the Standards are frequently too small or

inappropriate.

In highly technical areas such as laboratories and radiological departments, there is a noticeable and significant exception. The Ministry of Health in B.C. has Advisory Groups to deal with Radiology and Laboratory planning,[12] which include representatives of the user professions. These particular groups have kept the space Standards up to date. This is most interesting, in that without current "user" input the Ministry recognizes their inability to deal appropriately with rapidly changing and complex space needs of these technologies, yet this is certainly not so in other areas. It is noticeable in areas where the B.C. Ministry of Health Planning Consultants feel confident that it is not critical to periodically change their policies (e.g., general nursing policy, various supply systems policies, etc.), that any source of constant input by the people who use hospital facilities is not highly regarded. This attitude causes planning policy within the Government to remain fixed for long periods of time.

1.3 How are Standards Being Used in Canada?

We have observed that Standards existing in Canada

are not applied consistently across the country and as in the USA, there is a real concern about their reliability. Why then are planners demanding that Standards be consistently applied when they are already concerned about the reliability of the ones that exist? The fact inherent in this demand for consistency is the belief that agencies using Existing Standards will bring them into line with New Standards already available, but not used, and it is believed agencies not using Standards will adopt the New Standards. In the past, we have seen that both Planners and Regulators did use the same independently developed resource material. However, in today's planning environment, not only do the needs of the groups using Standards differ, but the Standards themselves are not the same.

It is critical that we begin making a distinction between two different types of Standards. The Standards that Planners and hospitals need are essential for their usefulness in the comparison of operational methods and the resultant space needs. These are communication tools used to ensure that shared experience will increase total knowledge and that when applied to a problem the best solution will result. The other kind of Standard is used by the Funding and Planning Authorities. These are used to check for compliance with a Planning "Norm", established by these agencies, as a measure of their acceptable

minimum requirements. The Standard used by Planners is an Optimal Guideline, the one used by the Authorities is a Minimal Standard. It is clear that over the last ten years, the Guidelines which have been shared by Planners are constantly evolving and have left the more static Standards behind. In order to reinforce the difference in the nature of the purposes of these two forms of guide, it is important to differentiate distinctly between the terms Guideline and Standard.

The AIA through their study have begun to recognize that the Regulatory Agencies have Standards which do not resemble the present Guidelines used by Planners. The reason is that in most cases up until the introduction of recent legislation in the USA,[13] there has been little need for regulatory standardization. Notably, the Standards that do exist have come from such agencies as the Department of Veterans Affairs, who like the Canadian Provinces, are themselves funding the construction of facilities. It is not surprising that when required to approve requests from Planners for hospital space, the Health Service Agencies (HSA) have chosen to use the available documents, already proven to be acceptable, such as the SouderWheeler formula, plus some current HEW Guides. Sophisticated Agencies and Planners have picked up the existence of any flaws in the Standards they are using, and are making changes, while others have not.

The Canadian Agencies were forced into this situation earlier and in the last ten years have slowly started to close the gap between Standards and Guidelines. In further support of the idea that a Standard/Guideline differentiation is a valid concept, the new Canadian Program Guidelines (Chi Systems Methodology) have been designed as a deliberate step toward closing this methodology gap. The new Standard is supposed to be a Guideline for both Planners and Governments and uses departmental workloads as a basis for determining functional and space requirements. This is a significant improvement over the old Souder-Wheeler formula of space per bed. The obvious advantage is the method's recognition of programs which relate to outpatients, who create workload and space needs that do not affect inpatient demands (number of beds). With the move to more outpatient services, bed-based calculations are inappropriate and have often been restrictive of opportunities for program innovations. Like Canada, as the realization of the need for current Standards occurs in the USA, the more sophisticated HSA's have sought better resources. The two most current resources which are closest to Guidelines, are the 1979 Chicago Hospital Council Report and the Standards of the Northern Indiana Health Systems Agency. These resources are now finding application in the USA Health Planning System.

When we look at the use of Standards and Guidelines one concern remains unaddressed. Is it possible that if we do reach a point where Guidelines are built into Standards, thereby enabling Regulating Agencies and Planners to share the same body of knowledge, the planning process will proceed smoothly? We have evidence which indicates there is doubt that this will occur. While it is clear that such a body of knowledge is essential, it will not solve the problem with present Standards themselves. Just because a point is reached where the new Standards are put in place, there is nothing to ensure that when these are outdated further change will continue to occur.

We are constantly aware that being overly rigid is still a major cause of concern with the Design Standards. As Peckham points out,[14] the constant impact of new concepts, methods and equipment, which appears to be accelerating in recent years, has thrown the planning process into a Tofflerian "future shock". Standards that have been traditionally used in planning now serve either as a point of departure or constant additions and changes to them lead only to eventually ignoring them altogether. This historical problem which suggests that the gap between Guidelines (which do respond to current knowledge) and Standards (which do not), can never permanently be

closed. Unless we can develop flexible Standards, it would appear that as soon as the gap does close it will soon open up again. To better appreciate this problem we can look at how the application of the British Columbia Extended Care Guideline has failed.

In 1974, a British Columbia Guideline for programming, planning, and sizing Extended Care Units (ECU) was produced. This was developed cooperatively between the Ministry of Health's planners and the Health Facilities Committee of the Architectural Institute of B.C. It was presumed by the architects to be a genuine attempt to produce a Guideline that would provide optimal spaces for residents of these facilities. Its sizes were based upon research carried out at the time.[15] It was also to be a way of assisting with the simplification of the process of communicating between the Ministry, the hospitals, and the planners. This example is then an 'ideal' Standard which is based upon cooperative Guidelines and the gap was closed between the two. The covering pages of the guide even states that it is not to be a rigid document and that the practical use of it will lead to revisions.

This has not been the case. If anything, the guide gave the Ministry of Health the opportunity to stop discussing ECU needs. Despite constant complaints by

users and planners, there was little formal recognition by government until about 1980, that the guide reflected a custodial model of care and did not include spaces for some necessary activation programs. The opportunity to develop new buildings which could incorporate such changes occurred in 1975. These changes were first proposed for the Delta Extended Care Unit in that year and again in 1979 when the Shaughnessy Hospital requested the opportunity to develop a new approach to their unit.

On both occasions the Ministry of Health refused to consider anything but an exact translation of the ECU Guideline. The application of the rigid Guideline was considered to be a cost-saving approach at Delta. The Ministry of Health not only enforced the Guideline, but also insisted that the plans and drawings of a unit previously built at Kamloops must be built at Delta. In the end, changes required by locational differences reduced the direct cost-benefit, and the inherent functional problems which were repeated, were ignored. This repetition of ECU units has occurred on a number of occasions supported by the idea that the Guideline is fixed and therefore the government may as well save about four percent of project cost in reduced consultants' design fees. We begin to see here a use for Standards by government which is contrary to the objectives of both the

Hospitals and the Planners. Unless these Standards can be used as a point of reconciliation, they will fail as devices to improve planning and will remain tools of restriction, in the hands of government.

Restriction and control is not without purpose. It is usually argued by regulators that the restrictions created by mandatory Standards will help to reduce the impact of what authorities consider to be "run-away" changes and therefore costs occurring to Health Care buildings. It is clear that this is substantially the motivation of government agencies who are formalizing these guides. Where authorities have at least the power to delay projects and most often the capability to refuse to cost-share in a project, this is a powerful control tool. The restraint which government's desire is not an unreasonable objective considering the continued growth of technical change which appears to be an independent (and hence uncontrolled) variable in health costs.[16] It would also appear that the point of diminishing returns with respect to mortality has already been reached for medical technology. However, in their desire to control the capital cost variable and therefore hopefully to stop opportunities for increases in operating costs, Government are being overly simplistic. It has already been shown that other uncontrolled system variables (such as

physician control over technology choices) are having greater cost impact on the System,[17] and therefore governments must realize that other mechanisms must be put in place to reduce costs. It will need a major health system restructuring to reduce costs in the way that the authorities desire but have not as yet addressed. Restriction is consistent with the current perception of government role in planning. That does not mean a flexible Standard cannot exist which accommodates all participants' needs.

An unfortunate truth has become clear. Even if the Standards are created to be like Guidelines, the resulting product is not capable of change so we are stuck with a gap between Standards and Guidelines; but why is this? We have other kinds of Standards -- Electrical Safety Standards, Equipment Hazard Standards, Radiation Level Standards, etc., which are regularly updated and often are regulated by law to a far greater extent than Design Standards. What is it about the Design Guidelines or Standards that makes them so inflexible?

The answer lies with the developmental background of Design Standards which is very different from Technical Safety Standards. With Technical Safety Standards, the readily quantifiable basis allows specific, real limits to

be recognized in every application. This is because the same variables are always present from application to application. For example, an ungrounded monitor lead will always cause arrythmia and cardiac arrest if a large enough amount of current leaks from electrical equipment. It can be measured, a safe limit given and precautions set down for every application. It does not matter in which hospital, in which country or often which piece of equipment is causing the leak, a current of a certain level will always cause death.

Design Standards are trying to define the same sorts of limits as Technical Standards through identifying deleterious results which occur as a result of the incorrect arrangement of objects or events within a space. The Design Standard is required to describe what arrangements are incorrect, or state the amount of space required to avoid these negative effects. The real problem is that the outcomes are not always quantifiable. We can see in examining the results of bad planning, that these deleterious outcomes may only have emotional and therefore unmeasurable effects -- e.g., too little space causes crowding, functions continue but at enormous levels of staff stress. Often what is identified as a problem in one situation, even where all the same variables seem to be present, may not be causing the same concern in another

situation. In effect, Design Standards are an attempt to regulate, in some pragmatic way, events which are amorphous and subjective.

What becomes clear in Design Standards is that they do not describe specific outcomes of an event, but desired outcomes of an event. If this fact has not been realized by the people who develop Design Standards then some of the problems with their inflexibility become clear. Since the preoccupation in Standards is with scientifically measurable outcomes, they generally limit themselves to describing the outcomes. They generally do not describe what relationship exists between the event that is being controlled and the outcome required. This may be acceptable in Technical Safety Standards where the relationship of event to outcome is constant, however it is unacceptable in Design where the relationship is not constant. If Design Standards only state what must be done to solve the problem, then the very aspect requiring design flexibility is ignored since solving problems is the purpose of building design.

It is unacceptable for a Design Standard to ignore the process of design. Even if we wish to achieve more precision by separating the Process of Design of buildings into a Pre-Design phase,[18] in which problems are scientif-

ically analyzed, and the Design Phase in which they are subjectively solved, the two parts form an interdependent continuum. The best design solution comes from more than just providing the correct number and sizes of spaces in the functionally correct relationships. These are certainly the fundamental platforms for the design, but a great deal more warrants consideration. We must remember that the spaces will be occupied by human beings who operate at a sub-conscious level as well as a conscious level. People will be happy or unhappy with the result of the design according to how they "feel" about the space. They will use subjective criteria to assess the "rightness" of the product. They will not even be able to tell in some instances what makes them feel happy or sad. It is the task of those who create the space to ensure that only good results occur.

The unfortunate reality is that efforts presently being made to improve both Guidelines and Standards concentrate only upon the factual and the scientific aspects of the guides. In addition to this emphasis, an effort is being directed toward distilling material required for Standards to its simplest formulation so that data contained in Standards is easy to use. The Souder-Wheeler formulation of area per bed was of this simplistic type. New Guidelines can no longer be this way.

In recent years the major participants in the design process have come under considerable pressure to be more accurate. This has occurred because, as all kinds of funding resources have become limited, demand is created for better predictions of space, (therefore of costs) and for measures of the anticipated productivity of operations, which usually depend upon good pre-planning of services. Increasingly, the architects and hospital planners are being asked to supply more and more information to clients and regulators to make better decisions. It seems incongruous that the Guidelines should seek to be simple tools, supposedly used by the inexperienced or layman-user while the planning process gets more and more complex. In the AIA-CAH review of the Canadian Federal Programming Guidelines, they discovered that even though the format had been deliberately simplified (using boxes for numbered entries alongside multipliers which easily give summary totals), considerable experience with hospital statistics and planning was still needed.

It would seem that in answer to this problem we need to recognize there is a complex "scientific" aspect as well as a "social" purpose to the Guidelines and Standards. The scientific aspect relates to the methods used for measuring space and the analysis of systems implications of flow processes. This is complex data

which requires trained people to deal with it so there is no harm in reducing the complexity, by shorthand methods, as long as it is realized that only in the hands of experienced users can the implications of this simplification of complex material be safely used.

It is not with the scientific aspects of Guidelines that simplification can be successfully achieved. It is only the humanist aspect of the Guideline dealing with the concerns and desires of people in spaces that can be simplified. This data must be carefully compiled by experts but presented in a format for lay persons to use. To some degree, it is obvious that the precise "number" related aspects of Guidelines can be built into the more simplistic format that deals with the "social-spatial" requirements of the Guidelines but it is not possible the other way around. Regardless of which format is used, the existence of this bi-level separation must be recognized. Needed within the Guideline is a first level of Social Systems upon which is built a second level of Scientific Systems.

Here, we find the answer to the problem of rigidity in present Design Standards. The Standards are not multi-dimensional, since they are only concerned with the precise outcomes of events and can not respond to changing

social concerns as this aspect is not represented. Although the many Guidelines used by Planners may not always describe an event-outcome relationship, they are frequently changed, because the users of Guidelines are firstly responding to the social and program changes, then secondly, to the scientific implications. Standards must also recognize the social basis, which has an effect upon spaces, so that when a change in one aspect is accepted then there can be a change in the other aspects. The process of communication between Planners and Regulator should include this fundamental planning aspect; presently unattainable.

1.4 Toward a New Standard

We have seen that in order for Design Standards to be effective they must resemble responsive multi-dimensional Design Guidelines which Planners typically use. This will ensure that the continuity needed in the processes of planning and regulating health facilities construction will occur. If Standards are the same as responsive Guidelines they will be flexible because they will respond readily to the new approaches being introduced by the

Planners who are constantly dealing with demands from the facility users.

It is very evident that the present Design Standards do not do this and there is grave doubt that merely to take the existing Design Guidelines and form them into Standards will assist. What is required is a new form of Design Guideline that can be used as a Standard.

The new Standard must be able to deal with the scientific complexities of sophisticated data in either "distilled" form, for getting quicker results, or as detailed predictive analyses. This Standard must be usable by Regulators to check data presented by hospitals and by the hospitals' consultants who will then be aware of the boundaries to the subjects under discussion.

The Standard must deal with design itself, because, although not fully recognized in Design Standards, this is the fundamental building block of the process. For this to occur, the Design Guidelines must express the simplest elements of the subconscious feelings of people who use built spaces. In the same fundamental way that the Social Sciences are built upon the thought objects constructed by the "common sense" thinking of people, living their daily lives within their social world, so must the foundations

of the Design be based upon these objects. The constructs of the Social Sciences are typically of a second level, that is, constructs of the constructs made by the actors on the social scene, whose behaviour the social scientist has to observe and explain in accordance with the procedural rules of his science. If we use such a method to build our Guidelines, then we may seek to discover the ways in which people "operate" their world and to discover from them from which elements of the built environment people receive their frustrations or joy. In this way, we can start to produce a new Guideline that includes such attitudes to people and building.

Before we begin to look for some better Guidelines, let us return for a moment to a requirement that the Standards should be responsive to the needs of all participants in the Planning process. As such, we have seen that Standards can provide boundaries required by Regulators, they can be made responsive to hospital needs through being multi-dimensional, but what can they do for architecture and the changes in the buildings that result? There has been a fundamental change in the attitudes of the public and the professionals involved which must be acknowledged.

1.5 A Change in the Role of Architecture

In the Vancouver Sun on Thursday, May 7, 1981, an article by Eunice Raines appeared on Page Five under the heading "A Thing of Beauty ... is dismayingly rare in modern architecture. Why should Vancouver suffer from the grey slickness?" Beginning with a quote from John Ruskin:

> "Architecture is the art of creating and adorning a building so that the sight of it may contribute to our mental health, power and pleasure."

the article went on to condemn architects and to express a concern shared by many people in our cities today. The author makes a point that is important:

> "Sadly, when I look round Vancouver I conclude that architects today are failing miserably in one of their prime purposes: the design of something beautiful.
>
> "There is nothing in modern architecture that contributes to my mental health, power, or pleasure. If I see one more building finished in grey concrete, I'll gag.
>
> "I am unspeakably depressed by the sight of the bare bleakness of many new houses, apartment buildings, and housing developments that are reminiscent of prison camps, or Prairie bunkhouses, or granaries, with their skimpy little metal pipes jutting out of the roof to serve as chimneys, their skinny little aluminum frames round windows and door, the gaping, outsize expanses of glass unrelieved by any leaded or wood-framed panes, or sometimes no windows at all.
>
> "Where are the charming delights of yesterday's architecture: the many-paned casement windows, the warmth of red brick chimneys, the french doors opening to flowered and latticed terraces, the dormers,

the window seats where, when life was too much with you, you could curl up with a book and be lost for hours in hopes and dreams?"

We are becoming constantly aware, particularly since the early 1970's, that for some time we have been designing environments which do not create a sense of well being for the people, who use, view, interact or live with them. Thomas Blair in The International Urban Crisis notes that:

> "Urban man is the litmus paper of this great age of transition...The continuous assault on his senses play havoc with the mind and emotions...As a result, the price of living in the city is a constant state of anxiety bordering on panic. There is a crisis of human identity in cities, and the illness lies somewhere down in the urbanized society itself, inside its value conflicts, its exploitative social institutions and its alienated individuals."[19]

Blair observes a direct link between Physical and Social decisions in our society. There appears to be a breakdown of that link, and although the people who live in our modern cities are aware of the demise in which they find themselves, they are too alienated both from this environment and each other to correct the situation. The breakdown of this physical/social link is not a new phenomenum, but is the result of a 200 year process.

Perhaps this alienation exists because collectively we are subject to the philosophies of an industrial society in which the belief in the "purity" of scientific thought makes it necessary for us to separate material or matter from emotion or mind. This process began with the revival in the 17th Century of the Philosophy of the Doctrine of Materialism and has developed with the empirical sciences throughout this period until to today. What started with Descartes, Locke and others, we do not even recognize today as a philosophical concept, but simply the way we view the world. We see matter as objective to ourselves. It is viewable, testable, manipulable but always free from any "personal" or "emotional" influence. We believe that only knowledge collected through science is acceptable.

The Modern Movement in architecture is a product of this philosophy.[20] Born into an age of new materials, with creative architects and engineers who used them to build sculptural forms, the movement created monuments to technology as symbols of scientific progress. It was an approach to the improvement of the quality of human life only as it could be gained from within the bounds of technical achievements. We have come to see the fallacy of this "technical imperative" and not only to distrust technology itself but to see life quality as separate from

it. Design concepts of the Post-Modern Movement,[21] are beginning to express the concerns of slow-growth economics, responsive technology, conservation and human needs. Unfortunately, the existing methods for guiding this conceptual process rests still with the earlier philosophy.

In the development of Guidelines which do respond to "Post-Modern" concerns we must rediscover the social reality of our buildings. The structure of these new Guidelines will require that we present data describing what makes the built space "work" socially, and the scientific reality of what must be done for its achievement. We shall now turn our attention to a method which will encompass all the aspects required of "good" Design Guidelines.

1.6 The Patterns of Design Rediscovered

The idea that there exists a central set of values held by people about space and design within a society, or a culture, is not ordinarily a part of modern Design ideologies. The belief that even should they exist, it is appropriate for these common rules for ordering space to be analyzed and written down, is even more unusual. The

only development of this approach with which we are familiar is by Christopher Alexander and his colleagues at the Centre for Environmental Structure in Berkeley, California, who began this work in the late 1960's.[22]

In observing and recording this interaction of people and space, Alexander's work has all the elements required to provide responsive, socially aware Design Guidelines. He uses an empirical methodology that approaches closely the work of social scientists using Ethnographic Techniques. The same techniques are examined later in this chapter when we address the problem of finding a method for developing our own Guidelines. By examining some key beliefs of Alexander about buildings, design and people, we can see why it is appropriate to adopt Alexander's concepts in developing a new Guideline which respects the design aspects as well as the other important features we have identified.

Alexander's fundamental belief is that historically great buildings, which for thousands of years have delighted the "populace" were formed with an awareness of certain rules of design. He calls them "Patterns" in which certain spatial elements are related to each other and repeat in all good building designs. He believes that it is not the physical building elements which are

repeated in, say, Gothic Cathedrals (although some techniques for solving building problems are common) rather it is from special spatial arrangements, proportions and relationships between building elements, that people recognize as stimulating, pleasing and "good". It is this that forms the "Patterns" of the Gothic Cathedral. These Patterns are essential arrangements which keep reappearing in different buildings and because they are interlocked with building elements, they give character to the place in which they occur. These events create the "quality" of a building. This "quality" is central to each individual's personal value system, a value system which is not <u>different</u> for each individual, but <u>shared</u> by all people within a society. In the search for good design we seek those moments and situations in buildings when we feel most "alive". We unconsciously generate buildings and towns from such patterns, and when we examine the process, we discover:

> "...each building and each town is ultimately made out of these patterns in the space, and out of nothing else: they are the atoms and the molecules from which a building or a town is made."[23]

According to Alexander the designers and builders of modern buildings have alienated the people at large from

the building processes and have lost the languages which were shared in earlier times. He points out that due to fifty years of the modern movements neo-positivism, people are so divergent and intellectually unconnected that discourse is impossible. We are all alienated from each other's emotive core. Alexander is concerned that all peoples, planners and users of buildings or towns, rediscover the languages which he believes we share but no longer articulate. He is also concerned that we continue to evolve and use these languages so buildings can have qualities which:

> "cannot be made, but are generated, indirectly, by the ordinary actions of the people, just as a flower cannot be made, but only generated from the seed."[24]

The act of building is not the exclusive egocentric domain of the building specialist but rather an appropriate involvement for all who "live" in a societies' boundaries.

In the same way that Alexander has chosen to use his Patterns to focus upon essential elements of space, in order to make designers aware of their existance, we can formalize their content for Guidelines. It is because the Patterns are "capsules" of the essence of socially responsive space that they can be used as Guidelines. We

shall explore the structure and philosophy of these Patterns.

In their broadest sense, Alexander's Patterns are a description of relationships between the spatial elements which make up a building and even though they do not describe what the building elements are, they do describe laws or Patterns which connect both kinds of elements. The Patterns can be removed from their specific building context and we are left with a fabric of relationships between spaces, structure and events. Through this relationship building elements can be assembled to produce an infinite variety of buildings which will satisfy the essential relationship between the events which will take place in the building.

> "This is not only true of general patterns; it is true of the entire building: all its details; the shape of rooms, the character of ornaments, the kind of window panes it has... the connection of the building to the garden and the street, and to the spaces and the paths and to the detailed seats, and walls which are around it..."[25]

In seeking these Patterns we realize that there are remarkably few Patterns from which a building or a town is derived. It is the power and depth of these few Patterns which allows an infinite variety of buildings to be

assembled. Alexander likens this to the atoms of our universe. Just as the world in all its complexity is made up of some 92 elements, so the small number of these patterns which are fundamental to our world repeat themselves over and over again. Our problem concerning design stems from the fact that just as we can look at the millions of tangible things in our world and ignore the essence of their source, so we have become concerned with the outward form of buildings in our world and not the essence that gives them life.

When it comes to using the Patterns in design, they describe those aspects of the environment which must be put in place to have a well-functioning series of spaces. Like the social scientist who knows he will not get a useful answer if he asks about the rules of society from a member of that society, since the individual's frame of reference is undetermined and unquestioned, Alexander sees little value in assessing <u>needs</u>. Asking the client does not ensure that the client knows his <u>needs</u> from his <u>wants</u> and there is no way to determine whether a statement of need is true or false; if, for example, one says a person needs water we know it is a matter of life or death. If he says he needs a museum what does it mean? To resolve this problem, so as to use an observational methodology, Alexander changes <u>need</u> into its operational alternative,

Tendency.[26] Since the Pattern is so fundamental to making spaces which satisfy social concerns, how does Alexander ensure that the needs of the people who use the space are respected?

He replaces need with a description of what it is people are trying to do. He points out if we say "People working in offices need a view", we have no way of interpreting the meaning of this need or whether it is even a fact. If we make the statement operational and say "People working in offices try to get a view from their offices", we have a statement of fact which can be tested. This statement of Tendency is an hypothesis which can be tested by empirical observation to rule out alternative hypothesis, such as; are they trying to get more light?; more ventilation or more sunshine?; and not a view? This hypothesis, once stated, can be evaluated over a period of time.

Since people can usually be left to function in different environments without having to modify that environment, there is not always a need for its redesign. Only when tendencies are likely to come in conflict must we act to resolve them. Alexander believes the concept of good design is not one in which needs are met but one in which no two tendencies conflict since this is observable

and real. A Pattern application starts by recognizing the tendencies of events in the environment to be in conflict. In this sense we use the Patterns to deal only with real design problems which need to be resolved. The real value to our exploration for a new Design Guideline lies in the fact that the Pattern does not require an actual building process in order to have a context. The Pattern describes a fundamental relationship between a problem which always occurs in a given condition and provides a solution which will always solve the problem. This is what a Guideline really does.

There is a simple formula which holds these aspects together and describes the scope of each Pattern. The Pattern has two parts the Pattern statement and the Problem statement.[27] The Pattern statement breaks into two further parts, an IF and a THEN. The formula which creates the pattern, reads:

> IF the conditions X occurs, THEN we should do Z (a spacial relationship which needs to be present under condition X), in order to solve the problem Y (a problem always likely to occur under condition X).

To illustrate this let us use the example of locating

the Radiology Department. One of the common aspects of location is the requirements of public access to the facility. We know that Inpatients and Outpatients have conflicting needs for access to the department. Outpatients are not familiar with the hospital yet must find the department's location easily, so this would require the location near an Outpatient entry. On the other hand, Inpatients are partially clothed on stretchers and do not want public exposure, so we would tend to locate the department close to an Inpatient access. We have a conflicting tendency requiring us to locate the facility in different places. In analysis of the problem we know that it is possible to have a less direct route for Inpatients because they are escorted and this more complex route can be made non-public. The Pattern that results is as follows:

> (IF) Where both inpatients and outpatients use a hospital department, (THEN) place the facility where it can be reached from two directions. Design the access for outpatients so that it is directly and simply achieved. Design the access for inpatients so that the route has little or no public use. This (THE PROBLEM) will allow unfamiliar outpatients an unconfusing access,

and inpatients, who are escorted by someone familiar with the route, a discrete access.

We have produced an impartial relationship. There is no need to decide on an action based upon one's subjective judgement, or one's personal values. That the conflict will be resolved by the action described is either right or wrong. It is a statement of fact. If it is wrong, there will be empirical evidence that any other designer can bring to this typical problem and the correct spatial relationship can be described. If it is right, then the relationship holds for all similar conflicts so that design solutions that are reflective of this Pattern will always produce good designs. By collecting numerous fundamental "elements" in this way these "capsules" or Patterns (viz., the link between the condition, the problem and the solution) stand alone as guides for any required design activity. We now begin to see how the Patterns form a series of universal Design Guidelines. When collected together for a specific building, or planning project, they will if the solution is followed, allow a design to evolve which will be <u>unique</u> to the project yet have no "conflicting tendencies" between people and spaces, <u>typical</u> of that application.

We have in each Pattern the essential element of the Design Guidelines we are seeking. They are based upon observation (empirical methodology) of how people operate, relate to and generally derive the best response from their built environment. This we can consider to be the First Level; the socially responsive design aspects. The Second Level, the scientific requirements, which is the basis for regulatable Standards, comes from further aspects of the Pattern.

Each Pattern forms a single statement of fact, a hypothesis that can be tested, checked, discussed and applied without affecting the validity of any other Pattern. This means Patterns can be applied selectively by Regultors where the agencies see fit. They can at the same time be constantly reviewed by the Planners (further tested) for any flaws that might be noticed in the basic relationships within the Pattern, then by clearly and factually presenting these flaws to Regulating Agencies, revisions can be made. Where Regulators have accepted Pattern Guidelines into their Standards they will have accepted its factual hypothesis. Where evidence is brought to show Regulators that this hypothesis is wrong and a new hypothesis should be substituted, neither party should feel threatened by subjective interpretations, since the issues can be kept at a purely 'scientific'

level, therefore change will be easily achieved.

Believing the Pattern Language approach to be ideal for application in Design Guidelines, we use this final section to examine Alexander's specific formats before we begin to develop a method for creating our own Patterns. In his second volume A Pattern Language[28] from a series of three books on this new attitude to architecture, Alexander presents some 253 Patterns. Each is presented in the same format while ranging from those relating to a region through those concerned with construction details.

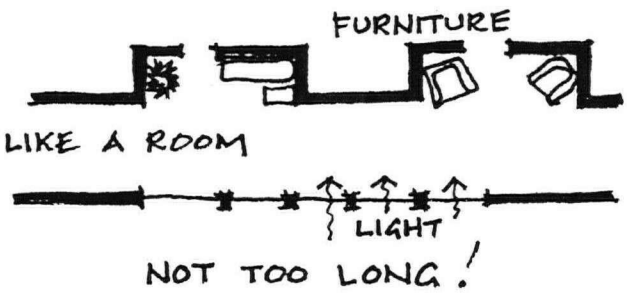
Usually, each Pattern has a picture which shows an archetypal example to capture the idea of the Pattern (see the example Diagram 1.1 over). There follows an introductory paragraph which provides the context of the Pattern and which in certain cases, explains how it will help to complete certain other Patterns. Next, is a short problem statement which gives a summary of the problem being presented. The longest part of the Pattern follows and this is the detailed description of the problem, the emperical data and other evidence for supporting the validity of the relationships within the Pattern. There follows a succinct statement of the solution to the problem, and this is the core of the Pattern. The solution is always given as a positive instruction as to what

DIAGRAM 1.1

Short Passages

"...LONG, STERILE CORRIDORS SET THE SCENE FOR EVERYTHING BAD ABOUT MODERN ARCHITECTURE."

NOT THIS!



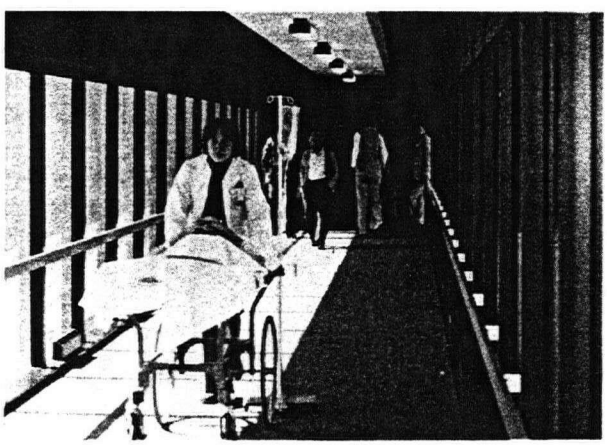
NOT TOO LONG!

THEREFORE: MAKE EACH STRETCH OF CORRIDOR LESS THAN 50 FEET; IN EFFECT, THIS MEANS NO MORE THAN 5 OR 6 UNITS OPENING OFF THE SIDE OF ANY SINGLE STRETCH OF CORRIDOR. BREAK LONGER CORRIDORS INTO LESS-THAN-50-FOOT UNITS BY JOGGING THEM, OPENING ONE SIDE TO A COURT, WIDENING THEM INTO LOBBIES, ETC.

In fact, the ugly long repetitive corridors of the machine age have so far infected the word "corridor" that it is hard to imagine that a corridor could ever be a place of beauty, a moment in your passage from room to room, which means as much as all the moments you spend in the rooms themselves.

Where a number of rooms are to share a circulation path, it is common practice to string them along a straight corridor. However, the intuition persists that, from a human point of view, long corridors with many rooms off them are dysfunctional: People dislike them; they represent bureaucracy and monotony.

Let us try to make this intuition more specific. What evidence is there that long corridors contribute to human uneasiness?



THIS!

is required to solve the problem. Finally, there is a diagram which is used to capture the generic spatial form of the Pattern. We find, in analysis of the Patterns, that they are very clear and that a great deal of effort has gone into not only the detail, but in reducing the wording in them to an absolute minimum.

1.7 The Format of the Pattern Language

Let us now look at the development process of the language which is in essence a collection of Patterns. It is clear that each Pattern does not exist as an isolated entity.

> "Each Pattern can exist in the world, only to the extent that it is supported by other Patterns: the larger Patterns in which it is embedded, the Patterns of the same size that surround it, and the smaller Patterns which are embedded in it."[29]

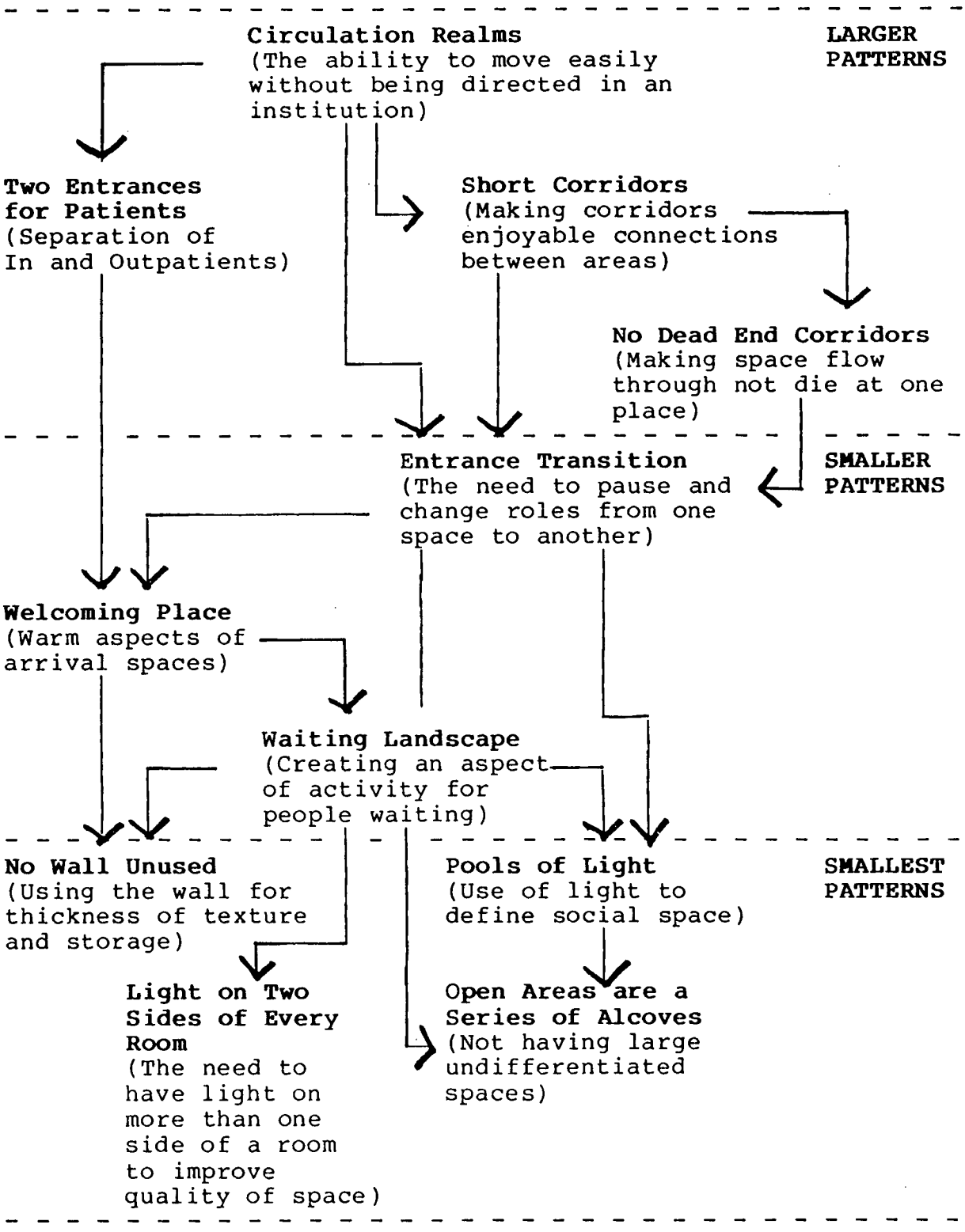
Alexander uses the term "size" as a measure in a hierarchy of which Patterns dealing with Macro (regional) issues are larger than Patterns dealing with details (ornament, window panes, etc.) or smaller issues. The process starts with a collection of fundamental Patterns and connects them with other Patterns, continuing until one feels each Pattern is "complete" in the network of

Patterns. If there are "incomplete" Patterns (Patterns that need to be linked to others to form a more meaningful statement) then new Patterns may need to be created to make existing ones "whole".

The linkage of Patterns creates the framework of the design. In the following example (see Diagram 1.2), we have some synoptic descriptions of some Patterns that are linked for the purposes of describing aspects which must be considered in designing any "Public Spaces" within a hospital department. In this Design Language, there are obviously no technical details, such as how many rooms are to be provided, or how these rooms must be inter-related for planning a specific department. This is not the purpose of the Design Guideline since the special needs for the particular project will be described in its Functional Program. Such things as the number of rooms and how they function, is project-specific and not universal (as in a Guideline). It should be remembered that where technical details such as corridor widths, ceiling heights, window heights, or bench heights are fundamental aspects of a spatial relationship, the Pattern will state what is required.

DIAGRAM 1.2

A PATTERN LANGUAGE FOR PUBLIC SPACES



When looking at our example, we note that the Patterns are presented in "size" starting with Larger Patterns relating to contexts outside the department itself (issues that link to the outside) e.g., Circulation Realms is concerned with linkages between spaces so this relates to Short Corridors, which describes the actual corridor itself as does Two Entrances for Patients which describes where corridors should begin and end. Two Entrances for Patients relates to Welcoming Place, which is a Smaller Pattern since its problem area is within the department. Welcoming Place describes what must be planned at the reception point to welcome the public and therefore is in a continuum with the Larger issues which leads to it. We note another Smaller Pattern, Entrance Transition which describes the need for a distinctive entry space where people can change from an outside person's role to an inside person's role (or in this case to a "Patient") and is linked thereby forming a logical conclusion to Short Corridors while Welcoming Place forms only one aspect of arrival.

We can see from these and other linkages the way in which the Language completes the concepts within individual Patterns.

1.8 Toward a New Method

We have explored the problems of and the distinctions between Standards and Guidelines. We have established their historical use and their failure to respond to the prevailing social attitudes or to meet the present needs for Consistency and Flexibility of use. As an alternative, we have described a socially-responsive approach, the Pattern Language concept, which satisfies the essential elements of a good Design Guideline and therefore can become an acceptable Design Standard. What remains is for us to develop a method for quickly and easily creating or rebuilding Patterns so that they can be readily accepted into the Planning Process. Only then can we be sure change will actually occur resulting in the acceptance of Design Standards, as an important part of the Health Facilities Planning Process.

To have a meaningful methodology for establishing Design Guidlines or Standards, this method must discover those same fundamental aspects of space and events which are basic to Alexander's Patterns. It must find its basis, not in techniques of the natural sciences, but in those of the social sciencies, so that those societal values we all share can be recognized and established within the Guidelines.

Social Scientists have always had to deal with the problems of scientific methodology. This we recognized earlier as a problem in our methodology for developing Design Guidelines. The Natural Sciences are able to abstract from personal or cultural objects, the objects which they wish to observe. Social Sciences, and in fact all theoretical sciences of human affairs; economics, sociology, cultural anthropology, etc., have had to develop particular devices foreign to the natural sciences in order to explain social realities which agree with the common-sense experiences of the social world.

While it is possible to see this need, it is the concern of some social scientists that the distinction between the methods of natural and social sciences are not clearly enough applied by many social scientists.[30] It is this same concern which we have about design and Design Guidelines. In an attempt to apply beautifully scientific, abstracted, rational methodologies to explain the process of design, we have allowed the human aspects of design to become subordinated.

Borrowing from the work of H. Garfinkel[31] in using his approach called "Ethnomethodolgy" we can develop an approach to understanding the "common-sense" or "natural facts of life" as they relate to the built environment.

We recognize that the society in which members interact is organized within a rational structure, the rules of which are known at a common-sense level. To understand the rules requires that we understand the nature of this rational structure.

Schutz,[32] points out that very little of one's knowledge of the world is from personal experience. The greater part is socially derived, taught by family, friends, teachers and teachers of teachers. In this way one is taught how to define the environment (the relative natural aspects of the world as taken for granted until further notice) and also how typical constructs have to be formed in accordance with a system of relevances which one accepts as being provided from the anonymous unified point of view of the in-group. Schutz notes that we come:

> "...to the conclusion that 'rational action' on the common-sense level is always action within an unquestioned and undetected frame of constructs of typicalities of the setting, the motives, the means and ends, the courses of action and personalities involved and taken for granted. They are, however, not merely taken for granted by the actor but also supposed as being taken for granted by the fellowman."[33]

In order to discover what people know of the rules of the society, or even the priorities that they place upon events within their society, we must lose the "knowledge" that we have in common with them. We must remove ourselves from the background of "seen but unnoticed" expectancies which members of society use for interpretation, but which if asked they could not describe. Garfinkel says:

> "For these background expectancies to come into view one must either be a stranger to the 'life as usual' character of everyday scenes, or become estranged from them."[34]

In treating the "obvious" actions of people as "strange", we are able to understand what it is that people are saying <u>about</u> the society and therefore what they believe it <u>is</u>.

If we focus on those aspects of our society which relate to people in the built environment it is possible for us to observe the actions of people operating the society within an organized arrangement of decision making, planning, choosing, commenting, discussing, criticizing, etc. If we treat these actions as "strange" or at least "unique" we can discover what it is that causes people to display their values of good or bad in respect to built spaces, and it will be possible to

identify those consistent elements, or truths, which form the "rules" of good or bad design. When we have done this analysis, we will be able to describe confidently what must occur in the design of spaces to enable all members of the society to say that it is a good building. We can thus ensure that any Guideline containing such data will improve the building we create and therefore the quality of people's lives who use them.

In the next chapter, we develop such a method in detail. Then in Chapter 3 it is tested, to establish its validity for use in creating Patterns as Guidelines, which are usable for Standards. We will see that there is a method available which simulates a conversation between two groups of people, thus enabling the details of the special features of their world to be recorded. In this way, the tenets of the social scientists' methods can be incorporated and the results of this exchange will provide the elements of a socially-founded, scientifically-validated, Pattern, whose format is that of our new Standard. We will have achieved our purpose in finding a method which can create effective Guidelines and Standards for Hospital Design.

CHAPTER 2: A METHODOLOGY FOR CREATING DESIGN GUIDELINES

2.1 An Appropriate Methodology

In order to develop Patterns for use as Guidelines, within the method used there are certain key characteristics of any Pattern which must be accommodated. We need to develop an understanding of how people use spaces and what they say about those spaces in order to recognize and comprehend the order which exists within its elements. This requires an interactive process between the group of people soliciting the data and those "members" of the living and operating "society". In this instance we need a discourse between Planning Experts who will collect, interpret and produce the Patterns, and User Experts who are the most informed "members" of the very specific "society" chosen for our subject area. We have chosen to examine Newborn Nurseries and Neonatal Intensive Care Units, because a broad range of both Medical and Non-Medical interest groups are involved. This subject also requires this expert involvement from as diverse a group of interests (expertises) as possible, plus, participation from as wide a geographic area as possible. In this way, we can ensure the involvement of a large cross section of the population thereby reducing possible biases from individual personal or locational differences.

When an interactive process is required, its most usual form is a committee. Using a committee inquiry method would allow us to select from a number of committee formats ranging from "open" structured Brain-Storming[1] to the more "closed" structured Nominal Group Technique[2]. The difficulty we would encounter with any of these methods is their requirement for assembling numbers of people in one place. This requirement would cause this project to develop into a major "Task Force" with representatives coming together from different geographic locations, to represent a variety of medical specialties. This could only occur with a large, well funded study or a considerable amount of time from volunteers prepared to agree to a satisfactory scheduling of the time that would be required. Since typically neither funding nor large amounts of time would be available, a process is required that allows communication with participants located in their own community. This suggests some form of "Delphi Technique". Also, since more than one communication between the groups would be required to complete the study, the Delphi Technique, being an interactive process, would appear to be a logical choice.

Before describing our particular application of the technique, we need an understanding of the Delphi Technique itself. The Delphi is difficult to define because in the past 20 years since its original use by Olaf Helmer and Norman Dalkey at the Rand Corporation of California,

it has evolved in many directions. Its present most characteristic use is still similar to that used by the original group (in the 1950's) who were looking to determine the most likely targets for Soviet A-bomb missiles. That particular form was to "obtain the most reliable consensus of opinion [sic] of a group of experts by a series of intensive questionnaires interspersed with controlled opinion feedbacks"[3]. In that example a series of questionnaires were sent out to experts three or four times by a monitoring group. These monitors prepared material, edited, assembled and acted to facilitate communication between the members of the group of experts, often called a Respondent Group. The objective was for each expert to give answers anonymously and to receive feedback from the other members of the group so that modification to answers occurred, from one questioning round to another, until a group consensus was reached. Usually consensus is sought in this application.

Linstone and Turoff, in the introduction to their landmark work on Delphi[4], suggest that only the broadest definition of Delphi is possible and Helmer himself states that despite the 20 years of development, there is not a completely sound theoretical basis for the technique. Because the technique is so diverse and has been widely used, rather than selecting one of the Delphis' to use as a model, we will design a special Delphi which will produce results consistent with our type of guidelines for

facilities design.

We can begin by using Linstone and Turoff's definition to ensure the design of our Delphi is representative of the broadest concepts of a Delphi. The definition is:

> "Delphi may be characterized as a method for structuring a group communication process so that the process is effective in allowing a group of individuals as a whole to deal with a complex problem."[5]

The Delphi as described could apply to any group arrangement for interaction, so we will describe the particular groups involved in our study, then structure a method for carrying out this study. As already stated, the Delphi does not have a purely theoretical basis, which would allow us precise results, so our study will concentrate on the value of the group interaction rather than the measurable value of the results. This Delphi must be seen as a "remote conversation" between the groups involved. Our method will use this "conversation" to generate some concepts of what is important in planning Newborn Nurseries, use these concepts to produce guidelines, and then check the results by a larger survey group.

In the structuring of the study we can concentrate upon two basic elements. First, it is important to clearly define the membership of each participating group and the roles each will play in the process. Secondly, we can

structure the interaction between the groups so as to control for the negative effects of any independent variables which could reasonably be foreseen. In resolving the former situation, we can draw upon the knowledge of the processes of group dynamics and in the latter situation we can draw upon published literature, particularly about Delphi processes, to guide our actions.

2.2 The Groups and Intergroup Structure

In accordance with the social science approach described in the previous chapter, our method for collecting data on the best elements of Nursery Design, is to 'know' what a person operating in that 'society' knows. We are seeking to know what are the recurring issues causing conflict in the environment and what ways people use to deal with this in planning. We need involvement of people who are exposed to both the theory and as many of the practical problems as possible, so that we may know what they know. Even when focussing on a single area of hospital planning, such as Newborn Nurseries, the extent of published material available on the subject is enormous. To illustrate, the results of asking for a Bibliographical Computer Search at the University of B.C. Biomedical Library, produced 35 articles, with only a cross reference between Newborn Nurseries and Planning. In the

Ross Laboratories book on Newborn Planning[6], in excess of 60 references are cited. While it is clear that there is, through published material on the subject, a vast amount of expertise available, it is not so clear that the numbers of people involved in the area of Nurseries is as large.

Since the population exposed to the problems of Nursery Design are subjects of this research, and this population will be confined to Medical Staff, Nursing Staff and the relatively small number of the public who use hospital nursery facilities; the probability of finding a representative sample is excellent. We can also recognize that data collected from a sample of experts involved in Nurseries from the Medical and Nursing fields are from the people not only fully aware of the relevant factors (as experts) but also those likely to be part of the limited population being observed. The choice of these people as a sample population will as a consequence increase confidence in the results of the research.

Further, it is reasonable to assume that the experts will be informed as to the operational issues and if not contributors to the literature, they will certainly be fully aware of the material available. It is also reasonable to assume that a great deal of time and cost can be saved by avoiding extensive literature reviews and

relying instead upon the experts to draw upon their background knowledge of current literature. The probability is high that any concerns described by the experts are likely to be both relevant and correct. However, we must still assume there is a need to cross reference these expert opinions.

A similar set of cross referencing circumstances is examined by Kurt Finsterbusch[7] in a paper which makes a strong case for the use of Mini-Surveys (defined as small samples sized from 15 to 20 people) in social research. In the paper he points out that the Mini-Survey is most useful in modifying the estimates of experts by the synthesis of both expert and Mini-Survey opinion. The theoretical basis of this particular process is the use of a Bayesian analysis to determine the probability of an event (the outcome of the Mini-Survey) given the fact that a specified set of prior probabilities exists which are provided by the experts. The final probability of the outcome is derived from the probability for the joint occurence of the event and the set of probabilities. This approach is useful for our problem, but cannot be followed exactly.

We know we have a great many issues related to the functioning of a unit which could be addressed. The probability is high that the key issues which are fundamental to the planning will be addressed by expert users. It is

very likely that what is produced by these experts will be exactly those issues which any population of users of all facilites would have raised. It remains then to ensure that a check of the expert opinions occurs through some form of Mini-Survey of a larger population. In the case described by Finsterbusch, if the outcome of the Mini-Survey shows a divergence from the experts, then the Bayesian Theorem will account for the modified joint probability through a mathematical combination. This mathematical basis is valuable where the numeric probability of events is used in forecasting, but not of much use in a direct sense here. We need to use this idea differently.

Required from our experts is their identification of spatial conflict, the recognition of its cause and the clarification of the solution most likely for its resolution. The null hypothesis is that an issue identified is not causing conflict, or if it is, that the wrong cause or solution has been identified and this can be checked by a larger (Mini-Survey) population. However, we would be able to modify expert findings, should there be a divergence, only by having further issues developed by the experts themselves in response to input from the Mini-Survey. The full effect of the Bayesian Mathematics is not of value; only its principle. We will check the experts' results by a Mini-Survey at the end of the study and build in a corrective round if required. Now we should develop the group interaction.

The first group we have involved are the Physicians and Nurses whom we have called Medical User Experts. We must recognize that solutions developed by involving just medical users, regardless of the cross check, would not make provision for the balancing of biases which normally occur due to possible stereotypical attitudes held within these professions. Like any decision making process, all participants can be presumed to bring with them their own points of view. This is not always a negative aspect because it may just reflect the degree of one's practical exposure to planning or differences in the priorities one associates with a specific area of one's responsibility. This can clearly be seen in the difference in attitude between Physicians, Nurses and Administrators in a hospital. People will normally come to this planning process as advocates of their partisan points of view, and so, we must accept this as a variable which will affect the results.

The design of the group structure must arrange for balance and this comes from two other groups of experts; the Consumers and Designers. Medical, Nursing and Administrative experts are the ones who have the best technical knowledge of operational function and technique. There will be differences between their perceptions of a problem and this will be addressed through each group expressing concerns which the others can comment upon, during the normal course of the Delphi events. However, we recognize

that this communication is only meaningful because each medical group shares a similar technical comprehension which they do not have in common with consumers. Consumers have concerns which tend to reflect a more common-sense, often emotional response to a situation. Many problems of the consumers may be created by policies, attitudes or priorities of the Technical users. These concerns may be shared, or at least known, by Medical users but the two groups do not necessarily have a common basis for discussion sufficient to make a productive joint effort.

It is necessary, therefore, that the basic "technical" detail be developed separately from the "emotive" material. This requires a Delphi Design in which the Technical experts produce basic material and Consumer (or non-technical) Users supplement the material with additions or reactions. To allow for this, the technical detail will be created in the Delphi-Surveys and the Consumers must be given input as a part of the checking Mini-Survey after the Delphi-Surveys.

Another expert group which is essential to Guideline Development comprises the Planning Experts whose real expertise lies in two areas. First is their skill in analysis of planning problems including a vocabulary of ways to solve them; second is their skill as synthesisers, as enablers in the process by which problems are recog-

nized, the common elements identified and acceptable solutions produced. Like the Consumers, they must be allowed to react to technical expertise and therefore must not be answering Medical Experts' questionnaires as a part of the technical questionnaire rounds. However, Designer Experts are a critical part of being able to take this particular Delphi process past just identification of problems into the area of the resolution of problems. They have technical expertise which is central to the process, rather than peripheral as with Consumers. Both Consumers and Designers are additionally critical to obtaining a balance of attitudes.

In the traditional Delphi Technique, the Monitoring Group acts as independent, objective managers of the process. Their role is to collect the material and redistribute questions between the interactive rounds. They enable the experts to produce the results but do not take part in the process. In this study, it is essential that the Delphi be designed as a communication process between the Designers and the Medical Experts. Rather than the Monitoring Group acting as objective facilitators, they would act as another group of experts (Planning Experts) using the input from the Medical (technical) Experts to develop material, then return this material to the Medical Experts for reaction and further development.

In broad outline then, we have two groups of experts interacting via a remote interactive process. Each group uses the expertise of the other to develop and modify their own point of view while bringing the issues needing to be addressed into focus. This approach is supported by Linstone who says in a discussion of the needs in our present world for heterogenistic logic when dealing with complex societial problems:

> "If the technique (Delphi) is viewed as a two-way communication system rather than a device to produce consensus it fits this evolving culture admirably."[8]

Although the roles of the Monitoring Group and the Planning Experts have now become the responsibility of one group of people, the actual functions of each group are separately maintained. This combined group must still perform very different roles at different times. To facilitate this, an internal structure of the group would be that of a simple small committee. The committee approach is acceptable in this instance because firstly, as Monitors, unstructured discussion is required in order to act as objective facilitators (neither representing Medical (Technical) expertise nor representing any specific geographic location) and secondly, as Planning Experts, they are selected for their convergent ideas rather than their divergences. They are to represent a single planner's point of view as opposed to a diverse

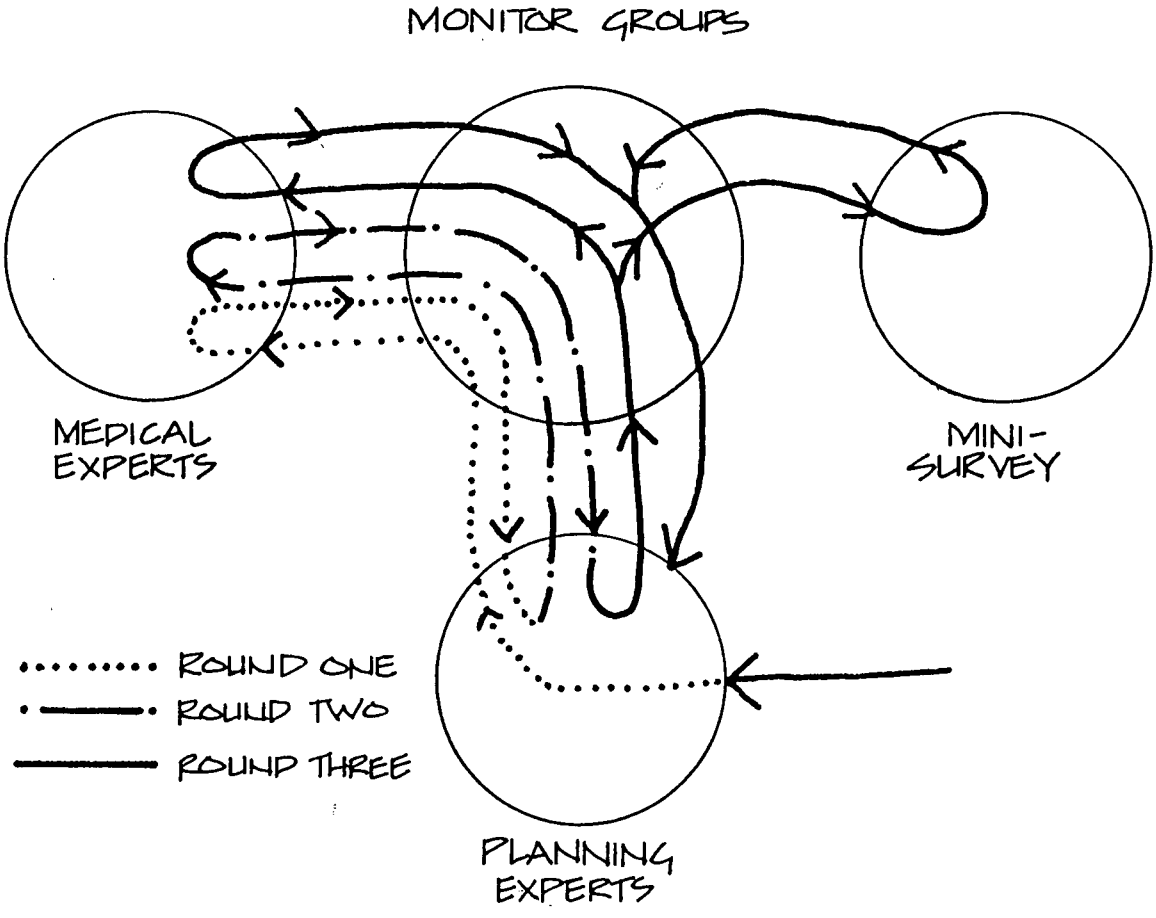
group of planners. They will interpret material from, and prepare material for, the Medical Experts and when doing this they will draw upon their knowledge of the 'world of planners' to summarize issues and articulate planning constraints or planning contexts. They can fill in details, or add details and opinions of their own. They will need to work as a cohesive group in both of these roles.

The final aspect to be examined in the design of the groups and group structures is the matter of providing for the Mini-Survey, (or larger group including consumers) to produce reactions to the work developed by the interacting experts. This survey would occur after a series of Planning Patterns had been developed. At the same time as the Technical Users would be commenting on what had been produced, the larger group would also be reacting to what had been produced. When the responses of both groups are collected, the Planning Experts can make any necessary corrections in response to the Mini Survey's identification of any biases or overlooked areas. An evaluation of the differences between the acceptability of the work of the experts, as representive of the population and the results of the wider group survey of the population, will indicate how representative the experts really are. This will enable us to assess the ability to generalize the method for other applications and will be a part of the concluding evalution in Chapter 4.

From the following Diagram 2.1 the structure for the flow of material between the Delphi groups becomes clear. It should be noted that the Monitoring Group is always the central point for receiving and distributing, of material as well as its editing. This is to ensure continuity of graphics, lettering and style.

DIAGRAM 2.1

THE INTERGROUP MODEL



2.3 Controlling the Independent Variables

Having described the roles of the four groups involved and the relationship which allows the Delphi to proceed, a number of Independent Variables must now be considered, because these could affect the results of the study. There is already provision for dealing with some variables within the structure as described and these are as follows:

i. Population Biases - these are eliminated by selecting representatives from the relevant population who can describe the Medical, Nursing and Administrative concerns. These expert participants are selected from each discipline and from as many locations as possible in British Columbia and Alberta. The Mini-Survey allows for further representation by including Consumers and Technical users who have an even greater geographical distribution.

ii. Misunderstandings or Omissions in Communication - these are reduced through the Experts interactive process, allowing all responses to be fed back to each individual thereby soliciting further comments. If the Patterns produced by the Planning Experts do not reflect the ideas as understood by the Medical Experts, the final round of the ques-

tionnaires will provide an opportunity for the experts to correct this misunderstanding.

iii. Negative Influences of Group Dynamics Upon the Communication - these influences generally are described in the literature[9] as: domination by one personality in the group while in a face to face situation; unwillingness to take a position until the direction of the majority is known (or all facts are in); the difficulty of contradicting or presenting ideas to persons perceived to be in a higher position; the unwillingness to abandon a (status) position once taken publicly; and the fear of bringing up an idea which may turn out to be idiotic and thereby causing loss of face. These will be eliminated in using the Delphi, which facilitates communication without face to face contact, particularly since responses are dealt with anonymously. The Planning Experts are working in a small-group committee structure which is not multi-disciplined, and does not attract these negative influences.

There are other independent variables which can be identified. Some will affect the questionnaires in the interactive exchanges and some will affect the inter-group structure. The first of these variables relates to the

capability for maintaining a degree of flexibility or openness of structure. If the material exchanged by the two expert groups can periodically be repriorized, the inter-change has the ability to "mature" as it continues. This would normally be a part of a face-to-face committee structure where the participants may feel the need to reorder the agenda so as to obtain the meeting's original objectives. The Delphi should provide the same opportunity.

The literature contains many references to the problem in survey research (of which the Delphi method is clearly one), of rigidity or lack of ability to change direction once a course of action has been taken. Finsterbusch[10] notes that interviewers may report difficulties, or new research concerns might arise, or a particular line of questioning may not be leading anywhere, but normally the questionnaires cannot be changed. Finsterbusch's example is a series of Mini-Surveys which break down a large population into four groups and between each survey the next questions can be responsive to the previous survey's results. The survey is then carried out in serial form which suits the dynamics of the enquiry.

It is easy to see the similarity between this Dynamic Mini-Survey approach and the steps in a Delphi enquiry. It is possible to utilize the various rounds of

the Delphi to make the process dynamic and avoid discovering too late that there are some compromises which could ruin the effectiveness of the process. To make certain that this flexibility occurs, the Monitoring/Planning Group will ensure, at the end of each round of questions, that material being received is consistent with the intention of the questions asked, and that the issues being identified have a planning context. If they find unsatisfactory problem resolutions, the Planning Group can intervene, as participants in the Delphi. They can make corrections when preparing their material for the next questions, or in preparing the feedback to the answers already received. Typical of the kind of thing that might occur is when all the Patterns are finally prepared it will be discovered further development is needed by the experts prior to the Patterns being finalized, or a new aspect arises after the Technical Experts have seen the Patterns. In either case, it is possible to add more rounds. These possibilities Turoff[11] warns could occur when:

> "a respondent feels the shock resulting from a realization that the other side also feels it has some valid points to be made. Therefore, it is only at the third round that this type of respondent begins to put a great deal of careful effort into the points he is making...".

so that more questioning rounds will be needed to have a resolution.

With this particular Delphi, another aspect needed is a flexible structure, to ensure that there is capability for dealing with Policy issues since it is quite clear we are dealing with Policy when we make Design Standards. A group developing Design Guidelines for Cardiac Care Units had the following comments:

> "Unit planners are faced with the responsibility of defining hierarchy of goals, supportive of, and consistent with long-range hospital goals and overall community health care needs. Their policies for unit operation must in turn be consistent with the objectives of the unit. Policies become tangible only through specific operations of the unit, involving a coordinated set of activities and sub-activities. The designer's responsibility is to develop a clear understanding of each level in this hierarchy in order to perceive clearly the operational order which ultimately will find expression in the physical design."[12]

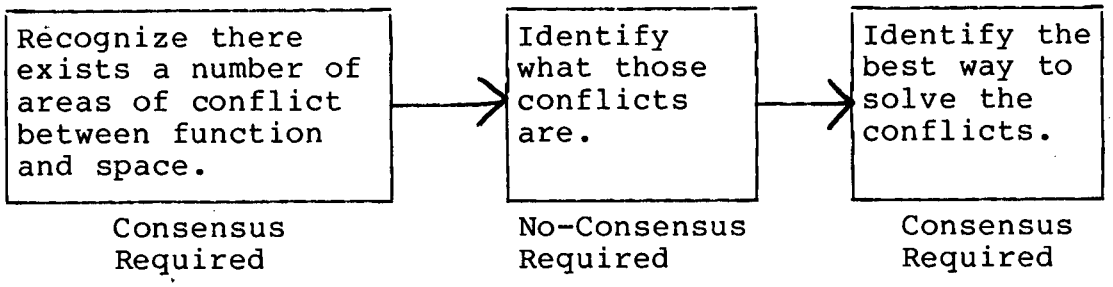
Since we are dealing with policy let us look briefly at what a Policy Delphi entails so that we can ensure our design has the necessary attributes. While the traditional Delphi tends to deal with technical topics and seeks a consensus among homogeneous groups of experts, the Policy Delphi seeks to generate with a heterogeneous group the strongest opposing views on a topic with a view to resolving them. Turoff[13] supports the case that in policy issues there are no experts, instead all views are those of informed advocates. An expert can contribute an opinion as to the outcome of a policy, but a policy maker is not interested in having an expert group make his dec-

ision for him. He requires them to develop all the options and supporting evidence to allow him to make his own decision.

It can be seen therefore, that our approach to date with a broad group of diverse experts, is consistent with a Policy Delphi. We are seeking Planning Guides which will help to minimize negative planning decisions and optimize good policies in planning. The objective in the Policy Delphi is not to arrive at consensus among the groups involved, but to explore the issues. In our case, we are looking to ensure all possible options have been presented; this does not require consensus. However, in order to produce more than a simple identification of problems, the Patterns produced must describe the resulting impact (or dysfunction) from unresolved problems. The Patterns must go on to suggest the most likely way to resolve this conflict which does require consensus. What we have is a process which requires elements of the study to operate in both consensus and no-consensus modes. We do not have a pure Policy Delphi and must develop a new approach. The diagram below shows the modes in which we must operate.

DIAGRAM 2.2

MODE ACTIVITIES



Achieving flexibility requires a Delphi Design capable of moving from one mode to another and potentially from one whole direction to another if there are indications that the degree of consensus required is not being achieved. This can be done in two ways. First, the general format of the questionnaire (the content of the questions themselves) can be designed to allow answers to be either in consensus or no-consensus. Secondly, the Planning Experts at the end of each round of questioning, can analyze the results and make corrections by either providing additional questions (indicating in the feedback where consensus has occurred) or by any other method they choose, to ensure that the appropriate mode has occurred. This questioning and "scanning" between rounds will ensure flexibility.

Another independent variable which must be addressed is the impact of any intervention by the Monitoring/ Planning Group. In a traditional Delphi, should there be any biases by one or other of the groups who are actually

shaping the questionnaires (Medical Users/Planning Users), it would be detected by the Monitoring Group and the action required would be to point this out and pass on the biased material to solicit further comment. In this design we have chosen to allow one of the groups to affect and if necessary, modify the material. They are no longer independent or disinterested and therefore a potential bias exists. Biases could be expected in two areas; both are an aspect of the Planners' "perspective".

The first bias is one where the Planners may inadvertently direct the process into too narrow a set of issues, because they mistakenly believe these to be more relevant to planning than others. In this instance, a whole series of Patterns might not be produced that should have been, or vice versa, yet since this occurs prior to the last evaluative round in which both Mini-Survey and Expert Groups are given the opportunity to suggest Patterns that could be added or deducted, the impact from this bias will be minimized. In fact, if a great many areas were identified as missed, the Monitoring Group could insist that another evaluative round be prepared.

The second bias is the possibility that the Patterns produced may be accepted by the Medical Experts and yet be incorrect because the Medical Experts could not evaluate the planning implications. In this case, the negative effect would be ultimately taken care of through

the structure of the Pattern itself. Although no other Planners are involved in this evaluation process, since each Pattern is always presented as an hypothesis, intended to be tested and continuously evaluated, it will certainly be evaluated by other Planners in future practical application.

A final independent variable comes from the possibility that in the general progress of the project, too much attention might be paid to long-range futuristic issues or conversely that too much concern might occur with incremental changes, instead of putting the issues into a broader perspective. In order to develop a variety of perspectives within the Delphi Design, it is necessary to structure the questions so that they address issues at various levels of a "hierarchy". Some will be "Macro" or large scale issues, some will be "Micro" or detailed issues.

In selecting an appropriate model for question building we chose to follow neither the "Rationalistic" planning approach (in which ends and means to achieve them are clearly defined so that the best policy is the one which has the most value to the outcome) nor the "Incrementalist"[14] planning approach (which allows the making of successive choices between policies based upon the relative value of the policy itself rather than the objectives to be achieved). We believe that a more appropriate

model is one which allows the opportunity to identify the major issues, and within this context the detailed relevant factors. This must be done without the risk of either missing issues or dealing at length with some which turn out to be unimportant. The "Mixed-Scanning" approach is an appropriate model.

This model has been developed as the "third" approach to decision-making by Amitai Etzioni.[15] It has elements of Rational Planning by using an overview which attempts to "scan" for all the major issues likely to occur but ignores the detailed evaluation of each one. Once this "scan" identifies issues, the Incrementalist policy decision-making occurs, but the policies are limited to the context of the overview. This Etzioni believes helps to reduce the shortcomings of both alternative systems. He states:

> "...incrementalism reduces the unrealistic aspects of rationalism by limiting the details required in fundamental decisions, and contextuating [sic] rationalism helps to overcome the conservative slant of incrementalism by exploring longer-run alternatives."[16]

The actual questionnaire design will follow this mixed-scanning approach by using the following formulation:

i. Prior to formulating the first set of questions the Planning Experts will review the current plan-

ning literature for issues or context and draw upon the issues which have been raised by clients in planning previous facilities. From this Rationalistic approach, a set of subject topics will be identified and the questionnaires developed around them.

ii. The questions asked of the Technical Expert Group will require them to develop two kinds of answers; the first are open, long-run, or futuristic in nature since the objective is to consider, within the general context set by the Planners, important directions which will have broad impact or will affect changes in current trends. This is a "scan" by the Technical Experts of major issues in the Rationalistic planning style.

iii. The second kind of question will provide policy options and then ask the Medical Experts to make comments and choices which will allow exploration of the various experts' relative values in setting policy. This is the Incrementalist approach to developing policy options. An unfortunate outcome could be that very little demonstration is given of their values so therefore, in this instance, the chosen policy can simply be accepted without a knowledge of why it was chosen.

iv. In the second round of questions, the Planning Experts would take a "Rationalist-Scan" of the results from the first round, to look for any new directions, any issues that might be worth exploring in depth, or to find trouble spots which need further policy choices. It is also in this round that the results of the policy choices from the first round are fed back to all participants and everyone is given a chance to assess ("rate") the value of the choices made by others. In other words, the second-round evaluation is a policy-choice process, in the Incrementalist vein, by which all participants express their personal values in choosing between each other's policy choices.

v. In the third and final round, the planning experts must develop the Planning Patterns which serve as the Design Guidelines. These are in themselves policy documents which when circulated for comment, will allow further decisions to be made as to their acceptability. The choice here constitutes a decision to accept, reject or modify the policy offered (within the Design Patterns), and as in the earlier stage, is Incrementalist in style. At the same time, a final "scan" is being conducted by the use of the Mini-Survey evaluation in going to the broader population. If this "scan" reveals any

further trouble spots, the planning experts can choose to continue, through additional rounds, to explore further policies and ultimately achieve resulution.

2.4 Summary Remarks

Our Delphi Design is essentially an "open" conversation between two groups of experts. One group (the Planning Experts) learning and interpreting what the other group (Medical Experts) describes as significant for use in planning about the world in which they operate. The detailed elements of the Delphi Design, including the structuring of the exchange, the format of the questions, and the specific representation within the groups, have all been carefully considered to ensure maximum flexibility (structure openness) without causing negative influences on the product. This open exchange can happening without requiring people to travel from their various locations so as to proceed with minimal cost and time. If this Delphi process can be carried out according to the objectives outlined here, it will prove to be an excellent tool for developing new and more responsive Design Guidelines in hospitals.

In the next chapter we describe in detail the process and results of carrying out this Delphi.

CHAPTER 3: CARRYING OUT THE DELPHI

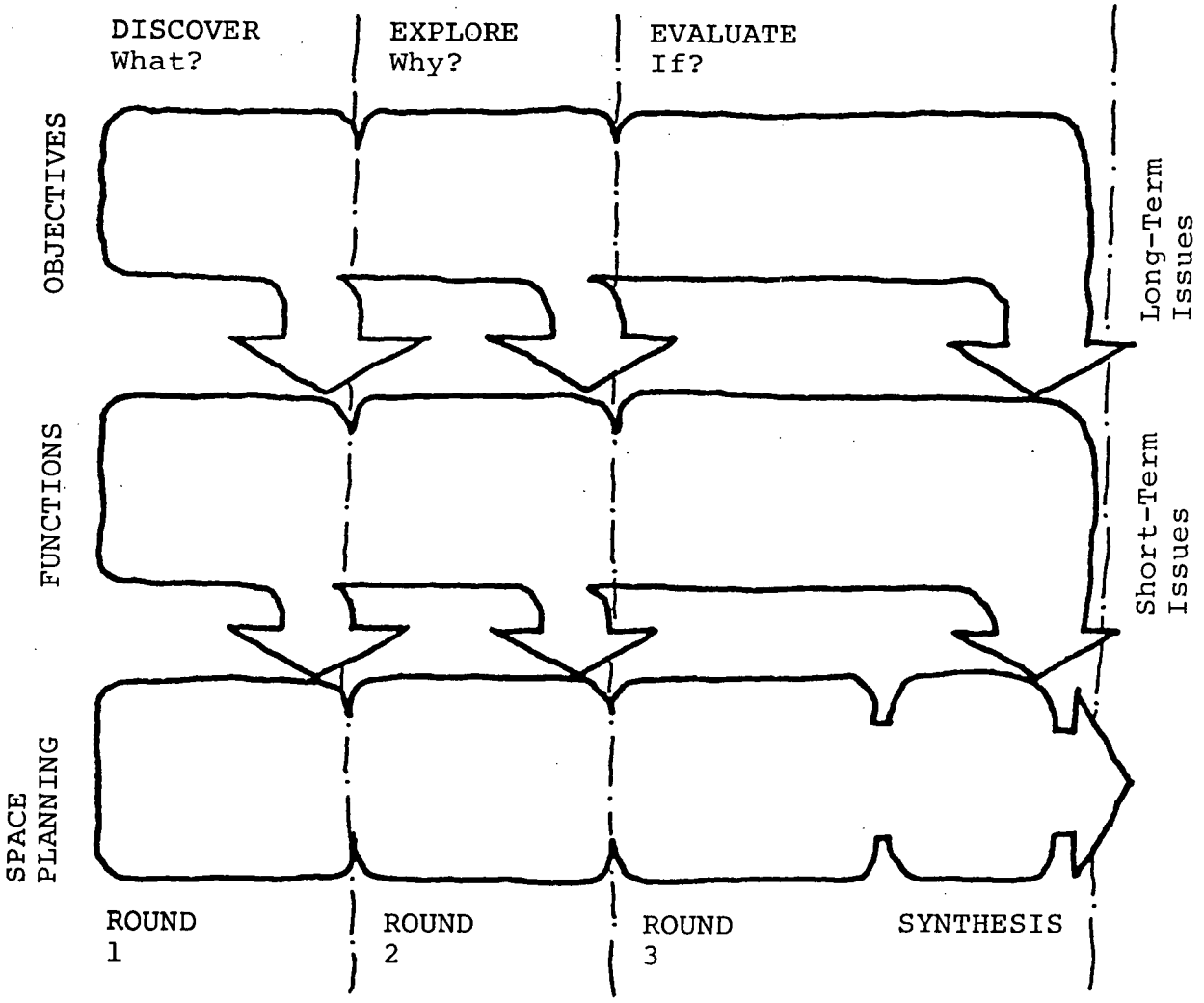
3.1 Round 1: The Questionnaire Preparation

Before developing the first round of the Delphi Study it was required that the Planners prepare material to guide the general direction of the whole study. This guide was achieved in two ways; first, by developing a diagram of the conceptual framework for the whole study; secondly, by examining relevant literature to develop a list of topics which could be used as a subject reference. The purpose of the study diagram was to describe visually the first round in context of the other rounds. The purpose of the literature survey was to inform the Planners so as to ensure that by developing issues familiar to them the Medical Experts would be able to focus their efforts upon subjects related to planning and not administrative or other issues which they might feel were important to them.

The diagram was also required to describe the essential flow of information that was needed through to completion of the project. Although it is a very simplistic diagram (see illustration 3.1), it illustrates the constraints which would be imposed upon the actions of the participants; thus this diagram represents the limits to the project, as well as its important building steps.

DIAGRAM 3.1

DELPHI INFORMATION AND ORGANIZATION MODEL



The first aspect which can be recognized on the diagram is the Matrix showing Levels of Concern (issues) and the Activities to be carried out in each round. Beginning with levels of concern, the diagram makes it clear that we intended three different strata of concerns to be explored. The first of these strata is Long Term Issues, or, those matters which may have implications extending over a period of time. These are referred to as Objectives and are the top item in the diagram. Next strata is the Short Term Issues which relate to problems associated with current practices; these are called Functions. Finally the third strata are Space Planning Issues which deal with items of the built environment; these are called Space Planning. These three levels are 'rows' in the diagram and it can be recognized that the ideas developed during each round (the columns which are shown numbered at the bottom), are always kept within the context of the specific level of concern. These strata (e.g., Long Term Issues), become discontinuous during Round 3 when all the ideas are synthesized into Patterns. In addition, we need to recognize that each row is not isolated and that there is a downward flow of information (shown as arrows within each round). This helps to build detail, starting with the "Macro" level of Objectives and finishing with the "Micro" level of Planning Concerns. In this way, each "questioning round" will develop a building block for the next round.

The next aspect is to examine the questioning rounds, or the Activities which form the columns on the diagram. There are three of these, each corresponding to a questionnaire and each concerned with developing a certain stage in the progressing of information. The first is shown as Discover; the theme is What? What are the issues that must be discussed? The second is Explore, the theme is Why; Why are these issues important? The final topic is shown as Evaluate; the theme is If; If these are real problems and their causes, are these the solutions? The final round, as indicated by the diagram, brings all horizontal "rows" and vertical "columns" together into the final round, in fact into the Patterns themselves.

To be more specific, the first round was to solicit a general understanding of what were the Objectives, the present functions and space planning issues. The second round would explore the issues presented by the respondents during the first round. This would be done through commenting on each others' ideas and then having respondents develop in more depth, some selected specific issues. The final round would summarize the most important issues from Round 2, then from this the draft Patterns (Guidelines) will be created and distributed for evaluation. The comments received from Round 3 would be used to amplify, modify or exemplify the Patterns themselves.

Although there was now a visual simplification of the overall methodology, to help the experts develop a feel for the importance of context, it would still be necessary to set some limits on the scope of the questions themselves. This question structure was developed in an open forum discussion by the Planning Experts. The group analyzed a spectrum of possible topic areas. These concerns drawn from the Planner's personal experience, from their knowledge of recent literature, especially where there were known planning conflicts. This discussion produced a short list of key Categories:

(i) Parents and Babies
(ii) Staff and Babies
(iii) Equipment and Supplies

From this short Category list, Major Issues were developed:

(i) Category: Parents and Babies

Issues: Access by parents
Education of parents
Care by parents
The whole family concept

(ii) Category: Staff and Babies

Issues: Infection
Patient Mix
Care of Babies
Patterns of Staffing
Staff Education
Stress
Administrative routines

(iii) Category: Equipment and Supplies

Issues: Supply methods
Access to other facilities
Space needs for access to equipment
Environmental issues
Mechanical service supplies
Washing and cleaning

A great many other issues were discussed, for example, concern with which types of incubators might be used, but this issue was then rejected as being beyond the specific task of relating to space or planning needs. The criterion used in deciding to reject was: Does the type of incubator affect the planning of nursery spaces? In this case the answer was no, because provision must be made for all types

of incubators. It could be assumed that incubator variations would already be described as a sub-issue of perhaps, height of service outlets or as an aspect of air-conditioned spaces. In this way only "whole" issues which might be presumed to include sub-issues, would be addressed.

Once the context of Round 1 questions was identified and the issues to be covered in this round were established, the style and content of the questions themselves were formulated. In deciding how much "structuring" would be involved, two factors were considered:

1. How much time was needed to answer the question; bearing in mind that a large range of issues had to be touched upon?

2. How clear would be the respondents' understanding of the way in which the questions should be answered when some guidance was not given in the question?

To resolve the problem the Monitor Group decided that when it came to most Space Planning questions, a good answer would be too dependent upon the respondents'

planning experience to risk open questions. The Space Planning would therefore require the most structured questions. The subjects that dealt with Objectives and Functions would relate directly to the medical world and could therefore be of a more open style.

The questions were then sorted so that Category and Issues would relate to the appropriate degree of structure required in the questions and would match the appropriate Level of Concern from the original matrix. The question format is shown in Table 3.0 as follows:

TABLE 3.0

ROUND ONE QUESTIONNAIRE STRUCTURE

Level of Concern	Category	Issue	Question Type
OBJECTIVES	any ideas suggested by respondent	any ideas suggested by respondent	Completely open
FUNCTIONAL	Parents	. Access . Education . Family	Semi-open (Answer to a specific issue topic, any ideas.)
	Staff	. Infection . Patient Mix . Care Issues . Patterns of Care . Education . Stress . Administration	
	Equipment	. Supply Methods . Cleaning	
PLANNING	Staff	. Infection . Patterns of Care . Administrative Routines	Closed (Most questions to involve selection from given options.)
	Equipment	. Access to . Space for . Environment . Mechanical Services	

Within each level of concern (the rows) the questions were designed to solicit different kinds of information. In the first row, Objectives, the questions were designed to examine from a longer-range perspective, any idea that might later affect current patterns of care. This concern was related to whether issues considered important today would still be important in the future. It is important that the design process anticipate those future changes which can be predicted, as well as those which cannot, since there must be allowance for both within the spaces planned.

To allow some context to be maintained and yet still leave answers open to receive any ideas that might be useful, the first section of the questionnaire was broken into two parts. First, we asked for a definition of Nurseries. This question would cause the respondent to think of boundaries that would naturally fall around the subject. It would then allow respondents to focus their concept of a nursery onto the second part. The second part asked what would happen, within this definition area, over the next 10 years. Ten years was chosen as being a time period in which real events could be anticipated rather than speculative fictitious events. Ten years, after all, is only two five year fiscal budget periods for most Provincial cash flows, to which most hospitals doing planning must relate their activities and demands.

The use of the two part question format also allowed the Monitor Group to cross reference the ideas given in part 2 of the question to the specific aspects of part 1 so that any anomalies occurring in later rounds could be re-examined. In all stages of the project the questions for Newborn Nurseries and for Intensive Care Nurseries were separated in order to allow respondents the opportunity to answer concering only one subject, if they had no exposure to the other subject, without invalidating the questionnaire.

The second level of concern; Functional Aspects, essentially required open answers, in which respondents wrote down what they felt appropriate, but in this instance they were given some limits to the subject area upon which they could reply. Important was the fact that answers provide policy criteria, rather than operational criteria. The answer required would be a statement of an objective and the purpose of the action required to deal achieve it. We did not need an answer which said e.g. "Given that infection control is needed here staff must wash." Our concern was with the earlier issue; what areas require infection control and why. It is a difficult task to communicate what a policy is to lay people, especially when an exact definition is not always clear even to policy planners. We decided to resolve this by giving examples of what policy meant in each context, usually in the preamble

to the question.

In addition to restricting the answers, in order to receive policy criteria, we set a limit of five aspects to be addressed and left a space of one third of a page in which to answer. Even though it was stated that we encouraged further pages, it was felt that subconsciously respondents would try to be brief and also would not feel overwhelmed by the amount of work which they must do in answering. There were ten topics in each nursery section and this was felt to be sufficient to solicit most ideas without causing excessive work.

The final section; Architectural Planning Aspects, (referred to as Space Planning in the diagram) was developed around a series of selected situations that the Planning Experts felt would encompass the major problems encountered in nursery planning. The question format was designed to solicit opinions and comments in response to statements made in the question. In some instances, the question required the selection of a preferred option from a given range. In this last section, other than providing the opportunity to comment, the questions were of a closed style. In some instances where a question asked, agree? or disagree?, the question would ask for an explanation if

"disagree" was ticked; however, none was absolutely necessary. The questions on Criteria for Illumination and Telephone Systems (see questions 3.4.3 and 3.4.4 of Round I Questionnaire in Appendix A.) were left open, because the context was so specific that the Monitor Group felt no misunderstanding would result. Some unstructured ideas were needed in this section and this was felt to be a way of encouraging comments.

The development of this final section of the questionnaire required most input by the Planning Experts. The questions had to present real situations and give appropriately informed comment, particularly with respect to the situations and examples presented, so that respondents could quickly grasp what was required of them. The simplest method was to present diagrams of plans, and within the question make comments about the plans (both positive and negative) which would allow respondents to check a choice and say they agreed or disagreed. A specified range of "Degrees of Agreement" was given each choice. Where needed, the respondents could give additional comments.

The basis for this set of questions was developed by using some current, published guidelines, which would probably be used in a nursery planning process. Sizes and numbers were given (as in most guidelines) without reason

or explanation. Ranges of room temperatures, and numbers and types of electrical and plumbing fixtures were offered for selection, usually taken from commonly used Federal and Provincial standards.

In addition to the three main sections of the questionnaire, two sections of information were required of the experts, for background analysis. The first section required the respondents to identify their normal point of view by selecting from a list of categories of interest, as it applied to their perception of their own expertise. The second section was designed to get an indication of their opinion as to how confident they felt about their expertise, by selecting from a list of policy areas and rating themselves according to the probability of providing an accurate answer on this topic.

The use of this section was to check how appropriate the person was for the expertise category to which we had nominated them. This simply required the matching of the expertise he/she was purported to have, with the expertise they felt themselves to have. In addition, it would be used to check for any consistent pattern of disagreements. Should this occur, it would suggest biases influenced either by the respondents' discipline or area of expertise.

3.2 Round 1: The Response

The questionnaire was pre-tested by three nursing graduates at the University of B.C. and one practising nurse. The pre-test was to confirm that the questionnaire could be done in about three hours and that there were no misunderstandings either in the questions asked or in the scope (of what was required). The results of the pre-test showed that two approaches might be taken by respondents to the questionnaire. First, a respondent could go through the questions fairly quickly making minimum comments in the open questions and essentially checking the selection most closely representing their ideas in the more detailed final section. Secondly, a respondent could go through giving indepth answers and take a great deal of time.

The pre-test also showed that the final section had a major flaw. Some of the University nurses supposed that the request-for-comment spaces in the Architectural Section required of them an evaluation of the diagrams provided. This was over and above the question already asked. This would cause an enormous and unnecessary time increase, so a note at the beginning of the section was added to make it clear that no evaluation was required. In addition, because of their more academic orientation, the pre-testers experienced a problem with some definitions being used.

To avoid this, minor rewording and more preamble were added in this area. Much more emphasis seemed to be needed on issues of family or parent involvement hence these were included.

After the pre-test corrections were made the results were sent to the 20 experts selected for Round 1. When the results came in from the respondents the following background data was obtained:

(i) The Mode for completion time was three hours, and the Mean five hours. The Distribution was from two hours to ten hours. This was consistent with the results expected from the pre-test result.

(ii) Most of the experts classified themselves according to our anticipated categories. An exception occurred with two physician experts (who were listed as academics), who chose their medical specialty (Neonatology) over their academic specialty. One other physician who was in the Pediatric category listed himself as a Neonatology specialist. Two nurses who were listed as representing an administrative point of view, chose

obstetrics and two others who were listed as obstetrics chose administration, so their names were exchanged on the lists. Rather than make additions to the team on the basis of these minor miscalculations, the Monitoring Group felt that the sub-categories under Physicians and Nurses were not sufficiently important to warrant the delay caused by having additional people included.

The adjusted list of responding Experts was:

Physicians		
Academic	2	(leaving specialty unchanged)
Pediatrics	3	
Neonatologists	5	
Nurses		
Administration	4	
Obstetrics	6	
Total	20	

Of these, 17 responses were returned.

(iii) Two nurses changed employment positions, withdrew and did not respond. One nurse answered but, due to time commitments, withdrew from the study. One physician withdrew due to other commitments, without answering.

Since we had a most unusually high response at 85% and still had 80% of the original participants, it was decided to proceed to the next round. One exception to the decision not to add participants was the inclusion of one obstetrical nurse who had already participated in the pre-test and therefore was familiar with the study.

(iv) With respect to their confidence in dealing with different issues the respondents rated themselves as follows: (See Table 3.1)

TABLE 3.1

MEDICAL EXPERTS SELF-RATING SCORES

	Percentage of Physicians Rating their Answers by the percentage Probability of an Accurate Answer			Percentage of Nurses Rating their Answers by the percentage Probability of Accurate Answer		
ISSUE CATEGORY	>80%	>50%	<50%	>80%	>50%	<50%
A. National or Provincial Policies	80%	10%	10%	30%	30%	40%
B. Legal and Ethical Outcomes	50%	30%	20%	40%	50%	10%
C. Intra-departmental functions within a hospital	90%	10%	-	90%	10%	-
D. Inter-departmental functions within a hospital	80%	20%	-	80%	20%	-
E. Staff Organization Issues	70%	10%	20%	80%	20%	-
F. Staff Training Issues	90%	-	10%	90%	10%	-
G. Patient Family Issues	70%	30%	-	70%	10%	20%
H. Environmental Safety	90%	-	10%	70%	30%	-
J. Equipment	80%	20%	-	70%	30%	-
K. Unit Administration	80%	-	20%	80%	20%	-

Some conclusions can be drawn from the results:

(a) Nurses do not feel confident with "Macro" issues such as National Policy and do not feel informed about legal and ethical issues.

(b) Physicians feel confident dealing with National issues but feel inadequate with legal issues.

(c) Both physicians and nurses feel confident in dealing with most other issues although certain individuals were less confident in certain aspects than others. Notably, nurses who are not involved on the unit because of administrative duties are not familiar with family issues. Physician specialists in larger hospitals who are not involved in unit administration feel very unsure in this area. These same physicians were not confident about staff organizational issues probably for the same reasons of non-involvement.

(v) It was noticeable when comparing the answers given in the Objectives section with the Levels of Confidence given in this section that both nurses and physicians tended to focus on "Micro" issues rather than "Macro" issues. In most cases they provided in the Objectives section additional comments on Functions and not on long-range issues as had been expected.

It was clear from the Monitors "scan" of the results of Round 1, that certain objectives of the methodology had not been achieved with respect to the purity of the Levels of

Concern. It had not been possible to maintain these and in some instances the same data was given in two sections; particularly, the Functional Issues which appeared again in Architectural Aspects, where the experts enlarged on their short-form answers of the earlier section. With consistency, all the experts failed to deal with the ten year time span and in fact they did not develop meaningful Long Range Issues in the Objectives level. It could be argued that this indicated experts felt there would not be changes in ten years, but no statements to this effect were made. In fact to the contrary, in support of the view that they did not deal with the longer time span, they documented details of short-term issues which are already affecting the system. Some exceptions were those who cited changes which they felt ought to occur -- e.g., noise reduction, better environmental control, etc. -- which are useful planning objectives and could be interpreted as describing a trend that could occur within ten years. Intervention was required by the Planning Experts (as provided within the Delphi design) through the regrouping of this material into more appropriate sections, and its extraction for expansion as feedback material under the Objectives Section (see Appendix B, Sections 1.3 and 1.4) for the next round.

It was felt that these results support the old adage that personnel in the clinical health sector are short term

thinkers and not long term thinkers viz. they are incrementalists, who deal with each problem as it presents itself. This indicates planners can expect little from medical users in terms of "anticipatory" thinking. An option would have been possible at this stage to further explore longer item objectives by "probing" for detail. It was decided that to do so would force another round for marginal benefit and instead "participatory" aspects were substituted by the planners for use at the end of Round 2 in preparing Patterns. Drawing some general conclusions about this group may be of interest but it is unwise to generalize this to other populations of physicians and nurses.

Answers given to the "open" questions in Sections 1 and 2, were about subjects mentioned with equal frequency by physicians and nurses. Both groups identified needs for infection control, family involvement, better staff to patient ratios and additional space. Although the types of issues identified were in about the same proportions for physicians and nurses, more physicians, especially those working as neonatologists, identified greater need for space in the nursery areas.

It was noticeable that where people may not have had recent experience in an area, because of involvement in administration and were not clinically involved, or where people in community hospitals were talking about I.C.N.s, the tendency was to avoid answering some open questions and

to check the "acceptable minimum" option in some sections, but with no comment. This meant that some biases were noticeable in compiling statistical results; particularly, with respect to the Architectural Section. This bias created a serious problem with our ability to present statistical percentages. When providing feed-back statistical data about those who agreed or diagreed with an issue, a qualifying mechanism was required. It was also necessary to introduce a "weighting" to account for the comments given by respondents who disagreed; particularly where these statements were made by only one but where this one is a recognized expert in a very pertinent area. This qualifying or weighting of information was done through the adding of explanatory comments with the statistics when presented in the next round (See Appendix B, Section 3, Architectural Aspects.).

Good examples of this need for weighting of comments can be seen with respect to Isolation Rooms in Nurseries and in the rejection of current space guidelines for bassinettes. In the latter case, medical staff who had recently been involved in planning their own units, and all those working in Neonatal Intensive Care Units, insisted on as much as double the space offered in our questions (See Appendix B, Sections 3.1.5, 3.1.6 and 3.1.7, Comments.). Since this larger size proposal was consistent with research done by the American Institute of Architects, in 1980, as

described in Chapter 1 of this document, we felt it was valid. In the next round we made this situation obvious to respondents, to allow for further comments on space needs.

We noted from the comments received in Round 1 that considerable polarization occurred within both physicians' and nurses' groups, with respect to separate isolation rooms. This can be seen in Round 2 feedback in Appendix B, particularly Section 3.1.3, Comments. To resolve this problem, further opportunity was given to change position during the next round, and the two sets of arguments given by the groups, were presented for their further comments. It is also worth noting that people with similar specialist backgrounds, both physicians and nurses, were diametrically opposed on this issue and it could only be hoped that once each group saw the opposing arguments that a compromise would occur. When all the questionnaires had been analyzed, Round 2 was prepared.

The results of Round 1 were generally very satisfactory. With the exception of the limited amount of long term ideas provided, most sections were well understood by all respondents and a great deal of useful planning data was supplied. A high degree of consensus was expected from this first round and this occurred. The Medical Expert groups expressed concern about similar types of issues and the variances in priority clearly corresponded to the

individuals' professional category. There appeared to be no effect of geographic differences between people in similar levels of care, although those in urban and rural settings differed on issues which they felt important. Ideas more often differed between people in the same city, than in comparable situations inter-provincially.

3.3 Round 2: The Questionnaire Preparation

The primary objectives of Round 2 were to:

(i) Feedback the responses given in Round 1 for further comment, and highlight particularly any disagreements the respondents might have had with data given in Round 1.

(ii) Ask for additional data to resolve polarized issues.

(iii) Rate the data given in Round 1 responses, to establish what information must be included in the Patterns and what could be omitted. This last objective was critical to being able to decide which issues actually made whole identifiable patterns, and which issues would just contribute to a pattern.

The Preparation of the material for further questioning and for feedback, was done section by section, then reviewed as a whole. This review was to determine whether there were overlaps and whether adjustments were required to make Round 2 viable. This was consistent with the need to "scan" the work to check whether a corrective intervention was needed by the Planning Experts.

It became obvious that an enormous amount of data had been collected and that if everything was fed back to respondents, then each section would take hours to answer during the next round. The first task was to go through all answers looking for similar statements which could be taken exactly as stated, or reworded to combine a number of individual's responses. The Monitoring group was required to consider carefully where two statements were actually saying the same thing. It was often necessary to let statements remain as they were in case a misinterpretation had occurred or an intent had not been understood by the Planners that would be understood by Medical Experts.

The Monitors' role was to analyze the material to reduce the volume. Then it was required that the Planners intervene to reword and reduce material. In practice this proved difficult because there was a tendency to reduce less than might have been desirable.

The Monitors gained further reduction by extracting what was useful as Functional Issues from the Objectives Section and also where any duplication occurred as a result of this move.

Section 1, from Round 1, was now split into two parts. The data on Definitions which had received considerable consensus was collected into a single statement so that one Definition could be made for Newborn Nurseries and one for Intensive Care Nurseries. Respondents were simply asked in this round to accept or reject these definitions but with comments. The Objectives part of Section 1 (the second part) was included with responses from Section 2, the Functional Issues, so that the statements reassembled by the Planners to deal with Objectives, could be rated like those on Functions.

Three rating aspects were asked of the respondents. These were:

Importance; how important was what had been said?
Desirability; how desirable would be the results of doing what was suggested?, and
Feasibility; how practical would it to be to implement this idea?

It was obvious that these three aspects could be in disagreement, in that something could be an Important Issue but have undesirable outcomes even though it would still be practical to implement. Those solutions which scored highly on all three scales would be our first choice. Choices of other issues for consideration among those rating high on Importance, would depend upon which aspect and for which reason they rated low.

In each rating a Scale was offered from 1, (a positive aspect) through 5, (a negative aspect). At the beginning of the rating Section in the Questionnaire, a set of Definitions was given for each rating point on each scale. This was to enable the respondents to comprehend the meaning of the value of the point given and thereby to ensure consistent results. The questions were formatted by putting each statement given in Round 1 (or a composited facsimile) on a line by itself, with space alongside it, to allow a rating and a comment. This was done to enable respondents to perceive that they must deal with each item separately, even though in some cases statements were saying almost similar things. Any variances thought to exist by the Monitors which resulted in the inclusion of two similar items in the questionnaire, would be validated or rejected by the experts, according to the way they scored the separate items.

The headings used to categorize the issues in Round 1 were used as sub-section headings in Round 2 and all the material collected in Round 1, was grouped under these headings. In this way, Sections 2.1 to 2.10 covered Newborn Nurseries, 2.11 to 2.20 covered Intensive Care Nurseries. Section 2 had received some additional comments from respondents in Round 1, so these were put in a section numbered 2.0 (See Appendix B.).

A further part was prepared to go within Section 2 in Round 2. This extra set of questions was considered necessary to obtain a more detailed description of the activities that take place in each area of the nurseries. It was felt by the Planning Experts that if a detailed understanding of the activities which staff felt were important could be compared with the policies they felt needed to be achieved, conflicts in the environment would be identified. This new input would require respondents to describe under two general headings (Patient Centred Activities and of Staff Support Activities) for both Newborn and Intensive Care Nurseries, those activities which the individual respondents felt most important. Each respondent was asked to concentrate on describing areas with which they were most familiar and in addition were given a list of activity topics they should consider. This part of Section 2 was to be the new input aspects of Round 2.

In Section 3, Architectural Aspects, with its closed style of questioning, coding and statistical analysis of result could be easily done. As feedback, the proportional percentages of responses to the questions were itemized and comments given from the Monitor Group about the statistics. As has been outlined earlier these comments were used to develop "weights" to qualify answers where the statistics were clearly not conveying the sense of conviction certain individuals had in giving an answer.

The statistical data and comments by the Monitors was followed by a section which included all the comments about the architectural aspects supplied by the respondents in Round 1. In this instance comments were included virtually unaltered and the respondents were required to indicate whether all or some of the comments were valid. The opportunity to add further comments or develop a discussion about any issue raised during the previous round was given in order to explore more deeply some issues.

Throughout the comment segment of Section 3, where additional questions were needed to highlight or develop an idea, the Planning Experts simply inserted questions as they felt necessary. The idea was for the respondents to move through this section as a continuum, reacting and developing their ideas and expanding on those of other participants in earlier rounds.

3.4 Round 2: The Response

This questionnaire represented a succinct integration of the previous round, and as such it was felt a pre-test would not be useful. When considering the likely response to the Round 2 questionnaire, the major concern the Monitoring Group had was possible reaction to the size of the questionnaire itself. There was concern that, to a group of volunteers, the immediate reaction would be to feel overwhelmed by the task of responding. To offset this, in both the letter accompanying the document and the first page of the document itself, emphasis was put on how to handle the volume of work (See Introduction Appendix B.). A suggestion was included as to how the respondents might do the questionnaire in parts and concentrate on those sections with which they had greatest familiarity. While it was recognized that we might get incomplete questionnaires the failure to get respondents to return what they had done, or to be unwilling to do the questionnaire at all, would be far worse. In reviewing this problem prior to sending out the document, reduction was considered unnecessary. It was agreed that adjustments could be made during the round. This soon proved to be required.

The first, fear that there was a problem with the amount of time required to complete the questionnaire, began to be realized as the requested deadline passed and only

five responses were received. Those responding indicated that some days were needed to address all the issues in depth. The Monitor Group noticed that the new input segment of Section 2 was not being answered satisfactorily. The respondents had not understood that descriptions of activities rather than lists of activities, were needed. On checking by telephone with some of the non-responding participants it was clear there were problems in the following areas:

(i) In Sections 1 and 2 rating each item with three different factors produced thousands of possible combinations and was very time consuming.

(ii) The "new input" segment in Section 2, required respondents to think through and provide original material, in addition to evaluating previous material, which seemed to be an overwhelming task for most people.

(iii) Regardless of the Introduction and letter, Respondents had been overwhelmed by their perception of the task and had put off doing the questionnaire. As time went by, they lost all motivation to continue.

Since the methodology of the study had made allowance for this eventuality the Monitoring Group was required to reassess priorities and correct the attrition problem. The first task was to reduce radically the time required to answer without invalidating the study. The new input for Section 2, part 2, could be dropped altogether, making Round 2 an exploration of previously presented ideas and not one of developing new ideas. This was still consistent with the original intent and the purpose of Round 2. Respondents could be given the choice of varying which of the ratings they would do in order to reduce the amount of time required. These options were:

(i) To continue to do all the ratings on all questions.

(ii) To do only the Importance ratings and having made a selection, leave the sorting of issues to the Planning Experts, the sorting of issues based upon their own assessment of Desirability and Feasibility.

(iii) To do all ratings on those items which were high on Importance rating and not on others.

By allowing respondents the choice of selecting from each of these options the answers received would still make

possible what was essential; identifying the most important whole issues and sub-issues required to develop the patterns.

A final concern was how to deal with the attrition of experts, particularly should some members of the original respondent groups now not wish to continue. To get some idea of the problems or acceptability of changing experts during Delphi studies, information was sought from Mr. Michael Yesley in Los Angeles, California. Mr. Yesley was at that time with the Rand Corporation and had previously been a staff member of a Congressional Commission the year before, who carried out a large Delphi Study from Washington, D.C. In these discussions it was clear that it would be acceptable to add new members during a round as long as the substitutes were few and were of a similar expertise. This was done during the Washington D.C. study and no detrimental effects were noted.

The participants who had not responded were telephoned, to inform them of the changes, the reduction in the time needs of the study, and to ask them to continue. It was felt that if 14 answers could be received, provided they were representative of both physicians and nurses, an acceptable sample would have been achieved. This would be a more than 80% response from the 17 who answered Round 1 and 70% of the original 20 participants.

The telephone survey indicated that in addition to the first five respondents, seven of the original group would continue and that one physician had left his Alberta directorship and gone to the U.S.A. On request, his replacement said he would continue and this of course meant a compatible exchange bringing the numbers to 13. One additional nurse was required to make up the 14 and once again a head nurse in the same hospital nursery as one of the retirees agreed to continue. A letter was sent explaining the "new" method and in some cases additional questionnaires, were distributed.

An unfortunate problem was that one of the Academic Physicians and one of the other physicians, considered by the Planning Experts to be the most experienced in planning Intensive Care Units, were not prepared to continue due to workload. While this weakened certain parts of the team it was expected that by the time the actual Patterns had been prepared they would be able to evaluate the results in Round 3 and strengthen the planning aspects again. Once these final changes had been made the additional nine responses came back fairly quickly.

The final list of Expert Respondents was:

Physicians	
Academic	1
Pediataric	1
Neonatologists	4
Nurses	
Administration	3
Obstetrics	5
Total	14

Once all the responses were available the Monitors "scanned" the answers and assessed the impact of these results. It was clear that by ensuring the highest level of response, the data was incomplete. A great many respondents (six) chose to use the Importance plus other ratings on high Importance scores only (Option 3 as offered them) with the first five respondents doing all sections and three respondents doing only Importance ratings. This meant the Planning Experts would be required to provide a great deal more data than had been anticipated in satisfactorily completing the Patterns. The concern here is with the possibility of biases due to technical inexperience but this has been countered in the Delphi design, through the evaluation in Round 3 by Experts and Mini Survey respondents. The result of this evaluation might indicate the need for a further round of questions, but not more serious effects.

In examining the ratings returned, it was noticeable

that positions had not changed substantially from Round 1. In comparing the issues upon which there was a high degree of consensus (through high Importance scores) with the comments and statistics from Round 1, it could be seen that primary issues were still firmly agreed upon, such as: more space; better family access; better infection control, etc. Similarly, with issues upon which the experts were initially divided, eg the need for Isolation Rooms, it appeared as though most experts remained divided even after seeing the arguments made by others. Although a shift of positions had been expected, this indicated that a Policy Delphi was successfully operating and the Planning Experts were now provided with the "polarized" policy options. The Planners could now perform their role by using this information to prepare solutions to the problems and then explore these solutions with the Medical Experts in the final round.

The second round had been very useful in providing good comments from the Medical Experts, allowing them to illustrate from their experience, the positive and negative effects of other peoples' suggestions. This information was consistent with other comments given across the different professional categories, it was also consistent with published material and generally provided the planners with a knowledge of the "workings" of the "world" of nurseries.

3.5 Round 3: Preparing the Patterns

As soon as more than half of the responses to Round 2 were received, the task of preparing the Patterns began. It was determined that all the material presented in Round 2 would have to be analyzed and assembled into a series of individual Patterns. The Patterns would be collected in a book form and circulated with questionnaires to the Expert and Mini-Survey groups. This preparation task proved to be the most time consuming event for the Planning Experts. However this was expected, since it was their major role in the study. The method used to prepare data was quite straight forward, and as follows:

(i) First, "Scan" Sections 1 and 2 to identify all items with ratings of 1 for all scales, or if only the Importance Rating had been filled in, those with scores of No. 1;

(ii) Then, assign to each answers from the questionnaire, a Usability Rating of from 1 to 4 according to the criteria of Table 3.2.

TABLE 3.2

USABILITY RATING CRITERIA

Rating	Description
1 (Most Important)	. More than 20% of respondents gave a No. 1 score on all three scales. . Where >75% of respondents gave No. 1 on the Importance Scale or No. 1 plus No. 2 totaled >75% on Importance. . Where a Medical Expert, recognized in this area, has additional supporting comments. . Where the Planning Experts felt that the item was important for a Pattern even if the medical users did not.
2 (2nd Order of Importance)	. Where >50% of No. 1 ratings or combinations of No. 1 and No. 2 ratings were given on the Importance Scale. . Where a specialist's comments lead the Planning Experts to consider the item's inclusion in a Pattern for supporting an issue. . Where the Planning Experts felt it should form a sub-issue of a Pattern.
3 (Unimportant; not for use in Pattern)	. Where a highly rated item was considered by Planning Experts to pertain more to management than to space or planning issues. . Where an item scored low on Importance and all scales.
4 (Rejected)	. Where Medical Experts rate the issue very low especially on the Desirability or Feasibility Scales.

(iii) Where comments given were associated with No. 1 rated answers, these would be examined for validity and for any issues which would cause the ratings given by respondents to be "weighted". The Usability Rating might be adjusted as a result of this review.

(iv) The answers Usability Rated No. 1 would be assembled by subject groupings so that they could form related sub-issues. Good judgment would be required by the Planners to determine which was an aspect of a whole issue and which was really a new topic.

(v) Where whole topics could be identified but there was insufficient data to complete the Pattern, the Planners would supplement from other sources or draw upon lesser rated issues but use "explaining" qualifiers within the Pattern produced.

The following charts summarize the results which were used in Round 3 from Round 2. For illustration we have selected those issues which finished with a No. 1 Usability Rating and therefore typically had more than 30 percent of respondent answers with all three scales rated No. 1. In

many cases the Planners examined the pros and cons presented in User comments so that data which was useful in the resolution of a problem could be included in a Pattern. Secondary issues are not shown in these summary charts, although these secondary issues were used in various ways. They were often used to decide if an issue really represented a planning problem or just a managerial policy problem. Then because in many cases improved planning could not solve the problem as presented, the issue was not developed further in these guidelines. In such an instance, a No. 2 rated issue would be downgraded to a No. 3. Secondary issues often provided additional statements that supported primary issues and these statements were incorporated within the Pattern.

Finally, not shown in these summaries are the issues rated Highly Important but rejected as infeasible by the Users. On several occasions the comments and voting indicated that it was most important that a certain action did not happen. As an example we present the following statement, made by a respondent in Round 1 and presented unchanged in Round 2:

> 1.3.11. Where length of stay is reduced, smaller nurseries adjacent to the Mothers' Room (or shared between two rooms) can be provided for those mothers/babies where the stay is longer.

In this case, 75 percent of respondents rated the issue 3, 4 or 5 on all three scales and the comments said that to implement such an idea would be dangerous. One physician

cited an example in Denver where a similar installation was built and due to the inability to control access or supervise properly, babies were stolen from the unit. Since it was an important issue for planning, careful consideration had to be given before rejecting the idea.

The summary charts, Tables 3.3 to 3.7, are exhibited in the following manner. First, each item is numbered according to the section used in Round 2, and a summary is given of what was stated. (The reader should refer to Appendix B, for the full descriptions.) The initial Usability Rating assigned to this item in accordance with the basic criteria is listed next, followed by the final Usability Rating resulting from the evaluation. The Importance Ratings are listed by percentages of those who responded by rating 1, 2 or 3 respectively. Where they do not total 100% it is due to lower scores (4 or 5) not being shown on this chart. The next column briefly lists reasons why the Usability Rating either remained unchanged or was changed. Included in this column are references to comments from the Architectural Section from the Round 2 questionnaire. These comments had a major influence on the Planners' decision as to whether an item was used in a Pattern, because respondents often made their best space-related comments in this section. It should be noted that comments from all sections formed a useful basis for evaluating the reasons why respondents chose their ratings. This was most important in that a fundamental requirement of the methodology was its ability

TABLE 3.3

SUMMARY OF RATINGS FOR OBJECTIVES: NEWBORN NURSERIES

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
1.3.1 Family Orientation	1	1	80%	10%	10%	.Importance Ratings	.Birth Home	30%
1.3.3 Designers must provide flexibility	2	1	25%	50%	25%	.Importance Ratings .Planners Comments	.Size of Well Babies' Room	<20%
1.3.4 Design is to allow mothers' choices	1	1	60%	20%	20%	.Importance Ratings .Planners and Users comments	.Size of Well Babies' Room	30%
1.3.5 Babies to spend time with parents	1	1	50%	50%	-	.All three scales high .High Importance	.Size of Well Babies' Room .Family Room	40%
1.3.7 Parents attitude to learning experience	1	1	50%	25%	25%	.Importance Ratings .Planners and Users comments support	.Family Room	30%

TABLE 3.3 - Continued

SUMMARY OF RATINGS FOR OBJECTIVES: NEWBORN NURSERIES

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
1.3.8 Size related to Infection Control	1	1	100%	-	-	.Importance Ratings .Users Comments	.Size of Well & Sick Babies' Room	50%
1.3.9 Application of systems approach to Design	1	3	60%	20%	20%	.Important issue but Planners could not relate to building issues	.Not used	30%

TABLE 3.4

SUMMARY OF RATINGS FOR OBJECTIVES: I.C.N.

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
1.4.1 The size of the Unit in relation to Staff stress	1	1	80%	20%	-	.Importance Ratings	.The Sickest Babies' Room	30%
1.4.3 Recognition of the number of staff needed	2	1	75%	25%	-	.Importance Ratings .Planners Comments	.Adults in the Nursery Room	<30%
1.4.4 Attention to research in the area of I.C.N.	1	1	80%	10%	10%	.High all three Scales .Major Planning Issues	.The Sickest Babies' Room	40%
1.4.7 Need for im- (a) proved Family only Educ. facilities	1	1	25%	75%	-	.High Importances high .Users comments mostly supported .Planners felt to be good	.Family Room	<30%
1.4.8 Positive need to defuse physical environment	2	1	30%	40%	30%	.Planners felt important aspect for space	.Family Room	<30%
1.4.10. Need space for parents to grieve	1	1	25%	50%	25%	.High scores on Importance	.Adults in the Nursery	<30%

TABLE 3.5

SUMMARY OF RATINGS FOR FUNCTIONS: NEWBORN NURSERIES

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.1 UNIT SIZE AND MIX								
2.1.1 Size as a function of nurse ratio	1	2	30%	50%	20%	.Used by Planners as a sub-issue	.Size of Well Babies' Room	<30%
2.1.3 Nursery staff must be covered during meals	1	1	50%	50%	-	.High Rating on Importance .Users comments very supportive	.Size of Well Babies' Room	<30%
2.1.8 16 Infants are Maximum in Group	2	2	40%	20%	20%	.Used as a discussion point	.Size of Well Babies' Room	<30%
2.2 PATTERNS OF CARE								
2.2.1 Mothers need choice of location	1	1	50%	30%	20%	.High rating .Users and Planners felt critical issue	.Size of Well Babies' Room .Adults in the Nursery	30%

TABLE 3.5 - Continued

SUMMARY OF RATINGS FOR FUNCTIONS: NEWBORN NURSERIES

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.2.3 With rooming-in nursery becomes temporary hold	1	1	60%	30%	10%	.High Importance Rating .Users comments positive	.Size of Well Babies' Room	<30%
2.2.4 Parents encouraged by involvement in unit function	1	1	70%	20%	10%	.High Rating .User comments positive .Planners used	.Family Room	30%
2.2.5 Flexibility of attitudes to help parents relax	1	1	80%	20%	-	.High Ratings on Importance .Some bad User comments but Planners used	.Family Room	<30%
2.3 INFECTION ISSUES								
2.3.1 Need for sinks in walking distance	1	1	90%	10%	-	.High Ratings .User and Planners felt major issue	.Size Patterns .Infection Barriers	40%
2.3.2 Adequate gown & wash at access	1	1	80%	10%	10%	.Major issue for planning space	.Adults in Nursery .Infection Barriers	50%

TABLE 3.5 - Continued

SUMMARY OF RATINGS FOR FUNCTIONS: NEWBORN NURSERIES

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.3 INFECTION ISSUES								
2.3.3 Controlled access issue	1	1	80%	10%	10%	.Major issue .High score	.Adults in Nursery .Infection Barriers	40%
2.3.5 (b) Parents/Siblings and known Infection	1	1	90%	10%	-	.High Importance Ratings .Major Planning issue	.Visitors Place .Family Room	40%
2.3.7 Separation of Dirty and Clean Supplies	1	1	80%	10%	10%	.High Importance Ratings .Favourable Comments	.Adults in Nursery .All size Patterns	30%
2.3.9 Enough floor space/patient to reduce cross infection	1	1	90%	10%	-	.High Importance Ratings .User & Planner comments good	.All the size related Patterns	30%
2.3.10 No isolation room - set aside space in open	2	1	40%	40%	20%	.Major disagreement .Planners used in discussion	.Isolation Barriers in I.C.N.	<30%

TABLE 3.5 - Continued

SUMMARY OF RATINGS FOR FUNCTIONS: NEWBORN NURSERIES

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.3 INFECTION ISSUES								
2.3.11 Need for a separate isolation area	2	1	35%	35%	10%	.Major controvery .Used in discussion due to User comments	.Isolation Barriers in I.C.N.	<30%
2.4 STAFFING ISSUES								
2.4.1 A qualified nurse with Nursery at all times occupied	1	1	80%	10%	10%	.High scores on all scales .User comments	.Size of Well Babies' Room	40%
2.4.3 Concept of Mother/Baby/ Nurse team	1	1	60%	20%	10%	.High Importance score .Acceptance by Expert Users	.Family Room	<30%
2.4.4 Staff ratios of I.R.N./L.P.N. to 4 mothers plus babies	1	1	80%	10%	10%	.High Importance .User comments indicate value	.Size of Well Babies' Room	<30%
2.4.5 Combined Nurse/ Infant ratio of 2 per 10-12	2	1	50%	25%	25%	.Good score .Used by Planers in discussion	.Size of Well Babies' Room	<30%

TABLE 3.5 - Continued

SUMMARY OF RATINGS FOR FUNCTIONS: NEWBORN NURSERIES

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.5 PARENT ACCESS								
2.5.1 Vital for parents to have access	1	1	90%	10%	-	.Very high score by all users .Basic philosophy used	.Family Room .All ICU Patterns	50%
2.5.3 Various hospital policies related to degree of parent access	1	1	50%	50%	-	.Based on user acceptance of controlled access policy	.Family Room .Adults in the Nursery	<30%
2.5.5 Mothers encouraged into the Nursery	1	1	70%	20%	10%	.High scores .MD's criticism based on routines .Good acceptance	.Family Room .Adults in the Nursery	50%
2.5.6 Facility needed near staff for mother/baby interaction	1	1	70%	10%	20%	.High score .Fundamental to Family Room issue for Planners	.Family Room	40%
2.5.8 Mother involved in routines with child	1	1	100%	-	-	.High score .Users good comments	.Family Room	40%

TABLE 3.5 - Continued

SUMMARY OF RATINGS FOR FUNCTIONS: NEWBORN NURSERIES

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.5 PARENT ACCESS								
2.5.9 Area for all family visiting	1	1	90%	10%	-	.High score .Basic concept of Visitors Room	.Visitors Room	<30%
2.6 TRAINING ISSUES								
2.6.1 Demonstration Room needed	1	1	70%	30%	-	.High score .User & Planner comments	.Family Room	40%
2.6.2 Hospital stay as an education opportunity	1	1	80%	20%	-	.High score .Basic issues for education	.Family Room	40%
2.8 STAFF ISSUES								
2.8.1 Stress is minimal in this area	2	1	20%	40%	10%	.Upgraded due to comment that stress is due to consumer demands	.Staff Retreat	<30%
2.8.7 Ability to contact right person in emergency	1	1	100%	-	-	.High score on all scales	.All size related problems	40%

TABLE 3.5 - Continued

SUMMARY OF RATINGS FOR FUNCTIONS: NEWBORN NURSERIES

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.8 STAFF ISSUES								
2.8.8 Cheerful colours to be used	1	1	60%	40%	-	.High scores .Planners & Users basic need for this in planning	.Warm colours	
2.8.9 Need for staff privacy and counselling area	1	1	80%	20%	-	.High scores .Basis of Staff Retreat	.Staff Retreat	50%
2.9 SUPPLY METHODS								
2.9.1 Mobile infant with supplies	2	1	35%	35%	15%	.Planners felt good concept	.All area Patterns .Adults in Nursery	<30%
2.9.2 No supplies shared--each bassinette isolated	1	1	50%	30%	20%	.High score .Planners felt good concept	.Size of Sick Babies' Room	30%
2.9.5 Storage of clean and dirty separate	1	1	100%	-	-	.Basic concept in all areas	.Isolation Barriers	60%

TABLE 3.5 - Continued

SUMMARY OF RATINGS FOR FUNCTIONS: NEWBORN NURSERIES

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.9 SUPPLY METHODS								
2.9.6 Capacity to get dirty supplies out without entry to unit	1	1	90%	10%	-	.High scores .Planners felt good concept	.Adults in Nursery	40%
2.9.11 Storage for commonly used equipment and access for X-Ray and Lab.	1	1	60%	30%	10%	.High score .Good supply issue concept	.All size related Patterns	30%
2.10 VISUAL SUPERVISION								
2.10.8 Infants should be visible at all times from nursing centre	1	1	80%	20%	-	.High score .Comments generally favour	.All size Patterns	40%

TABLE 3.6

SUMMARY OF RATINGS FOR FUNCTIONS: I.C.N.

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.11 PATIENT MIX								
2.11.1 One and one-half spaces per 1,000 deliveries or 3 per high referral	1	1	60%	20%	20%	.Confirmed by literature	.Size of the Sicker Babies' Room	30%
2.12 PATTERN OF CARE								
2.12.3 Encouragement of parent participation through access to ICN and staff	1	1	80%	20%	-	.High scores on all scales .Major factor in planning and philosophy	.Adults in Nursery	30%
2.13 INFECTION ISSUES								
2.13.1 No isolation area needed due to incubators and air systems	1	1	20%	60%	20%	.Major issue not resolved but argument weighed toward no isolation	.Infection Barriers in ICN	<30%

TABLE 3.6 - Continued

SUMMARY OF RATINGS FOR FUNCTIONS: I.C.N.

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.13 INFECTION ISSUES								
2.13.2 Provision of discrete isolation room necessary	2	1	10%	15%	20%	.Tied as an issue with 2.13.1 therefore mode 1 rating as a sub-issue .Basically rejected by most Users	.Infection Barriers in ICN	<30%
2.13.3 Space around infant to create geographic and pyschological barriers	1	1	60%	30%	10%	.Basic issue in size patterns and infection control	.Size of Sickest Babies' Room .Infection Barriers in ICN	30%
2.13.4 Space to provide clearing of surfaces and enclosures	1	1	70%	10%	20%	.High scores .Comments of low scores descriptive so Planers used .Basic space & control issue	.Size of Sickest Babies' Room .Infection Barriers in ICN .Adults in Nursery	40%

TABLE 3.6 - Continued

SUMMARY OF RATINGS FOR FUNCTIONS: I.C.N.

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.13 INFECTION ISSUES								
2.13.5 Need for large scrub unit at Nursery entrance	2	1	55%	15%	15%	.Ratings marginal but major planning issue- so required an upgrade	.Adults in Nursery	30%
2.13.6 Need for gowning and scrubbing at entrance.	1	1	70%	20%	10%	.Same issues as 2.13.5 but higher scores .Some MD users doubt need for gowning	.Adult in Nursery .Family Room	40%
2.13.7 Need for many scrub facilities in Nursery out of traffic in close proximity	1	1	80%	20%	-	.Very important issue with large consensus .Used as major space issue	.All size Patterns .Adults in Nursery	60%
2.13.8 Air handling systems used to avoid cross infection	1	1	80%	20%	-	.High scores .Critical basic issue effecting space .High degree of consensus	.All size Patterns .Infection Barriers in I.C.N. .Adults in Nursery	60%

TABLE 3.6 - Continued

SUMMARY OF RATINGS FOR FUNCTIONS: I.C.N.

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.13 INFECTION ISSUES								
2.13.9 There should be non-shared supplies at each bassinette	1	1	80%	20%	-	.High scores .Critical basic issue effecting space .High degree of consensus	.All size Patterns .Infection Barriers .Adults in Nursery	60%
2.15 PARENT ACCESS								
2.15.1 Visiting to child should be unlimited except for staff routine needs	1	1	80%	10%	10%	.High scores .Basic parent issue	.Infection Barriers .Adults in Nursery	50%
2.15.2 Space to be provided for family access for bonding	1	1	80%	20%	-	.High scores .Some Users had doubts on feasibility in I.C.N. .Planners used in principle	.Family Room .Adults in Nursery	30%
2.15.3 Encouragement for sibling involvement	1	1	80%	20%	-	.High scores .Good Sub-issue	.Family Room	30%

TABLE 3.6 - Continued

SUMMARY OF RATINGS FOR FUNCTIONS: I.C.N.

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.15 PARENT ACCESS								
2.15.4 (a) Parents to be informed in detail (b) Parents taught infection techniques	1	1	90%	-	10%	.Good issues as sub-issues in Pattern .Some MD's not been on too much information .All agreed on learning techniques	.Adults in Nursery	40%
2.17 LOCATION OF ICN								
2.17.1 Locate firstly near labour and delivery	1	1	70%	20%	10%	.High score .Major issue as use preference	.Locating the I.C.N.	40%
2.17.2 Easy access for Diagnostic services	1	1	90%	-	10%	.High scores .Some users disagreed with which services were needed .Fundamental issue	.Locating the I.C.N.	30%

TABLE 3.6 - Continued

SUMMARY OF RATINGS FOR FUNCTIONS: I.C.N.

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.18 STAFF & STRESS								
2.18.1 Primary help in space in the Nursery	1	1	90%	10%	-	.Major consensus .Basic issue for size Patterns	.Size of Sickest Babies' Room	30%
2.18.3 Private space for staff away from noise of machines	1	1	80%	10%	10%	.High agreement .Some felt it might be hard to achieve .Planners made solution recommendations	.Staff Retreat	30%
2.18.5 Space adjacent	1	1	80%	10%	10%	.High score .Basic need agreed by all	.Adults in Nursery	40%
2.19 SUPPLY METHODS								
2.19.1 Supplies to ICN from central stores not another unit	1	1	50%	50%	-	.High score .Consensus of users meant basic planning requirement		<30%

TABLE 3.6 - Continued

SUMMARY OF RATINGS FOR FUNCTIONS: I.C.N.

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.19 SUPPLY METHODS								
2.19.2 Two sources of supply in Unit: Central with 24 hour supply, remainder at incubator	1	1	70%	20%	10%	.High scores .Fundamental issue for supply planning	.Size of Sickest Babies' Room	40%
2.19.4 Dirty storage physically separate - removed without unit entry	1	1	80%	20%	-	.High score .Fundamental infection issue	.Adults in Nursery	50%
2.20 VISUAL SUPERVISION /LOCATION								
2.20.1 Babies should be located so that adjacent nurse can supervise in breaks	1	1	80%	20%	-	.High score .Basic space planning issue	.Size of Sickest Babies' Room	30%
2.20.2 Due to high staff ratio, supervision at bedside not station	1	1	80%	10%	10%	.High score .Basic space planning issue	.Size of Sickest Babies' Room	40%

TABLE 3.6 - Continued

SUMMARY OF RATINGS FOR FUNCTIONS: I.C.N.

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	% RESPONDING BY IMPORTANCE RATING			REASON FOR USABILITY RATING	USED IN PATTERN	% NO. 1 SCORES ON ALL SCALES
			1	2	3			
2.20 VISUAL SUPERVISION								
2.20.3 Need for central communication base as a station	1	1	60%	40%	-	.High score .Good planning issue	.Adults in Nursery	<30%

TABLE 3.7

SUMMARY OF RATINGS FOR SPACES: NEWBORN NURSERIES AND I.C.U.s

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	VALID COMPONENT	PARTLY VALID COMPONENT	REASON FOR USABILITY RATING	USED IN PATTERN
3.1 NEWBORN NURSERIES						
3.1.1 Staffing and Workflow Diagram I	2	2	25%	75%	.High degree of consensus .Good comments	.Birth Home .Size of Well Babies' Unit
3.1.3 Isolation Rooms and American Academy of Pediatrics	1	1	75%	25%	.Very valuable comments about the issue used as basis of Infection Pattern	.Infection Barriers in I.C.N.
3.1.5 Spacing for Term or Minimal Care Nurseries	1	1	50%	50%	.Discussion on comments rejected - present standards .Basic issues on sizes used	.Size of Well Babies' Room
3.1.6 Special Care Unit Intermediate Care Sizes	1	1	25%	75%	.Excellent comments were basis for many issues in the Patterns	.All size Patterns .Heights of Service Outlets .Adults in the Nursery

TABLE 3.7 - Continued

SUMMARY OF RATINGS FOR SPACES: NEWBORN NURSERIES AND I.C.U.s

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	VALID COMPONENT	PARTLY VALID COMPONENT	REASON FOR USABILITY RATING	USED IN PATTERN
3.1 NEWBORN NURSERIES						
3.1.7 Maximal Care Space suggestions	1	1	No Vote Needed	No Vote Needed	.User comments rejecting current standards were used in space Patterns	.Size of Sickest Babies' Room .Adults in the Nursery
3.1.8 Where the requirements of the American Academy can't be met	1	1	No Vote Needed	No Vote Needed	.Excellent comments used .Basis of Infection Barriers Patterns	.Infection Barriers in I.C.N.
3.2 NEONATAL I.C.U.						
3.2.2 An I.C.N. operating in its own environment	1	1	40%	60%	.Further discussions clarified locational issues	.Locating the Intensive Care Nursery
3.2.3 Spacing around Bassinettes/ Incubators	1	1	60%	40%	.Basis of space issues - user comments useful	.Size of Sickest Babies' Room

TABLE 3.7 - Continued

SUMMARY OF RATINGS FOR SPACES: NEWBORN NURSERIES AND I.C.U.s

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	VALID COMPONENT	PARTLY VALID COMPONENT	REASON FOR USABILITY RATING	USED IN PATTERN
3.3 MECHANICAL CONSIDERATIONS						
3.3.1 Heating, Ventilating and Air Conditioning	1	1	No Vote	No Vote	.Comments used in service consensus .Basic of related Patterns	.All size Patterns .Heights of Service Outlets .Babies in the Sun
3.3.2 Plumbing related to numbers of sinks	1	1	100%	-	.Basic issue used in all size Patterns .Fundamental to space needs	.All size Patterns .Heights of Service Outlets .Adults in the Nursery
3.3.3 Gas Outlet numbers & 3.3.4 Heights of Gas Outlets	1	1	75%	25%	.Basic to all size Patterns .Used in cluster module patterns .Fundamental to Heights of outlets pattern	.All size Patterns .Height of Service Outlets .Adults in the Nursery

TABLE 3.7 - Continued

SUMMARY OF RATINGS FOR SPACES: NEWBORN NURSERIES AND I.C.U.s

BRIEF DESCRIPTION AND ITEM NO.	INITIAL USABILITY RATING	FINAL USABILITY RATING	VALID COMPONENT	PARTLY VALID COMPONENT	REASON FOR USABILITY RATING	USED IN PATTERN
3.4 ELECTRICAL CONSIDERATIONS						
3.4.2 Heights of Electrical Outlets	1	1	-	100%	.Discussion and comments used as basis of Heights Pattern	.Heights of Service Outlets
3.4.3 Performance Requirements for Illumination	1	1	60%	40%	.All disagreements were on the basis of maintaining 100-120 ft. candles .Used as a sub-issue	.Babies in the Sun .Warm colours

to cause the respondents to "display" the values that they hold when making their policy choices. This proved to be successful in that while the ratings themselves indicated the choice (and the degree of conviction in that choice) the comments displayed a great deal of "knowledge" about the choice.

The second last column shows the title of one or more Patterns in which the issue was used. Finally, the last column lists those scores receiving 30 percent (more or less) from all respondents' No. 1 ratings, since this scoring was a primary sorting mechanism for determining an issue's inclusion in a Pattern. A change was made to the format of the summarized data for Category 3, since there were no ratings, but instead an indication of validity of comments.

Once all the data had been usability rated and the location for the Pattern was identified, the Patterns were assembled. This assembling required the taking of an item given by the Medical Experts and building a theme. The actual wording and format of the Pattern followed a set style. This style was used in the early Patterns developed at Berkeley, California.

In the following example, a typical Pattern has been assembled to show the type of information used in its

creation. It must be realized that there is a considerable influence from numerous comments that have been used to "extend" the phrases and the solution on the first page is entirely the Planning Experts' understanding of what is required to resolve the problems.

Table 3.8 shows the full item descriptions taken from Round 2 questionnaire and a set of item numbers in brackets which correspond to the paragraphs outlined in Diagram 3.2. The fully detailed responses to these items can be seen in Tables 3.3 to 3.7. The numbers in the outlined paragraphs on the Diagram, indicate those numbers bracketed against items from the table, which most influenced their development.

TABLE 3.8

PARAGRAPHS USED IN FAMILY ROOM

1.3.7 [1] Need to develop an attitude in patients so as to consider the time in the hospital as a time of learning (more satisfactory and complete parent education).

1.4.7 [2] There must be improved facilities for education and preparation of the family prior to discharge
- parent education programs.

1.4.8 [3] There must be a positive attempt to defuse the intensity of the physical environment as the infant moves nearer to discharge.

2.2.4 [4] In order to encourage parent involvement this can be accomplished through group participation and teaching so the nursery and post-partum ward functions as a unit.

2.2.5 [5] Flexibility of staffing and attitudes so that mother and father can relax and enjoy the event of the new baby.

2.3.5 [6] Parents and/or siblings with symptoms of an infection should not enter nursery.

2.4.3 [7] The concept of a mother/baby/nurse team is used whereby one nurse looks after the total care of a mother and baby including her education.

2.5.1 [8] It is vital for parents to have access to newborns to facilitate the bonding process.

2.5.3 [9] Hospital policy varies as follows:
- some hospitals do not allow parents to enter the nursery
- others encourage mothers to demand and encourage them to relate closely to nursery staff in the nursery but prevent mothers from entering nursery
- others allow mothers free access to nursery
- others allow controlled access to nursery.

2.5.5 [10] Mothers should be allowed and encouraged into the nursery.

2.5.6 [11] Facility is needed for mothers who choose to stay in the nursery near supervision and support to enable observation of parent/baby interaction, plus teaching needed.

2.5.8 Where possible, the mother should be
[12] involved in normal nursing routines of her infant.

2.6.1 Demonstration/conference room is needed
[13] for training and educating nurses, parents and medical staff.

2.6.2 The hospital stay is a teaching opportuni-
[14] ty and personnel should be designated to assist parents.

2.13.6 There must be gowning facilities at the
[15] entrance for staff and parents. Even though there is no indication that gowning decreases infection it reinforces other techniques.

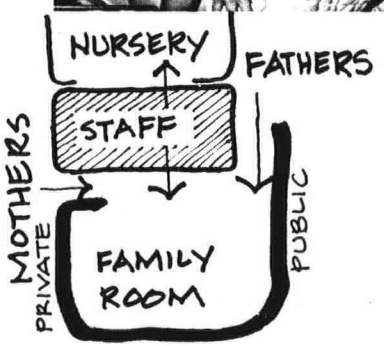
2.15.2 The policy of the unit should actively
[16] encourage involvement by parents to facilitate parent/infant bonding and physical space should be provided for private access to the child for breast feeding, education, etc.

2.15.3 Where there are siblings involved,
[17] encouragement should be given by staff to involve the 'whole family' although physical access may not be possible.

Family Room

JUST AS A FAMILY ROOM AT HOME IS A PLACE
WHERE THE FAMILY ARE TOGETHER DOING
ACTIVITIES OF INTEREST AND LEARNING
SO DOES THE HOSPITAL NEED A FAMILY SPACE.

1 14 Since a mother and her child are required to stay in hospital for some days, an opportunity exists to use the visit as a learning experience.



THEREFORE: IN ORDER TO ALLOW MOTHERS OR BOTH PARENTS THE CHOICE OF UTILIZING THE HOSPITAL STAY TO LEARN CHILD OR FAMILY CARE, A SPACE MUST BE PROVIDED IN CLOSE PROXIMITY TO THE STAFF ACTIVITY IN THE NURSERY WHICH HAS:

1. OPPORTUNITY TO BE IN DIRECT CONTACT WITH STAFF WHO ARE WORKING IN THE NURSERY TO ASK ADVICE OR ASSISTANCE WITHOUT HAVING TO DISTURB ROUTINE NURSERY CARE.

2. PROVISION TO WORK IN A CLEAN ENVIRONMENT BY MAKING IT A PHYSICALLY SEPARATE SPACE AND YET STILL HAVING ACCESS TO STAFF BY ENSURING NORMAL BARRIER TECHNIQUES (E.G., HAND WASHING).

3. AN EASY TRAFFIC FLOW FOR MOTHERS AT ANY TIME FROM THE NON PUBLIC POST-PARTUM AREAS.

4. THE ABILITY TO BE FLEXIBLE AND DIVIDABLE THROUGH SCREENING AND BY ARRANGING FURNITURE TO ALLOW MOTHERS TO HAVE HELP WITH BREAST FEEDING AS WELL AS ALLOWING OTHERS TO HAVE GROUP EVENTS.

5. AN ATMOSPHERE OF FRIENDLY EXCHANGE.

2 We know that the involvement of staff is important to ensure the education process occurs. With the general limits on the number of staff available this learning experience must occur where the presence of staff is required most of the time.

11 13 If this access does not occur there will be insufficient staff to provide total mother and child care including education.

3 7 14 Nursing staff and medical staff traditionally find their mother and child care time concentrated in two areas; at the bedside and in the nursery. Since the information a mother receives at the bedside is usually personal, individually provided (one to one) and can be readily given with any hospital stay, it is more important to deal with the less available opportunity.

4 This is to exchange information and draw upon limited staff resources while in the nursery areas; an opportunity that should be maximized. Regardless of whether mothers Room-In or not, a facility must be provided for mothers to stay near supervision. Here they get support to achieve their parent/baby interaction or learn from the nurses primarily occupied in the nursery.

10 14 Numerous babies have low resistance to infection, so infection becomes a special problem when considering mothers having access to the nursery. Because of the need to be with the nursing staff, special provision should be through a transition space either within the normal nursery or just outside the nursery. It could be argued that a mother's physical condition is known by staff therefore possible risk of infection can be minimized.

6 10 However, access to the baby, in the presence of other babies with supervision by staff will also want to be available to the father (or supporting relative) whose infection risk is unknown.

7 11 12 Provision must be made for hand washing or gowning or other barrier techniques for these known "others" to enter this zone. It should occur with ease and not intimidation.

9 15 This space becomes a meeting space. A space to share learning experiences. A place for multi-para mothers to share ideas with first time mothers. An opportunity for group demonstrations by the staff, of child care techniques with mothers having access to their babies to participate. It becomes the parents family room where there can be an exchange of information and enjoyment.

3 8 17 CONTEXT

This space is not the same as Mothers Exchange. This is a work area that has access for other members of the family. It is for individual families to be together not a group of mothers. Mothers Exchange is part of the bedroom, privacy zone, Family Room is part of the activity zone.

6 15

13 14 16

5 17

The Patterns have expressive titles. Each title was written to evoke an appropriate response on first reading of the heading. It either suggested a whimsical, emotive, "every man's" idea of the subject such as; Mother's Exchange, The Size of the Well Babies' Room, and Babies in the Sun, or a more precise title such as; The Birth Home, Visitors' Place, Infection Barriers in Intensive Care Nurseries and Heights of Service Outlets, which were intended to evoke more pragmatic attitude.

The title is intended to be more than a thought evoker, since it is also a definition of the topic. It is written to provide an image of what is included in the Pattern. This is necessary so that having read the Pattern, only the topic itself need be used in creating the Pattern Language. People could easily remember what is implied in the Pattern and could begin using it to create linkages, build upon the ideas and, more importantly, to evaluate the ideas encompassed by the Pattern. To test this concept, one has only to think of similar topics which evoke images that can be developed as Patterns eg Continuous Benchwork, Soft Floor Finishes and Texture on Walls.

Immediately under the title is a succinct statement which provides a context for the data following. It is

often written as a statement of the dilemma that would be resolved within the pattern e.g. in the Pattern Infection Barriers in Intensive Care Nurseries we have a statement "Designing Spaces to Help the Reduction of Infection is Fundamental." In this case, we could expect to be informed in the Pattern as to how we can design spaces to reduce infection. Other statements are written to set a context by expounding some fundamental truth that is the basis of the Pattern, e.g. in the Pattern Mothers' Exchange we find "Mothers Need a Space to Socialize and Share Experiences Removed from Hospital Routines." In this Pattern, you would expect to find the reason for this belief and how to ensure that appropriate space is provided.

Once the contextual statement is provided, the solution to the problem is placed on the front page. The solution is written as a positive statement, describing the specific steps needed to be carried out. It is, in all cases, a collection of positive, action oriented requirements starting usually with "THEREFORE: PROVIDE A ROOM ...." or "THEREFORE: WHEN PROVIDING SPACE FOR ....". The solution statement is, in many cases, a summary of the detailed description within the body of the Pattern which provides more rationale. The result when reading the first page is that it becomes possible to grasp the issue and how to deal with it, without reading deeper within the Pattern.

To complete the front page of the Pattern, an illustration is appropriately placed, which describes the essence of what is being stated. This is in the form of either a picture used to set the mood or a simple diagram which represents the essence of the relationship being described. Typically where spatial relationships or zoning of spaces are being described, a diagram is used and where social relationships are involved there is a photograph. As often as possible both methods of illustration are used.

On the remaining space of the front page, more detailed Pattern material is placed. This consists of factual statements, some rationale and some literature references for these statements. There are also some descriptions of problems and more detailed information about the solution. We tried to keep the Patterns to two or three pages where possible. This became impossible in some of the larger topic groupings e.g. Adults in the Nursery, which covered the lists of, and the explanations used for, describing numerous support areas. The key to this grouping within this particular Pattern was the concept that the spaces have adults in common. The common thread is that activities are related to the functional needs of adults and not babies. This is the essence that causes the spaces to exist. It might have been valid to break this one Pattern into more Patterns if another approach had been taken. If, for example, we had

focussed on Materials Distribution as the common thread, it would have caused the creation of separate topic issues related to Clean Supply, Dirt Holding and Washing, Clerical and Pharmacy Activities which would have created separate Patterns for these topics.

In the "purest" sense, the Pattern like the physics principle, must deal with the "atom" or the smallest indivisible problem within a design. It would suggest that a problem must be broken down to this degree each time. In most cases, this holds true when conflicts exist and a resolution for this aspect needs to be described. In other cases, Patterns describe issues in the environment which need resolution but are not problematic. In these cases the Pattern can simply state what and why something needs to be done. It is therefore possible to include within one Pattern, a larger collection of "atoms" than might initially have been thought prudent by Pattern purists.

Once the special nursery-oriented Patterns had been developed for direct application to the Nursery design, the Pattern Language itself had to be developed. This was done by starting with the larger issue Patterns and linking them progressively toward the particular or specific issue Patterns. Simplistically this is shown in Diagram 3.3.

DIAGRAM 3.3

NEWBORN NURSERIES 1ST STAGE GROUPINGS

1) Large Issues

THE BIRTH HOME

VISITORS' | FAMILY ROOM | MOTHERS' EXCHANGE

2) Specific Issues

STAFF RETREAT | ADULTS IN THE NURSERY | THE SIZE OF THE WELL BABIES' ROOM | THE SIZE OF OF THE SICK BABIES' ROOM

3) Very Specific Issues

BABIES IN THE SUN | HEIGHT OF SERVICE OUTLETS

To this general grouping, other Patterns that were needed to complete the ideas within each general grouping were added. This rearrangement is shown in Diagram 3.4.

Note that the additional Patterns, which are "Universal" so therefore taken from Alexander's Patterns, are shown in bold print.

DIAGRAM 3.4

NEWBORN NURSERIES 2ND STAGE GROUPINGS

1) Large Issues

RECEPTION NODES **FRIENDLY INFORMATION**

ENTRANCE TRANSITION THE BIRTH HOME

VISITORS' PLACE | FAMILY ROOM | MOTHERS' EXCHANGE

2) Specific Issues

WARM COLORS **SHORT PASSAGES** **POOLS OF LIGHT**

NO WALLS UNUSED ADULTS IN THE NURSERY

STAFF RETREAT THE SIZE OF THE WELL BABIES' ROOM

THE SIZE OF THE SICK BABIES' ROOM

3) Very Specific Issues

LIGHT ON TWO SIDES OF EVERY ROOM HEIGHT OF SERVICE OUTLETS

WORKSPACE ENCLOSURE **WINDOWS OVERLOOKING LIFE**

ADJUSTABLE LIGHT QUALITY **FILES AT HAND**

WINDOW HEIGHT IN MEETING ROOMS BABIES IN THE SUN

The final step, or series of steps, was taken to link to each Pattern so that they were attached by lines and arrows where the direction of the arrow identified which Pattern influenced which other Pattern. This hierarchy of influence could be in a descending order starting with a Larger Issue such as THE BIRTH HOME whose concept leads to the determination of space and size in a Specific Issue like THE SIZE OF THE WELL BABIES' ROOM. Similarly, the issues of the WELL BABIES' ROOM lead sequentially to THE SIZE OF THE SICK BABIES' ROOM and so on.

Another factor affecting linkage was the recognition of the natural progression of the way people arriving address the spaces. Thus, we placed RECEPTION NODES ahead of ENTRANCE TRANSITION because people are first received in the hospital and then find their way to the nursery before entering the nursery. These Patterns deal with this kind of process and provision was made for them to link in this way.

The linking of the Patterns became a series of tasks because a rather complex sorting process was required. Having made the logical connections, the actual diagram needed to be reassembled several times so that the least number of arrow-lines crossed. (See Diagram in Appendix C, p.386.) This was a simple sorting technique used to establish a clear planning logic. The logic assumes that if the connections are truly appropriate, then there is an appropriate

position for each Pattern on the chart, so that the least number of lines will cross to achieve this. That more complex diagrams will have more interactions is also true.

In assembling the document for the Third Round Questionnaire, some of the Patterns used to supplement the specific Nursery Patterns needed to be modified. The use of existing Patterns was considered most appropriate in this study. This arises from the belief that there are elements in our built environment which are universal for all building types and that their adoption is a fundamental concept in the Pattern Language approach. Since residential or commercial examples had been used to provide a context in some existing Patterns they were changed so the context could be more specifically about hospitals.

Where we found in the Language that the line diagram linkages were not strong enough to convey intent clearly, a statement of the possible adjoining Patterns was provided within the Patterns themselves. If a distinction should be made between one Pattern and another Pattern to improve their clarity, this is also indicated.

The Questionnaire format for the Third Round was deliberately simplified. Firstly, because only uncomplicated basic evaluation was required and, secondly, to avoid

the problems with excessive time requirements encountered in Round 2.

We were chiefly concerned with the evaluation of our New Patterns, so it was decided to locate all those Universal Patterns (taken from Berkeley) at the end of the document following the Pattern Language diagram. Consequently, one set of questionnaires was used for the whole group. This finally had two sections to allow for both the slightly Modified Universal Patterns and the Non-Modified Universal Pattern. This split also allowed for the testing of our concerns about the impact of changing versus not changing a Pattern since we were unsure whether people would feel that reused Patterns should be altered.

In the first section, the nursery-related section, a standard questionnaire form was put after each Pattern. The questionnaire format had two parts. The first part was designed to ask questions about the content of the Pattern: Was it correct? Did it cover all the Issues? Was the problem clear? and so on. The second part dealt with the format of the Pattern itself: Was the summary form of the first page clear? Did the title or lettering style or the diagrams need improving? In each case, space was left at the end of the questions for any additional comments a respondent might feel appropriate. We felt all questions should be of the

closed, select-from-an-option type. This was considered safe because the intent of what was required in the answer was quite clear and we needed only simple respondent preferences. To ensure that no misunderstanding occurred, particularly with respondents assessing what ought to be included in a Pattern, a preamble was provided at the start of each question section. This preamble explained the purpose of the Content and the intended Format of the Patterns.

When it came to the questions for the Pattern Language, the questionnaire was placed in front rather than behind the diagrams. Thus, the preamble, which only needed to be stated once, could act as the introduction to, as well as the description of, the use of the Pattern Language itself. Once the volumes were assembled, copies were sent out to Experts, to Hospitals in British Columbia and in Alberta, and to consumers.

3.6 Round 3: The Response

The intent of this final round was to combine with the Mini-Survey of the hospitals a larger and more diversified group of respondents. The Expert Group was expanded to include all those who had participated but retired from earlier rounds. This occurred once the reason for their retirement had been resolved. In many cases, no prior contact by telephone was made to reintroduce them and seek

their renewed participation. Instead it was felt that a good accompanying letter of explanation with the questionnaire would be sufficient.

The Expert groups receiving the questionnaires were divided as follows:

	SENT OUT	RETURNED
Physicians:		
Neonatologists	4	2
Pediatrics	3	2
Academic	2	1
Infection Specialty	1	1
Total	10	6
Nurses:		
Obstetrics	6	3
Administrative	4	3
Total	10	6
Total Experts:	20	12

Thus, the response rate was 60 percent for the Expert Group. The Mini-Survey of hospitals was as follows:

	SENT OUT	RETURNED
B.C. Hospitals	16	12
Alberta Hospitals	10	6
Consumers	4	4
Total	30	22

Here the response rate was 74 percent.

When all the questionnaires had been returned or accounted for, the results were compiled. The statistics for the new Pattern with Section 1 and Section 2 questions, have been compiled separately from the Pattern Language and the Universal Patterns. The response to these two groups of questions have been recorded in two categories; Physicians and Nurses and the Mini-Survey which includes hospitals and consumers together. The results are summarized in the following Tables: 3.9 to 3.14

Having compiled the statistics, it becomes clear which Patterns and which aspects of the Patterns need to be revised. Generally, both Medical Experts and Mini-Survey Respondents agreed with what was presented. Both groups agreed that certain Patterns were not satisfactory and made suggestions to solve the problem, although to differing extents. It was noticeable that once the Patterns had focussed the issues into positive statements and brought the otherwise unrelated issues together, the Experts were much more critical of what had been said earlier. One of the Experts who is a specialist in Infectious Diseases was very critical of the implications of public access in Visitors' Place and also the broader aspects of Infection Barriers in Intensive Care Nurseries which he felt were "dangerously naive". Other comments from Experts who felt technical details were lacking supplied good comments, or in one case, a supporting article.

TABLE 3.9

PERCENTAGE OF MEDICAL EXPERTS ANSWERING IN SECTION ONE

PATTERNS	1.1 FACTS IN THE PATTERN					1.2 SCOPE OF THE PATTERN			1.3 WHAT IS DESCRIBED MAKES CLEAR						1.4 IMPORTANCE FOR PLANNING		
	Totally Incorrect	Mostly Incorrect	Some Incorrect	Supportive	Proves Conclusively	Well Covered	Sufficient	Incomplete	Total Problem		The Solution		The Connection		In All Cases	In Some Cases	Not At All
									Yes	No	Yes	No	Yes	No			
The Babies Home	0	25	25	50	0	50	50	0	100		75	25	75	25	75	25	0
Visitors Place	0	0	50	50	0	50	25	25	100		75	25	100		75	0	25
Mothers Exchange	0	0	13	75	12	75	25	0	100		100		100		75	25	0
Family Room Room	0	0	25	50	25	50	25	25	75	25	75	25	75	25	60	40	0
The Size of Well Babies Room	0	0	5	75	20	50	25	25	75	25	75	25	75	25	75	25	0
The Size of Sick Babies Room	0	0	10	75	15	50	50	0	75	25	75	25	75	25	75	25	0
Locating the Intensive Care Nursery	0	0	12	75	13	75	25	0	100		100		100		75	25	0

TABLE 3.9 --Continued

PERCENTAGE OF MEDICAL EXPERTS ANSWERING IN SECTION ONE

PATTERNS	1.1 FACTS IN THE PATTERN					1.2 SCOPE OF THE PATTERN			1.3 WHAT IS DESCRIBED MAKES CLEAR						1.4 IMPORTANCE FOR PLANNING		
	Totally Incorrect	Mostly Incorrect	Some Incorrect	Supportive	Proves Conclusively	Well Covered	Sufficient	Imcomplete	Total Problem		The Solution		The Connection		In All Cases	In Some Cases	Not At All
									Yes	No	Yes	No	Yes	No			
Infection Barriers in ICU	0	50	2	25	0	75	0	25	75	25	75	25	75	25	75	25	0
The Sickest Babies Room	0	0	0	100	0	100	0	0	100	0	100	0	100	0	00	0	0
Babies in the Sun	0	0	25	25	50	75	25	0	75	25	75	25	75	25	70	30	0
Heights of Service Outlets	0	0	25	50	25	75	25	0	75	25	60	40	70	30	70	30	0
Adults in the Nursery	0	0	10	75	15	75	25	0	75	25	75	25	75	25	70	30	0
Staff Retreat	0	0	25	50	25	75	25	0	50	50	50	50	75	25	50	50	0

TABLE 3.10

PERCENTAGE OF MINI-SURVEY RESPONDENTS ANSWERING IN SECTION ONE

PATTERNS	1.1 FACTS IN THE PATTERN					1.2 SCOPE OF THE PATTERN			1.3 WHAT IS DESCRIBED MAKES CLEAR						1.4 IMPORTANCE FOR PLANNING		
	Totally Incorrect	Mostly Incorrect	Some Incorrect	Supportive	Proves Conclusively	Well Covered	Sufficient	Incomplete	Total Problem		The Solution		The Connection		In All Cases	In Some Cases	Not At All
									Yes	No	Yes	No	Yes	No			
The Babies Home	0	0	50	50	0	50	30	20	85	15	80	20	85	15	70	30	0
Visitors Place	0	0	30	70	0	20	60	20	75	25	70	30	70	30	85	15	0
Mothers Exchange	0	0	25	50	25	40	60	0	85	15	85	15	85	15	75	0	25
Family Room	0	0	20	60	20	50	50	0	85	15	85	15	75	25	50	50	0
The Size of Well Babies Room	0	0	20	60	20	80	20	0	85	15	75	25	85	15	70	30	0
The Size of Sick Babies Room	0	0	0	70	30	60	40	0	85	15	85	15	85	15	75	25	0
Locating the Intensive Care Nursery	0	0	20	40	40	60	40	0	75	25	75	25	75	25	75	25	0

TABLE 3.10 -- Continued

PERCENTAGE OF MINI-SURVEY RESPONDENTS ANSWERING IN SECTION ONE

PATTERNS	1.1 FACTS IN THE PATTERN					1.2 SCOPE OF THE PATTERN			1.3 WHAT IS DESCRIBED MAKES CLEAR						1.4 IMPORTANCE FOR PLANNING		
	Totally Incorrect	Mostly Incorrect	Some Incorrect	Supportive	Proves Conclusively	Well Covered	Sufficient	Incomplete	Total Problem		The Solution		The Connection		In All Cases	In Some Cases	Not At All
									Yes	No	Yes	No	Yes	No			
Infection Barriers in ICU	0	0	0	70	30	75	25	0	75	25	75	25	75	25	75	25	0
The Sickest Babies Room	0	0	0	70	30	65	35	0	60	40	75	25	75	25	75	25	0
Babies in the Sun	0	0	25	75	0	55	30	15	85	15	75	25	75	25	85	15	0
Heights of Service Outlets	0	0	0	80	20	70	30	0	85	15	85	15	85	15	85	15	0
Adults in the Nursery	0	0	0	80	20	50	50	0	85	15	85	15	85	15	70	30	0
Staff Retreat	0	0	0	80	20	65	35	0	85	15	85	15	85	15	70	30	0

TABLE 3.11

PERCENTAGE OF MEDICAL EXPERTS ANSWERING IN SECTION TWO

PATTERNS	2.1 INTENT OF THE FORMAT				2.2 IMPROVEMENTS NEEDED					2.3	2.4 STYLE IS				
	Very Clear	Understandable	Not Too Clear	Confusing	Yes / No Title Lettering	Yes / No Diagram	Yes / No Language Style	Yes / No Too Long	Yes / No Too Short	Yes / No Format Useful in Planning	Too Technical	Understandable	Not Technical Enough	Too Colloquial	A Good Style
The Babies Home	25	75	0	0	25/ 75	50/ 50	0/ 100	0/ 100	25/ 75	100/ 0	0	50	0	25	25
Visitors Place	50	50	0	0	50/ 50	50/ 50	50/ 50	0/ 100	0/ 100	60/ 40	0	50	0	25	25
Mothers Exchange	75	25	0	0	25/ 75	0/ 100	25/ 75	0/ 100	25/ 75	100/ 0	0	50	0	0	50
Family Room	50	25	0	25	25/ 75	25/ 75	25/ 75	25/ 75	25/ 75	75/ 25	0	25	0	25	50
The Size of Well Babies Room	50	25	0	25	0/ 100	25/ 75	25/ 75	25/ 75	25/ 75	75/ 25	0	50	0	25	25
The Size of Sick Babies Room	50	25	25	0	30/ 70	30/ 70	30/ 70	30/ 70	50/ 50	100/ 0	0	70	0	0	30
Locating the Intensive Care Nursery	50	50	0	0	0/ 100	25/ 75	25/ 75	100 /0	25/ 75	75/ 25	25	25	25	0	25

TABLE 3.11 -- Continued

PERCENTAGE OF MEDICAL EXPERTS ANSWERING IN SECTION TWO

PATTERNS	2.1 INTENT OF THE FORMAT				2.2 IMPROVEMENTS NEEDED					2.3	2.4 STYLE IS				
	Very Clear	Understandable	Not Too Clear	Confusing	Yes / No Title Lettering	Yes / No Diagram	Yes / No Language Style	Yes / No Too Long	Yes / No Too Short	Yes / No Format Useful in Planning	Too Technical	Understandable	Not Technical Enough	Too Colloquial	A Good Style
Infection Barriers in ICU	25	50	25	0	0/ 100	25/ 75	25/ 75	25/ 75	25/ 75	25/ 75	25	0	0	25	50
The Sickest Babies Room	50	50	0	0	0/ 100	50/ 50	25/ 75	25/ 75	25/ 75	100/ 0	0	25	0	0	75
Babies in the Sun	30	70	0	0	30/ 70	30/ 70	25/ 75	25/ 75	25/ 75	75/ 25	0	30	0	0	70
Heights of Service Outlets	33	34	33	0	25/ 75	30/ 70	25/ 75	25/ 75	25/ 75	75/ 25	0	50	0	0	50
Adults in the Nursery	70	30	0	0	25/ 75	30/ 70	25/ 75	25/ 75	25/ 75	75/ 25	0	30	0	0	70
Staff Retreat	50	50	0	0	30/ 70	50/ 50	25/ 75	50/ 50	-	80/ 20	0	50	0	0	50

TABLE 3.12

PERCENTAGE OF MINI-SURVEY RESPONDENTS ANSWERING IN SECTION TWO

PATTERNS	2.1 INTENT OF THE FORMAT				2.2 IMPROVEMENTS NEEDED					2.3	2.4 STYLE IS				
	Very Clear	Understandable	Not Too Clear	Confusing	Yes / No Title Lettering	Yes / No Diagram	Yes / No Language Style	Yes / No Too Long	Yes / No Too Short	Yes / No Format Useful in Planning	Too Technical	Understandable	Not Technical Enough	Too Colloquial	A Good Style
The Babies Home	20	60	0	20	25/ 75	25/ 75	30/ 70	30/ 70	25/ 75	85/ 15	20	20	0	0	60
Visitors Place	30	50	20	0	20/ 80	20/ 80	30/ 70	25/ 75	20/ 80	75/ 25	15	15	0	0	70
Mothers Exchange	50	25	25	0	20/ 80	30/ 70	20/ 80	40/ 60	20/ 80	75/ 25	25	0	0	0	75
Family Room	30	50	20	0	25/ 75	25/ 75	25/ 75	20/ 80	25/ 75	85/ 15	15	0	0	15	70
The Size of Well Babies Room	20	60	0	20	25/ 75	20/ 80	30/ 70	50/ 50	20/ 80	85/ 15	0	65	0	0	35
The Size of Sick Babies Room	35	65	0	0	25/ 75	20/ 80	25/ 75	40/ 60	25/ 75	85/ 15	0	70	0	0	30
Locating the Intensive Care Nursery	75	25	0	0	20/ 80	30/ 70	40/ 60	40/ 60	30/ 70	75/ 25	0	50	0	0	50

TABLE 3.12 -- Continued

PERCENTAGE OF MINI-SURVEY RESPONDENTS ANSWERING IN SECTION TWO

PATTERNS	2.1 INTENT OF THE FORMAT				2.2 IMPROVEMENTS NEEDED					2.3	2.4 STYLE IS				
	Very Clear	Understandable	Not Too Clear	Confusing	Yes / No Title Lettering	Yes / No Diagram	Yes / No Language Style	Yes / No Too Long	Yes / No Too Short	Yes / No Format Useful in Planning	Too Technical	Understandable	Not Technical Enough	Too Colloquial	A Good Style
Infection Barriers in ICU	70	30	0	0	20/80	20/80	20/80	30/70	20/80	75/25	0	40	20	0	40
The Sickest Babies Room	60	40	0	0	20/80	20/80	35/65	35/65	20/80	80/20	0	25	25	0	50
Babies in the Sun	70	30	0	0	35/65	35/65	35/65	40/60	35/65	85/15	0	40	0	0	60
Heights of Service Outlets	50	30	20	0	35/65	35/65	35/65	60/40	30/70	85/15	20	20	0	0	60
Adults in the Nursery	50	50	0	0	35/65	35/65	35/65	65/35	30/70	85/15	25	0	0	0	75
Staff Retreat	65	35	0	0	30/70	35/65	30/70	60/40	30/70	75/25	25	0	0	0	75

TABLE 3.13

PERCENTAGE OF MEDICAL EXPERTS ANSWERING IN SECTIONS 3, 4, & 5.

PATTERNS	3.1 SUFFICIENT PATTERNS TO DESCRIBE LANGUAGE		3.2 ARE LINKAGES OF LANGUAGE CLEAR?		4.1 USE OF PATTERNS ACCEPT-ABLE			5.1 ARE MODIF-ICATIONS OBVIOUS		5.2 SHOULD THEY BE FURTHER MODIFIED	
	YES	NO	YES	NO							
Language of Newborn Nurseries	100	-	100	-							
Language of NICU	100	-	100	-				YES	NO	YES	NO
Universal Patterns					50	50	-				
Universal Patterns Modified								20%	80%	20%	80%

TABLE 3.14

PERCENTAGE OF MINI-SURVEY RESPONDENTS ANSWERING IN SECTIONS 3, 4, & 5.

PATTERNS	3.1 SUFFICIENT PATTERNS TO DESCRIBE LANGUAGE		3.2 ARE LINKAGES OF LANGUAGE CLEAR?		4.1 USE OF PATTERNS ACCEPT-ABLE			5.1 ARE MODIF-ICATIONS OBVIOUS		5.2 SHOULD THEY BE FURTHER MODIFIED	
	YES	NO	YES	NO							
Language of Newborn Nurseries	75	25	72	28							
Language of NICU	70	30	72	28							
Universal Patterns					60	40	-	YES	NO	YES	NO
Universal Patterns Modified								40	60	40	60

The result of this evaluation proved most successful since it was the technical aspects of the Round 2 results that were lacking and the "naive" planners were required to fill the gap in completing the Patterns. To have the weaknesses identified by the Experts, and therefore a corrective process made possible, was most pleasing. Further, it was clear there was not a divergence between the concerns of the Mini-Survey respondents, who had not seen the work before, and the Experts who had been fully involved. This indicated that the Experts had been representative of the larger population. Reinforcing the similarity of response of the groups is the fact that for answers shown on Tables 3 and 4, have a similar distribution of concerns with respect to the Factual Content and the Scope of the first four Patterns. A similar distribution occurs with Babies in the Sun except that the Mini-Survey group have slightly more reservations than the Experts, and with Locating the Intensive Care Nursery it is the reverse situation.

In all cases, it was noticeable that most respondents, regardless of their prior exposure to the Pattern Concept, did not feel constrained in commenting upon the format, lettering style or any other presentation aspect of the material. This was very pleasing to the Planners who were able to derive useful feedback on the Patterns as a communication devise. With respect to this aspect of the

Patterns, the answers received indicated people were comfortable working within the Pattern Format and this is therefore supportive of them as Guidelines. Criticism was noticeable with four of the less technical Patterns, which Expert respondents felt were not clear enough because they were "too colloquial" in language, and two of the more technical Patterns in which the Mini-Survey respondents felt the language was not technical enough. This type of criticism is supportive of the idea that the respondents comprehended the intent and style of the Patterns and suggesting they are good communication tools.

The final task of the Monitoring Group was to determine whether any further questioning rounds would be necessary. The final "scan" of the Round 3 material showed this to be unnecessary since: there had been sufficient comments received to revise the Patterns; there was a clear indication from the Mini-Survey that no flaw was evident in the "Expert-Opinion" received; and there was clear evidence of consensus on the results of the Delphi Rounds which was a requirement of this "mode" of the study. The project had been successfully completed.

CHAPTER 4: CONCLUSIONS AND RECOMMENDATIONS

If the arguments put forward in the initial chapters are adequate and the method described in achieving their purpose successful, they point to a new direction in addressing the social responsibility of design. It is important for our purpose to have demonstrated the beginning of a process rather than its conclusion. This demonstration is evidence that we can do something about adjusting our societal attitudes to the sociological qualities of our buildings. This success is particularly timely because there is increasing discussion which shows that Western society is going through a transition from a uniformity-seeking period to one which emphasizes heterogeneity.[1] Our Delphi, like many others, has amply provided an example of the suitability of the Delphi Technique for this emerging logic.

In selecting the Delphi to be our means of communicating with a segment of the population, expressly to learn from them (in a social science context) what we should know about their world, we have demonstrated that an important "tool" does exist. We have further demonstrated its usefulness in gathering knowlege in a form valuable in the pursuit of better Design Guidelines for building.

We began, in Chapter One, with criteria for a method to build a more responsive Standard. That method was required to solicit a description of the important aspects of the "world" of the people who "use" Newborn Nurseries and Neonatal Intensive Care Units, in such a way that they described what is required to operate within that world. We further required that the method provide an opportunity to clarify problems which occur when certain events of that world are affected by spatial - environmental relationships. Finally we required that upon the completion of the Delphi application a set of acceptable Design Guidelines would exist in a Pattern Language format, for use in "adaptable" Standards. We shall now go on to evaluate the strengths and weaknesses of our Delphi application to establish whether these criteria have been met and assess its validity for further applications.

The three basic needs of our method can be assessed in comparison with three of the Eight Basic Pitfalls of the Delphi as published by Linstone.[2] This will permit a systematic evaluation and an opportunity to assess our application for its value as a Delphi example. We begin by assessing how well our method addresses the problem of having people describe their world. We have chosen experts to represent this world and Linstone finds this leads to what he calls the problem of Illusory Expertise. In this pitfall he notes:

> "... [In Delphi], reliance is almost invariably placed on panels of experts or specialists ..., the specialist is not necessarily the best forecaster. He focuses on a subsystem and frequently takes no account of the larger system.
>
> "... A panel consisting of experts on the various body subsystems (e.g., circulation, respiration, reproduction), does not constitute expertise on human behaviour and group dynamics."[3]

The concern centres on the ability of experts to represent all the ideas needed to cover the topic. This was the first concern of our Delphi application so we chose a diverse group to ensure representation, then we checked the expert opinions with a Mini-Survey. The results of the inquiry showed the representation to be successful for two reasons:

(i) In the main Delphi inquiry, all the Medical Experts, regardless of discipline, presented the same types of concern. Although their professional perspectives were often diverse and their opinion about the solutions were at times opposite, they did cover similar areas and all the main issues.

(ii) In the Mini-Survey inquiry when the results were compared with the Medical experts opinions, the statistical profiles of their comments were remarkably similar. (See Tables 3.9 to 3.14 in Chapter 3.) This means that the

> method provided an opportunity to collect the material and check the validity of its content and as a result we could be sure that data provided was important.

This means we were successful in structuring the format of the questions and the actual rounds to solicit descriptions of what was important to the operations of this particular "world". The Delphi iterations helped us to work through a "conversation" in such a way that interpretations could be made by the Planning Experts, thus providing descriptions of the problems, the context of events and their solutions. This is essential to the successful production of the Patterns.

Regardless of the successful production of the Patterns, there is concern as to whether any biases due to the Planning Experts' involvement would be detected. The Mini-Survey was to be used as a check of the possible misinterpretation of the Planners. The strong reactions of some experts, as well as some Mini-Survey respondents, ensured that any technical issues were corrected, however there may well be Planning problems which went undetected. This cannot be tested now but should be avoided in future.

A possible variation that might, in future, provide further corrections of results, is the involvement of

various planners from both private practice and government employment in the Mini-Survey itself. This would ensure that the Planning Experts were "checked" in the same manner as the Medical Experts, particularly when the skills of the Planners as interpreters operating in their "social scientist" role are not clearly proven. It should be realized that if the Mini-Survey check is not effective, the only screening of the Patterns for incorrect planning hypotheses remains with their practical application in planning and ultimately the built environment. If this were the only measure of certainty for new Standards, it is not satisfactory.

Another interesting variation of the single Mini-Survey for achieving additional checks, is by a series of surveys, similar to those described by Finsterbush as Dynamic Mini-Surveys as cited in Chapter One. It might prove useful to first survey Medical Experts and hospitals; make corrections; then survey Planners and Architects making corrections of planning aspects not detected by Medical people; and finally survey government regulators for their assessment of the applicability of the material in Standards. The additional time implications are obvious, but considering the length of time testing-in-the-field might take, the validity of confirmation by these extra surveys would prove valuable in achieving later acceptance of the Standards.

The second aspect considered critical in our methodology, was its capability to provide a clear picture of the problems, the event in which the problem would occur, and the agreement on the solution. The key to satisfying these requirements lay in the ability of the Monitoring Group/Planning Group to create a flexible and interactive Delphi process. This meant that the Delphi, as designed, would be capable of changing modes, to achieve consensus or no-consensus, and depended upon the degree to which flexibility was truly available. This is an issue of execution in which Linstone warns of Sloppy Execution.

While a great deal of literature is available to describe how Delphi can be executed correctly, there are some factors which cannot always be controlled. These are: maintaining a level of enthusiastic responses by experts; controlling the time of expert's responses; and the problem of trying consciously to achieve a balance between too much structuring, in the interests of expeditious results, and being too unstructured, in trying to avoid preconceptions. In each of these aspects, we had some successes and some failures, but the most significant factor to remember is that we were able to successfully produce the Patterns. This leads us to believe that the method is capable of producing the desired result regardless of this pitfall. Let us examine these concerns one at a time.

Selection of Experts is cited by Linstone and Turoff,[3] as critical to a good result. There are suggestions that honoraria must be paid in recognition of time involved. This is normally acceptable for funded research projects but rarely happens in this type of multi-disciplinary health related project. We suffered by being able to select only from those available experts who will volunteer. In our case this limitation was further complicated by trying to get rural and urban representation. As a consequence some specialist physicians in urban centres were not pleased with what they anticipated would come from their "country peers". This meant we experienced a level of antagonism from some of the most important participants which may well have affected their input to the process.

The implication of this on the Patterns could be three-fold; one, that the level of development would not be in sufficient depth and either all the issues were not examined or those that were examined tended to be superficial; two, that the specially informed experts discounted their own input because of the disregard they have for the calibre of their peers, or; three, that information gained was actually diluted by experts who were not true experts. These biases are of concern because there is evidence of changes having occurred in Delphis where false

data was introduced.[4] The only way this would be corrected is by the Mini-Survey. Unfortunately, there is also concern whether the level of expertise of the Mini-Survey respondents would allow for adequate compensation. As we stated earlier, there is one last resort for a "poor" Pattern and that is to test it through practical application which will take some time. This appears to be an area of weakness in the method.

Another option may be to look again to the Dynamic Mini-Survey and select an alternative Medical Expert population to test for Pattern validity. In this application it is our opinion that the comments received from the whole evaluative round (Round 3) were sufficiently critical, in both their positive and negative expressions, to be assured that no lack of effort was evident and that we could be confident that the method produced good Patterns.

Maintaining control of respondents' time was a major weakness and we felt this reduced the capability of the interaction to adequately explore controversial issues. The first round, which was pre-tested, was returned in the predicted time. However, in returning the submissions respondents said they could not maintain the schedule for the three rounds which had been sent to them. Our only alternative was to allow them greater time or suffer

attrition of the participants. Even allowing extra time failed to ensure good results in Round 2, because it seemed completion was viewed as less urgent as time passed. The failure of time control meant that where an issue under development could have benefited from a substantial reassessment, this proved to be impossible. All that could be done was to ask for additional comments once the problem had been made evident in the feedback. While the interaction between Medical and Planner Experts did allow for the presentation of issues by one group, and, the interpretation of feedback by the other group, there was little room to freely explore unforeseen opportunities. The design of the methodology allowed the means for correcting deviations but not for much "adventure".

As a result, if a Planner did misinterpret, he had only the normal findings of the next round in which to check himself. Where the subject is such that more exploratory opportunities become of primary concern, it may be better in that application to select a more restricted subject area, then do three formal rounds and insert one exploratory round, but all within the same time-frame. As a consequence, exploration of the whole topic area would require more studies than just one. In this instance, completing the Patterns was more important than the extra exploration so we felt for us that the method was successful.

The final issue on the subject of Delphi execution relates to the handling of material between rounds. Again, despite all the warnings in the literature and the careful preparations for this activity, only by actual experience could we learn how much time is required to deal with the enormous volume of material produced. We found that far greater turn-around-times were needed. Also, we showed poor judgement as to how much material people can respond to versus how much material was required in order to produce meaningful results. The conclusion one draws is that only experience can improve participants' judgement and yet our results show the quality of the product does not suffer greatly while this is being gained.

Unsatisfactory resulting effects from poor execution are most likely due to overstructuring which causes the whole process to be influenced by the Planning Experts' preconception of the issues. This bias becomes of concern with our Delphi structure because our method encourages process-intervention during the interactions.

In Chapter Two, we discussed intervention and assumed that the Mini-Survey would correct any biases. We found, in the application, that when we were required to "correct" the Delphi between rounds it was usually done by increased structure. It was also necessary to make up

lost time and "lost" experts by having Planners fill in details. This proved to be a very successful mechanism for ensuring the completion of the process, but we are not sure that if all these negative execution factors had not occurred, some of the issues which were left unresolved or polarized by the Medical Experts could have been resolved by Medical, rather than Planning, Experts.

Sloppy Execution is constantly decried by the authors of Delphi Technique literature because "we are really past the stage in the evolution of Delphi where an excuse exists for this pitfall. Most of the common errors have been amply demonstrated in a significant number of poorly conducted Delphis."[5] This may be so where there is good funding, plenty of time and experienced operators. Our use of the Delphi is more typical of no funding, with volunteers who are part-time and enthusiastic amateurs. Surely Delphi is not a tool only useful to the expert? We have demonstrated that it is possible to adhere to the Delphi principles, even modify the structure to suit our needs, then carry out a Delphi, encountering all the typical problems for which no "excuses exist", and still produce the intended product. We have further demonstrated that the strength of our method was to expect pitfalls and eventually overcome the usual problems rather than to avoid them.

It is clear that our method produced a set of Patterns which, when tested within the method, succeeded in describing problems, events and solutions that the Medical users themselves had described in their own terms by displaying their own value systems. It was encouraging to note that the participants, both Expert and Mini-Survey, had no qualms about commenting on the Pattern format, lettering style or any other aspect of the Pattern itself, during the evaluation. We felt that they truly entered into the spirit of the "conversation". While the evidence indicates that the method produced a successful product we still need to ask the question: could the same results have been achieved without the Delphi?

Since the concept of socially responsive Design Guidelines and the Delphi Technique itself are both evolving, it is impossible to say what other methods might work. We would have to conclude that any interactive-communication process that can be carried out from remote locations would probably be successful, but from the earliest definition this activity would be a form of Delphi. Since we conclude that we have here the beginning of a process, rather than the successful end to one, it is worth exploring some options for the future.

In borrowing a concept from the Patterns, we find that the successful elements of our method are in the

relationships which hold together the simulation of a conversation. It also allows involvement in the actual management of the process by one of the subject participants, namely the Planning Group.[6] This "Pattern" might just as easily move away from the restriction of paper-and-pencil communications into electronic methods. It is already possible to assemble groups in urban and rural settings of British Columbia and carry out the interactive rounds of a Delphi, via satellite link, using a real-time conferencing form.[7]

The Knowledge Network of the West is in place and with the extension of AV/TV education systems into the hospitals of the province, individual interactions and possibly Mini-Surveys with one-way answers, will soon be possible. Such interactive applications are virtually limitless. Many of the time-related execution problems encountered in our application might be overcome.

Another possibility is to extend the method described here to evaluate previously developed Pattern Guidelines so that the validity of the hypothesis stated within them can be tested. This will enrich the "Pattern Languages" much faster than we could do otherwise.

If, as this application of Delphi has shown, we have a method available which readily and accurately produces

usable and socially responsive Guidelines, we possess a powerful instrument for the improvement of health facilities design. Required now is a realization by the participants in Health Planning that change will begin to occur only after evaluating the whole process. The result of such an evaluation would surely indicate that it is mandatory to develop a means for having better, more purposeful interaction which ensures respect for, and understanding of, the complexities involved in the decision making aspects. At that time Standards can become the basis for such a communication process and the method we have described will help in their formulation. Until such a realization does occur, Standards as they exist have little value and in their present application will continue to act against innovative and responsive design.

CHAPTER ONE

NOTES AND REFERENCES

1. Arthur H. Peckham, Jr., "The Use of Standards in the Planning Process," Hospital Administration in Canada, (May 1975), p. 52.

2. This sub-committee was mandated, to examine the problem of Standards. This first report contains a list of all Planning Agencies in the United States and the Standards they use. The report also contains 42 Bibliographic References of available Guidelines. A Preliminary Report by the Sub-Committee on Programming and Design, James Diaz, Chairman. Mexico City: American Institute of Architects, October 1980.

3. James Diaz and Bill Porter, "Considerations About New Standards for Projecting Space Requirements for Community Hospitals." Paper presented at the Quarterly Meeting of the American Institute of Architects, Committee on Architecture for Health, Washington, D.C., March 1981.

4. Ibid., p. 5.

5. Health and Welfare Canada, Recommended Standards for Maternity and Newborn Care, Ottawa: Information Canada, 1975.

6. Health and Welfare Canada, Guidelines for Minimum Standards in the Planning, Organization and Operations of Special Care Units in Hospitals, Report of the Working Party on Special Care Units in Hospitals, 1976.

7. James A. Hamilton and Associates, A Hospital Plan and a Professional Education/Programme of the Province of British Columbia, Canada, Minneopolis, 1949.

8. Isadore Rosenfield, Hospitals; Integrated Design, New York: Reinhold Publishing Corp., 1947.

9. James J. Souder, Estimating Space Needs and Costs in General Hospital Construction. Chicago: American Hospital Association, 1963.

10. E. Todd Wheeler, Hospital Design and Function. New York: McGraw-Hill Book Co., 1964.

11. Diaz and Porter, "Considerations About New Standards,", p. 7.

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12. In the mid 1950's the Ministry of Health in B.C. appointed a Laboratory Advisory Council and a Radiological Advisory Council with representation from groups and associations whose professional staffs used such facilities. While they were originally established to advise the Deputy Minister in charge of hospitals about regional distribution of services (i.e., Pathologists and Radiologists in rural areas) they established standards and reviewed spaces for planning approvals. In the 25 years of their existence, the ability to give first class advice has dwindled due to representation by association, not expertise. In June of 1981, the Laboratory Advisory Council was replaced by the Laboratory Strategic Planning Group which can draw upon experts but appears to be relying upon the Chi Systems Methodology for space calculation and now deals with larger policy issues but not planning.

13. With the introduction of the major planning legislation, National Health Planning and Resources Development Act (PL93-641) in January 1975, a completely new structure was established across the United States to control the planning of health servics and facilities particularly with respect to requests for government based funding. Prior to this the impact of the 1947 Hill-Burton Act and the 1964 Hill-Harris Amendment was to create an explosion of standards and regulations - see Donald F. Phillips, "Health Regulations in 1977: A period of Adjustment." Hospital, Vol. 51 (Feb. 1, 1977), p. 61.

14. Peckham, Jr., "Standards in Planning," p. 52.

15. In producing these guidelines, mock-ups were made testing locations of beds in rooms and toilet fixtures within bathrooms to provide optimal working spaces. The bathroom arrangements were drawn up and put in the guide with all the fixtures exactly from the mock-up. Later, continued use of this layout showed that assumptions made concerning how staff would assist patients proved to be wrong. Although it is now being revised, for the original document see; Department of Health Services and Hospital Insurance of B.C., Hospitals for Extended Care: A Program and Design Guide, prepared for R. Loffmark Minister of Health, 1974.

16. Alan Campbell, et al., Changing Strategies for British Columbia Health Management, Health Servics Planning Discussion Paper, No. 1, Dept. of Health Care and Epidemiology, University of British Columbia, May, 1981. p. 3.

17. Ibid., p. 8.

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18. With the need for clearer definition of the design problems in complex buildings, particularly hospitals, it is common practice to develop a detailed Pre-Design document called a Functional Program which outlines: existing and future workloads; activities taking place; anticipated staff numbers; the number and size of spaces required; details of the operating systems and usually pre-construction capital and operating cost estimates. This work is usually undertaken by a specialist.

19. Thomas L. Blair, The International Urban Crisis. Fragmore, England: Paladin Books, 1974. p. 117.

20. This term is used to describe the period in European and American architecture from 1910 to the mid-1970's. Noticeable about the founders of this architecture was the fascination for the clean, smooth, polish of the machine. There was an excitement for machinery, particularly mass production, and the ability to use steel and glass to represent simplistic forms. For a brief review of the beginnings of the Modern Movement see: Gerd Hatje, gen., ed., Encyclopaedia of Modern Architecture, (2nd ed.; London: Thames and Hudson, 1965), pp. 11 - 27.

21. Scholars believe the failure of the architecture of the Modern Movement to deal with human problems is best symbolized by the demolition of the 12 storey public housing project at Pruitt-Igoe in St. Louis in 1973. After creating what became a vertical slum the U.S. Dept. of Housing and Urban Development were forced to demolish their own project after it was abandoned while still new. This has become a symbolic end to the Modern Movement and the opening of the Post-Modern Movement in architecture. Heimsath says; "the Modern Movement began as the world changed to industralization, behavioural architecture begins as the world shifts to conservation and an ecological world view." Clovis Heimsath, Behavioural Architecture. New York: McGraw-Hill Book Co., 1977, p. 181.

22. For a discussion regarding the societal values which are the basis of Alexander's beliefs there is a critical review of the Pattern Language approach by Jean-Pierre Protzen, "The Poverty of the Pattern Language," and a retort by Christopher Alexander, "Value," in Concrete, Vol. 1, No. 8. The College of Environmental Design, Berkeley, (November 15, 1977).

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23. Christopher Alexander, The Timeless Way of Building, New York: Oxford University Press, 1979. p. 75.

24. Ibid. p. 157.

25. Ibid. p. 95.

26. Christopher Alexander and Barry Poyner, The Atoms of Environmental Structure, Working Paper No. 42, Center for Planning and Development Research, Berkeley, California, 1969, p. 3.

27. Christopher Alexander, et al., A Pattern Language Which Generates Multi-Service Centers, Report from the Center for Environmental Structure, Berkeley, California, 1968. p. 15.

28. Christopher Alexander, et al., A Pattern Language, New York: Oxford University Press, 1977.

29. Ibid. p. xiii.

30. There are a number of "Ethnographers" who express concern that social scientists describe behaviour, events, structure, etc., without recognizing their own social frame of reference in making judgements about the societies they observe. This is particularly noticeable with respect to "Mental Illness" from authors such as Ervin Goffman, Alfred Schutz, Harold Garfinkel, Jeff Coulter, et al.

31. Harold Garfinkel, Studies in Ethnomethodology, Englewood Cliffs, N.J.: Prentice-Hall, 1967. See especially pp. 18 - 24 and pp. 35 - 37.

32. Alfred Schutz was recognized among sociological theorists for his studies in the "seen but unnoticed" attitudes of the world of everyday life, particularly a series of studies done between 1962 and 1966, see especially, Alfred Schutz, Collected Papers: I. The Problem of Social Reality, ed. by M. Natanson, The Hague: Nijhoff, 1962.

33. Alfred Schutz, The Frame of Unquestioned Constructs, cited by Mary Douglas, Rules and Meanings (London: Penguin Books, 1973) p. 18.

34. Harold Garfinkel, Background Expectancies, cited by, Mary Douglas, Rules and Meanings (London: Penguin Books, 1973) p. 22.

CHAPTER TWO

NOTES AND REFERENCES

1. The term is used with reference to a deliberately unstructured meeting in which ideas are presented and explored freely with the objective of arriving at a previously unanticipated result.

2. This is a very structured committee process in which the interaction occurs only through the monitor and the group although present are "nominal" (in name only) see; Andre Delbecq, Andrew Van de Ven and David Gustafson, Group Techniques for Programme Planning, Glenview: Scott Foresman and Co., 1975.

3. N. Dalkey and O. Helmer "An Experimental Application of the Delphi Method to the Use of Experts", Management Science 9, No. 3 (April 1963), p. 458 as cited in Harold A. Linstone and Murray Turoff, eds., The Delphi Method: Techniques and Applications, Don Mills: Addison-Wesley Publishing Co., 1975. p. 10.

4. Linstone and Turoff, Ibid.

5. Ibid. p. 3.

6. Ross Planning Associates, Design for Obstetrical and Pediatric Facilities, Ohio: Ross Laboratories, 1972.

7. Kurt Finsterbusch "The Mini Survey: An Underemployed Research Tool", Social Science Research, (March, 1976). p. 81.

8. Harold A. Linstone, Eight Basic Pitfalls: A Checklist, as cited in Harold A. Linstone and Murray Turoff, eds., Ibid. p. 578.

9. There are numerous general references to these problems in Andrew Delbecq et. al., Ibid. and in Harold A. Linstone and Murray Turoff, eds., Ibid. particularly p. 86.

10. Finsterbusch, The Mini Survey, p. 92.

11. Murrary Turoff, "The Design of a Policy Delphi", Technological Forecasting and Social Change 2, No. 2 (1970), as cited in Harold A. Linstone and Murray Turoff, eds., Ibid. p. 94.

CHAPTER TWO -- continued

12. Colin W. Clipson and Joseph J. Wehrer, Planning for Cardiac Care: A Guide to the Planning and Design of Cardiac Care Facilities, Michigan: The Health Administration Press, 1973. p. 85.

13. Turoff, Policy Delphi, p. 84.

14. The discussion of Rationalist versus Incrementalist approaches to planning refers to two extremes in a spectrum of approaches (Developmental, Adaptive, Allocative, etc.) which are not being considered here for the purposes of simplification.

15. Amitai Etizioni, "Mixed Scanning: A 'Third' Approach to Decision-Making", Public Administration Review, December, 1967, reprinted in, A. Faludi ed., A Reader in Planning Theory Urban and Regional Planning Series, Vol. 5 (Oxford: Pergamon Press, 1976).

16. Ibid. p. 217.

CHAPTER FOUR

NOTES AND REFERENCES

1. See the statement of a concept by Mr. Maruyama, "Commentaries on the 'Quality of Life' concept," unpublished, cited in Harold A. Linstone and Murray Turoff, eds., The Delphi Method: Techniques and Applications, Don Mills: Addison-Wesley Publishing Co., 1975. pp. 494-495.

2. Ibid. pp. 573-586.

3. Ibid. p. 6.

4. An experimental Delphi was conducted in which false information was deliberately introduced see F. Cyphert and W. Gant, "The Delphi Techniques", Journal of Teacher Education, Vol. 21, No. 3, 1970, p. 422 as cited in Harold A. Linstone and Murray Turoff, eds., Ibid. p. 586.

5. Ibid. p. 583.

6. Linstone introduces the idea of "Singerian Inquiry System" in his work on Delphi. This system is similar in objectives to our objectives in that it broadens the class of participants to include the designer. This is done for the participants to add to their knowledge of the subject and themselves. See Ibid. p. 35.

7. In particular see the Chapter VII. Computers and the Future of Delphi in Harold A. Linstone and Murrary Turoff, eds., Ibid. p. 487.

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APPENDIX A

Round One Questionnaire

introduction

DO NOT COPY PP. 203-416

INTRODUCTION

The Study is designed to look at three broad aspects which are in themselves separate but interact together. It will be the task of the respondents to identify and develop each of the three areas separately and then respond to the synthesis developed by the monitors. In this way a set of Long Term Objectives, Functional Criteria and Space Planning elements will be developed.

It is the linking of these three areas that is the basis of the proposed Design Standard or Planning Guideline in that these aspects are dependent upon one another and cannot be taken in isolation to represent sufficient information to be a guide.

THE STUDY

The Study takes place as a series of questionnaires over three rounds. The data collected is fed back to respondents at the next round and they are asked to comment and vote upon issues.

This is a study in Policy Issues, so we are trying to develop as many diverse opinions as possible rather than to achieve consensus. It is important that the Design Guide be able to cover all the objectives a unit could foreseeably require. We will be looking to explore the issues which cause polarization and most likely just accept the ones upon which there is agreement.

THE DESIGN

The three rounds can be classified as to their primary intent as follows: Round One is to Discover. The keyword is What - what are the issues, what are the objectives that should be achieved and what criteria examined. Round Two is to Explore. The keyword is Why - why do respondents disagree, why do they hold that point of view and why won't something different work. The final round is to Evaluate. The keyword is If - if this is done the outcome will be, or if this is not done the outcome will be.

introduction

QUESTIONNAIRES

Each of the Questionnaires will maintain three streams. The first one is overall objectives, which provide a long range perspective. This is important if plans are to accommodate future changes. This means that priorities in planning can be made with a futures perspective rather than to only seek precedent in the past.

The Second stream deals with Functional Issues. These are the criteria considered important in operating a unit and are the basis of ensuring the spaces which accommodate them are adequate.

The Third stream deals with the Space Planning issues. This section allows the monitors to communicate with the respondents by initiating a series of architectural policy issues in response to the criteria being established in the first two sections. The opinions and criticism in terms of the importance and validity of this criteria allows the synthesis to take place and the architectural model to develop.

PATTERN LANGUAGE

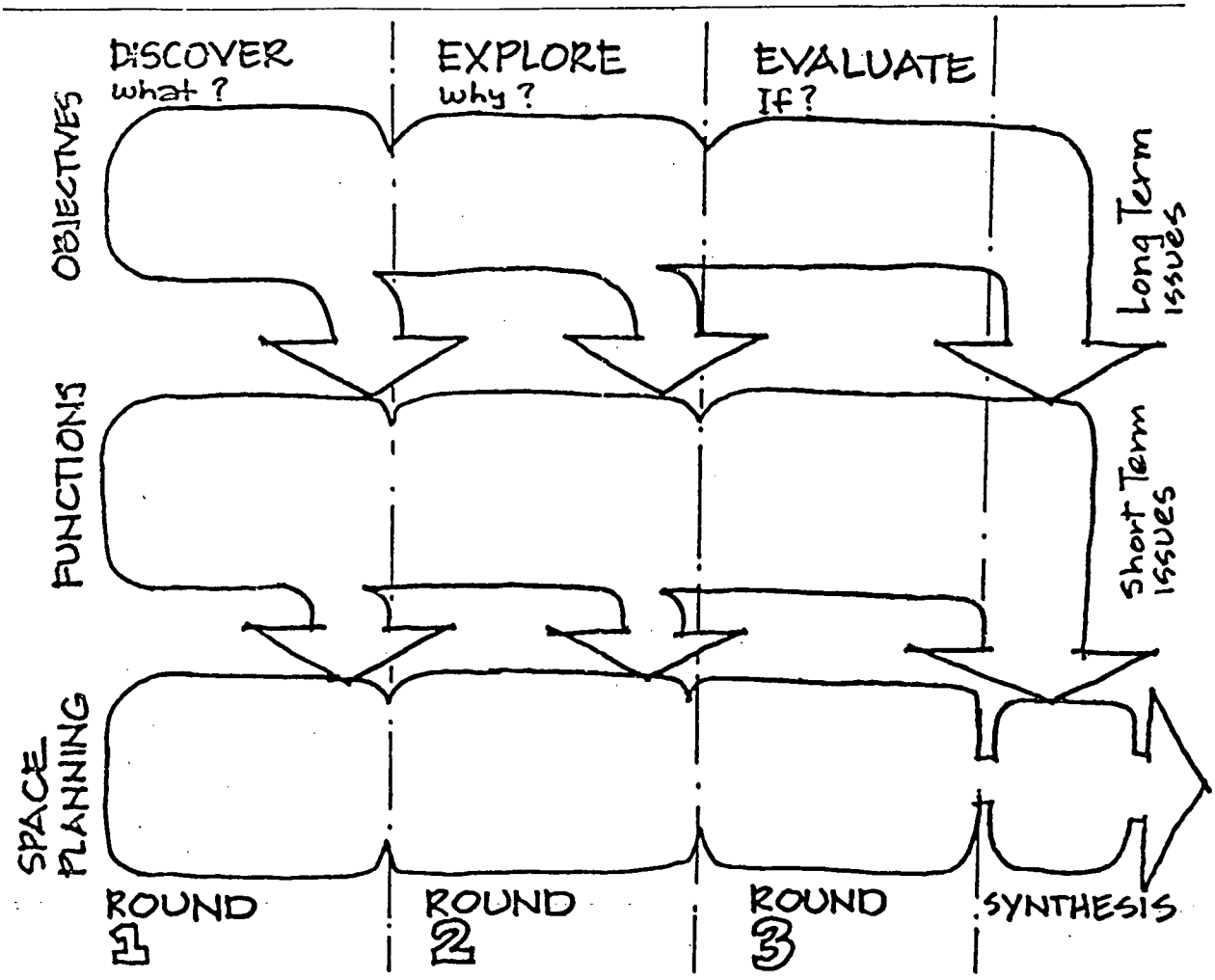
What we will have developed as a result of this inquiry will be a series of "patterns". These are based upon the work of a Christopher Alexander who, between 1968 and 1977, developed a Pattern Language for linking a series of design problems and solutions together. It will be the basis of our new design standards. We will use this method to describe a series of patterns for the nurseries. The pattern describes a problem which occurs over and over again, then describes the core of the solution to the problem such that it can be solved in many ways. By this method we hope to achieve a format like this:

> If X (a planning situation or issue to be solved):
> then Y (a best solution): solving Z (the problem being overcome). This is the pattern.

This has the distinct advantage of building a number of these patterns into a larger pattern network and each grouping or "language" forms a unique solution. While the problems and solutions are definite, they are clearly 'visible' and challengeable when inappropriate to the specific set of circumstances being accommodated in planning. There are numerous combinations available. All that must be agreed is the linking of problem and solution in each pattern.

We will have developed these patterns during the study and a possible network after the third round of questionnaires.

DELPHI STUDY



INSTRUCTIONS

INSTRUCTIONS

In this series of questionnaires we are seeking your personal answer. We expect that where you wish, you will use your assistants and colleagues who are not already involved in this study to assist. Don't feel compelled to answer all the questions yourself, however, they will be processed as if done by an individual.

Since we are dealing with two subject areas (Neonatal I.C.U. & Nurseries) which could ultimately be looked at quite independently, we would appreciate your addressing each segment of questions separately. This will help to orient your frame of mind. Overlaps between the two subject areas should be avoided.

If you feel you don't have great depth in some area don't feel you can't give an opinion. This is a policy issue and opinions are what we are seeking. If, however, you feel you can't give an opinion on one aspect just fill in the other aspects and proceed. This will in no way eliminate you since you can still vote or rate other's answers in the next round. Maximum partcipation helps the whole exercise become meaningful.

If you feel you need additional space to fully explain your answer or point of view please do so on an additional piece of paper. However, you must prefix this with the question and section number.

At the completion of the questionnaire, please fill out what you feel to be a reasonable assessment of the time it took to complete the questionnaire. While this may be a difficult task, it is important to the monitor group's decisions about their estimate of respondent times for later questionnaires.

instructions

Please fill out your answers directly on these pages where space is provided and return the WHOLE questionnaire in a sealed envelope to:

Thompson, Berwick, Pratt & Partners
1553 Robson Street, Vancouver, B.C. V6G 1C6

Attention: Ian Forbes

Please fill out:

1. NAME OF RESPONDENT:

   .....

2. MY ESTIMATE OF THE TIME REQUIRED TO FILL OUT THIS QUESTIONNAIRE IS:

   .....

3. ARE THERE EXTRA PAGES ADDED?

   YES (STATE NUMBER) ◯ NO. ◯

   .....

BACKGROUND TO STUDY

We feel that it is important in using a multi-disciplinary team of respondents to let each respondent know where he/she stands not only with regard to the total group, but to the specific point of view of the various disciplines involved.

Similarly where individuals feel they have a special area of expertise this should be reflected in the feedback. A typical example might be "of those claimed to be expert in this area only 30% agreed with this idea."

The following segment of the first questionnaire seeks this data. Please answer from your own personal point of view.

B1. ORIENTATION OF INTEREST

I would consider my point of view to most closely represented by:

AREA OF MOST ACTIVITY	PREDOMINANT POINT OF VIEW	
	MEDICAL	NURSING
ADMINISTRATION	○	○
ACADEMIC	○	○
FAMILY PRACTICE	○	○
NEONATOLOGY	○	○
OBSTETRICS	○	○
PEDIATRICS	○	○
CONSUMER	○	
OTHER	○	

(EXPLAIN)_____

_____

Select and check only ONE

B2. AREA OF EXPERTISE

In being asked to give your opinion in regard to the following issues of the Newborn, rate yourself as to your confidence in being accurate in your response, in regard to expected outcomes.

	VERY LIKELY TO BE ACCURATE				ACCURATE 50% OF THE TIME					ACCURATE 100% OF THE TIME	
A. National or Provincial Planning Policies	0	1	2	3	4	5	6	7	8	9	10
B. Legal and Ethical Outcomes	0	1	2	3	4	5	6	7	8	9	10
C. Intra-departmental functions within a hospital	0	1	2	3	4	5	6	7	8	9	10
D. Inter-departmental functions within a hospital	0	1	2	3	4	5	6	7	8	9	10
E. Staff Organization Issues	0	1	2	3	4	5	6	7	8	9	10
F. Staff Training Issues	0	1	2	3	4	5	6	7	8	9	10
G. Patient Family Issues	0	1	2	3	4	5	6	7	8	9	10
H. Environmental Safety	0	1	2	3	4	5	6	7	8	9	10
J. Equipment	0	1	2	3	4	5	6	7	8	9	10
K. Unit Administration	0	1	2	3	4	5	6	7	8	9	10

PLACE A CIRCLE AROUND ONE NUMBER IN EACH LINE

questions

SECTION 1

For a planner needing a definition of the following items give a single statement which conveys what you see to be the essential concept of:

1.1. NEWBORN NURSERY

1.2. INTENSIVE CARE NURSERY

TBP +P

questions

List under each section separately the most important long term OBJECTIVES that should be achieved in the planning of new units over the next 10 years. You should describe what are the problems to be overcome and what is the best solution to overcome them.

To give you some concept of time take a look back to 1968 and see what has happened in ten years and what might the objectives for 1978 have been in 1968.

1.3. NEWBORN NURSERIES

1.4. INTENSIVE CARE NURSERIES

TBP+ P

questions

SECTION 2

2. With regard to Functional Aspects (normal activities performed in order to have purposeful completion of tasks) list up to 5 policy criteria that you consider IMPORTANT to achieve (in their effect upon planning) under each general topic area below. Answer to issues in Newborn Nurseries separately from I.C.N.

   Again you should identify the problem to be addressed and the policy to overcome it.

   To assist you with your answer an example of "Policy Criteria" is given for a question on Surgery -

   "Infection Issues

   1) Nursing staff supplying O.R.'s with instruments and equipment held in the central sterile store should be the only ones with access to that area to ensure control of cross infection."

   This example addresses (1) a key issue (2) it has a specific objective to work to (3) solve a specific problem.

NEWBORN NURSERIES

2.1. Unit Size and Patient Mix

2.2. Patterns of Care

2.3. Infection Issues

NEWBORN NURSERIES

2.4. Staffing Issues

2.5. Parent Access Issues

2.6. Training/Education Issues

NEWBORN NURSERIES

2.7. Location in Relation to other Departments

2.8. Staff issues related to stress in the working environment

2.9. Supply Methods (to/from) & Materials Management Distribution Methods (within) the unit

NEWBORN NURSERIES

2.10. Visual Supervision of
Patients and Staff
Locational Issues

COMMENTS (PLEASE REFER TO SECTION NUMBER)

Again you should identify the problem to be addressed and the policy to overcome it.

Please add further Functional Aspects as you see fit. Add comments on any section in the space at the end or on an additional paper.

I.C.N.

2.11 Unit Size and Patient Mix

2.12 Patterns of Care

2.13 Infection Issues

I.C.N.

2.14 Staffing Issues

2.15 Parent Access Issues

2.16 Training/Education Issues

I.C.N.

2.17 Location in Relation to other Departments

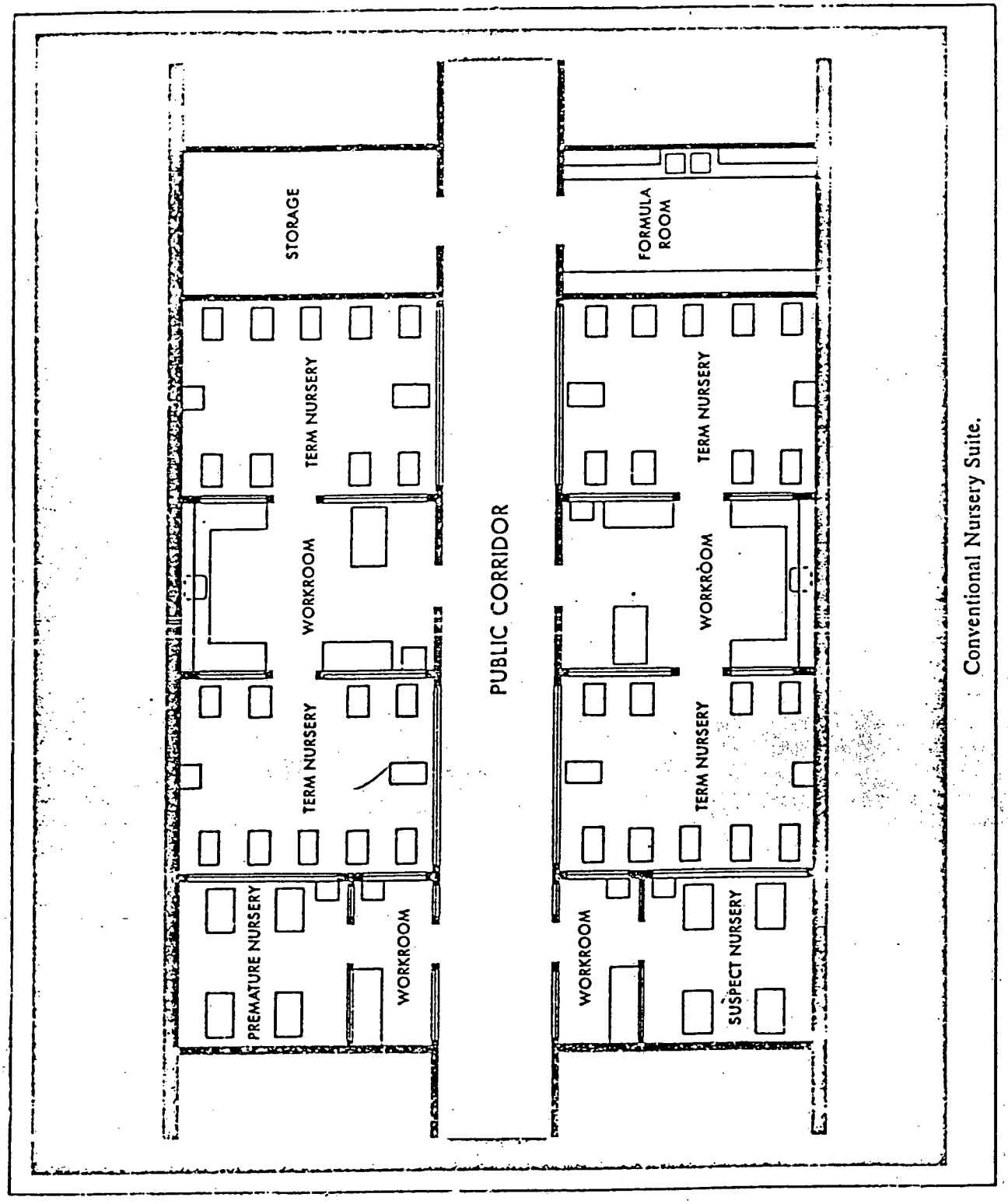
2.18 Staff issues related to stress in the working environment

2.19 Supply Methods (to/from) & Material Management Distribution Methods (within) the unit

I.C.N.

2.20 Visual Supervision of Patients and Staff Locational Issues

COMMENTS (PLEASE REFER TO SECTION NUMBER)



From Planning Guidelines by Ross Laboratories, Milwaukee, Wis. U.S.A.

DIAGRAM 1

TBP+P

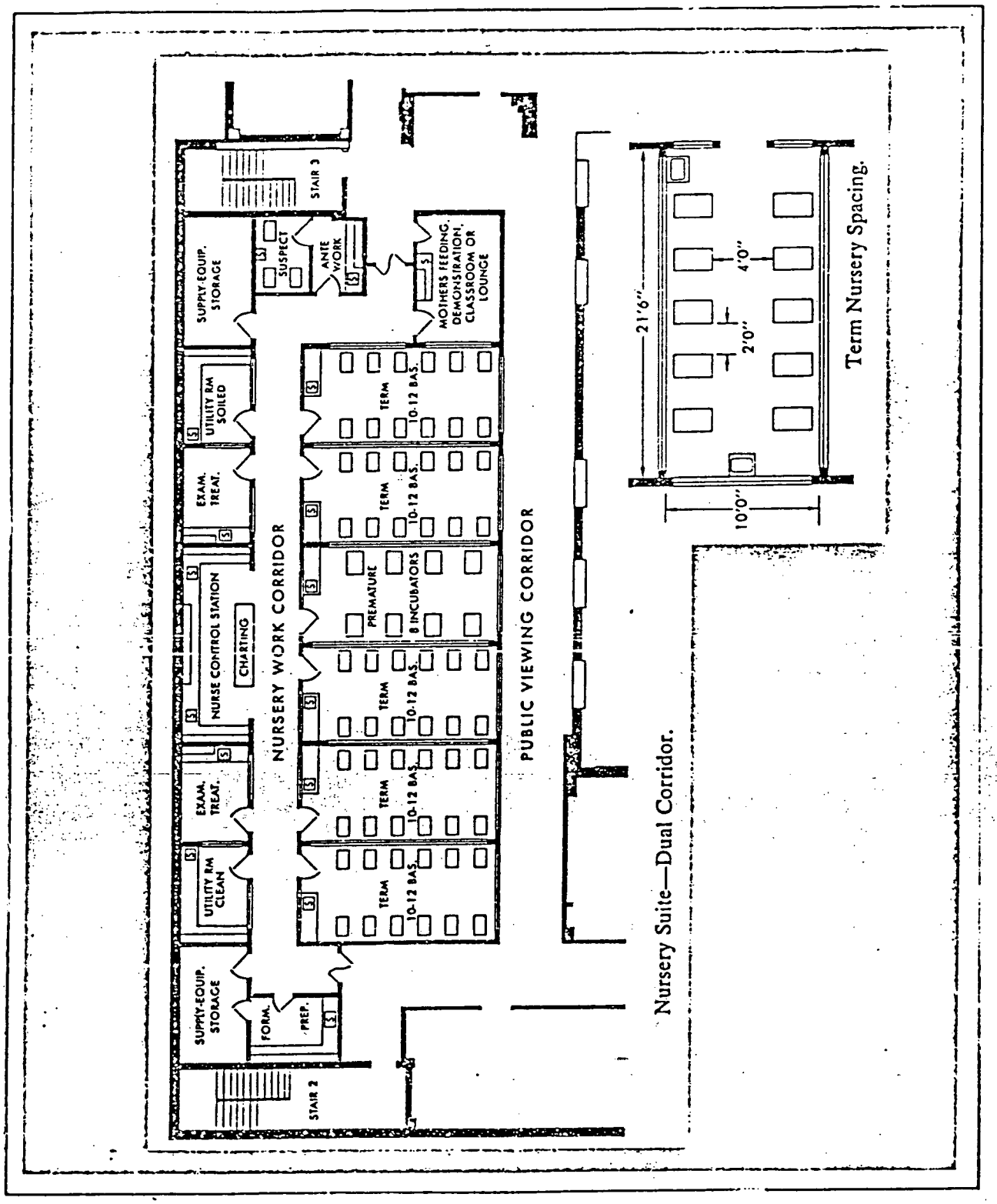


DIAGRAM 2

From Planning Guidelines by Ross Laboratories, Milwaukee, Wis. U.S.A.

SECTION 3

3. This section deals with architectural aspects, please give your opinion in each case even if you may not have any personal experience in one specific area. Your collective response will guide our action on the next questionnaire.

3.1. NEWBORN NURSERIES

The Single-corridor system of Diagram 1 has been unfavourably compared with the Double-corridor system of Diagram 2. Using the diagrams supplied, answer the following: (NOTE: The Diagrams are for the purpose of illustraing specific concerns not evaluation as examples of planning generally).

3.1.1. Staffing and Work flow pattern created by Diagram 1 are inefficient due to the multiple workrooms, and travel between nurseries and/or washrooms is time consuming because of continual gowning and scrubbing. This type of layout would be unacceptable for a new facility. Do you:

Strongly Agree ◯
Agree ◯
Have Neutral Feelings ◯ (select one)
Strongly Disagree ◯
No Opinion ◯

Comments: _____

_____

3.1.2. The workroom itself is unsatisfactory in Diagram 1, because it must support many dissimilar functions such as entry, gowning, clerical, charting, utilities and examination-treatment of the infant. Dissimilar functions require formal separation. Do you:

Strongly Agree ◯
Agree ◯
Have Neutral Feelings ◯ (select one)
Strongly Disagree ◯
No Opinion ◯

Comments: _____

TBP+P. _____ 20,

3.1.3. The American Academy of Pediatrics, Standards and Recommendations for Hospital Care of Newborn Infants (5th Ed.) says about Isolation rooms:

> Isolation rooms per se are unnecessary when (1) there is adequate nursing (see page 14) and medical staff so movement between patients is unhurried and there is always time for thorough hand washing; (2) there is sufficient space in the intensive care, observation, and intermediate care areas for a physical separation of 3 or 4 ft between infants (and the temptation is reduced to move from patient to patient without washing hands); (3) there are two wash basins for each nursery area; and (4) there is a continuing program of instruction for all nursery personnel on the mode of spread of infections.

Do you:

Strongly Agree ◯

Agree ◯

Neutral ◯ (select one)

Strongly Disagree ◯

No Opinion ◯

Comments:

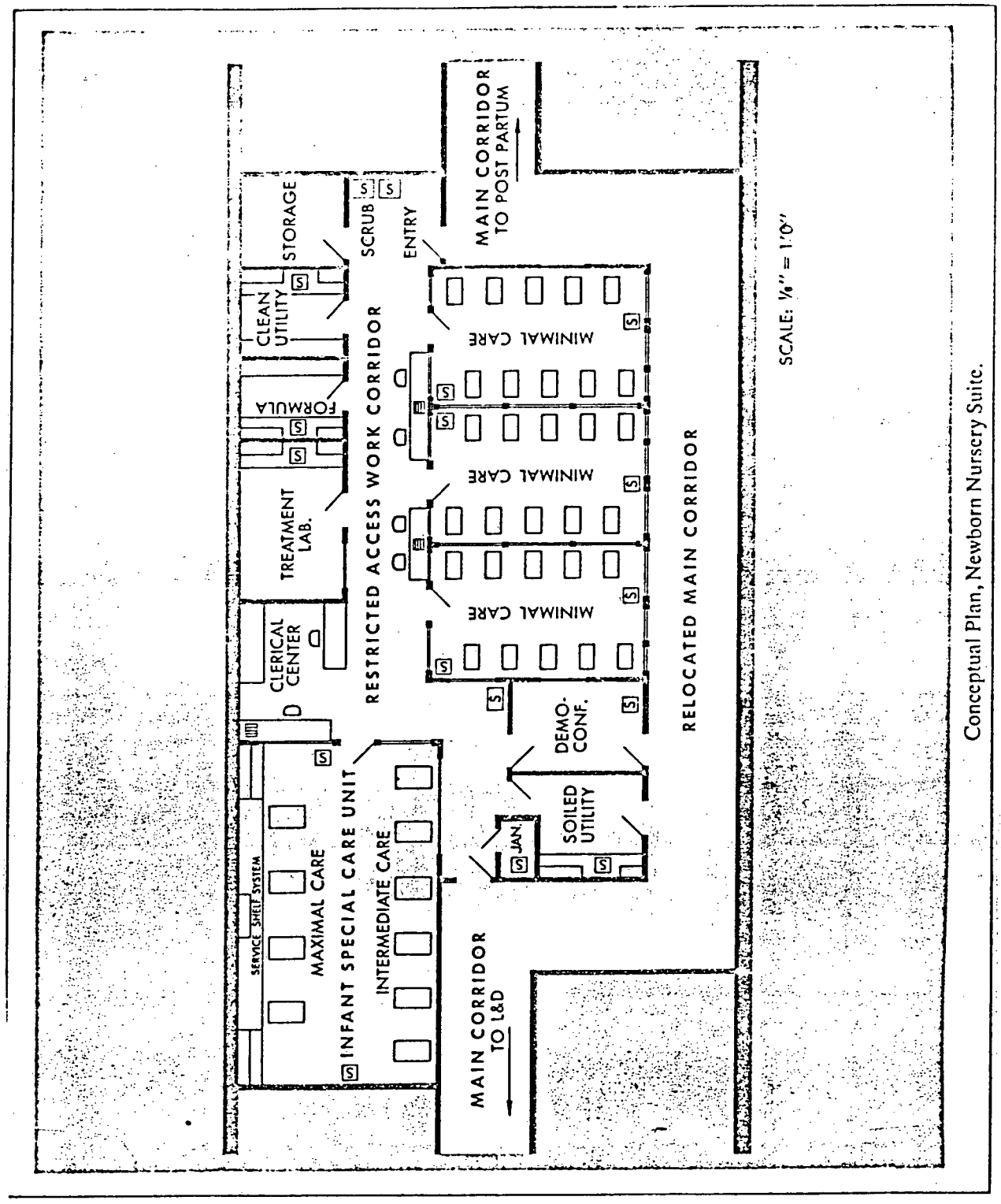


DIAGRAM 3

From Planning Guidelines by Ross Laboratories, Milwaukee, Wis. U.S.A.

TBP+P

3.1.4. In both Diagrams 2 and 3 the traffic patterns have been built around the concept that it is essential for nursery-staff traffic to be positively separated from general hospital and public traffic patterns. This necessitates an internal corridor linking all nursery components and another corridor for general traffic and parent viewing. This would then be a basic requirement of any new nursery facility. Do you:

Strongly Agree ◯
Agree ◯
Neutral ◯
Disagree ◯
Strongly Disagree ◯ (select one)
No Opinion ◯

Comments: _____

_____

3.1.5. The spacing shown on the insert of Diagram 2 provides the following standards for Term or Minimal Care nurseries.

(i) Clear space between sides of bassinets of 2'-0" (60 cm)
(ii) Clear space of aisle between sides of cribs of 4'-0" (120 cm)
(iii) A minimum area of 21 sq. ft. (2 sq. m) per bassinet of floor for the enclosed room space containing the infants.
(iv) Bassinet set clear of wall or obstruction by 6" (15 cm)

These are:

An acceptable minimum ◯
Not acceptable ◯ (select one)

Explain: (or comment)

In Diagram 3 a Special Care Unit is included with two levels of care, Intermediate (below "intensive" and might include stabilized, low-birth-weight infants and graduates from "intensive" care) and Maximal (infants with life threatening conditions). The standards are:

3.1.6. Intermediate

(i) Clear space between the sides of the incubator or bassinets to be a minimum of 3'-0" (90 cm)
(ii) Clear aisle width of 4'-0" (120 cm) from any protrusion on incubator or bassinet.
(iii) An area of 30 sq. ft. (2.8 sq. m) in addition to the size of each incubator or bassinet (assume 6 sq. ft. (56 sq. cm) for the enclosed room space containing the infants.
(iv) Bassinets or incubators set 6" clear of wall or unit.

These are:

An acceptable minimum ◯
Not acceptable ◯ (select one)

Explain: (or comment)

3.1.7. Maximal Care would be the same as NICN spaces, namely:

(i) Space between 4'-0" (120 cm)
(ii) Aisles clear of protrusion 5'-0" (150 cm)
(iii) An area of 55 sq. ft. (5 sq. m) in addition to the size of each incubator for the enclosed room space containing the infants.

These are:

An acceptable minimum ◯
Not acceptable ◯ (select one)

Explain: (or comment)

3.1.8. Where the requirements for doing without an isolation nursery cannot be met (ref. 3.1.3.) the following are the proposed minimums:

(i) Required to have a minimum of two spaces with an acute room and nursery proper. Access to nursery is through anteroom.
(ii) The anteroom must contain space for a scrub unit, gowning space, charting area and supply cabinet or shelves and cart and soiled linen hamper.

(iii) The Isolation nursery must contain a maximum of two incubators with an enclosed space of 33 sq. ft. (3 sq. m) per incubator.
(iv) Incubators must be spaced 3'-0" (90 cm) apart.
(v) Aisle width of 4'-0" (120 cm) required.

These are:

An acceptable minimum ○
Not acceptable ○ (select one)

Explain: (or comment)

questions

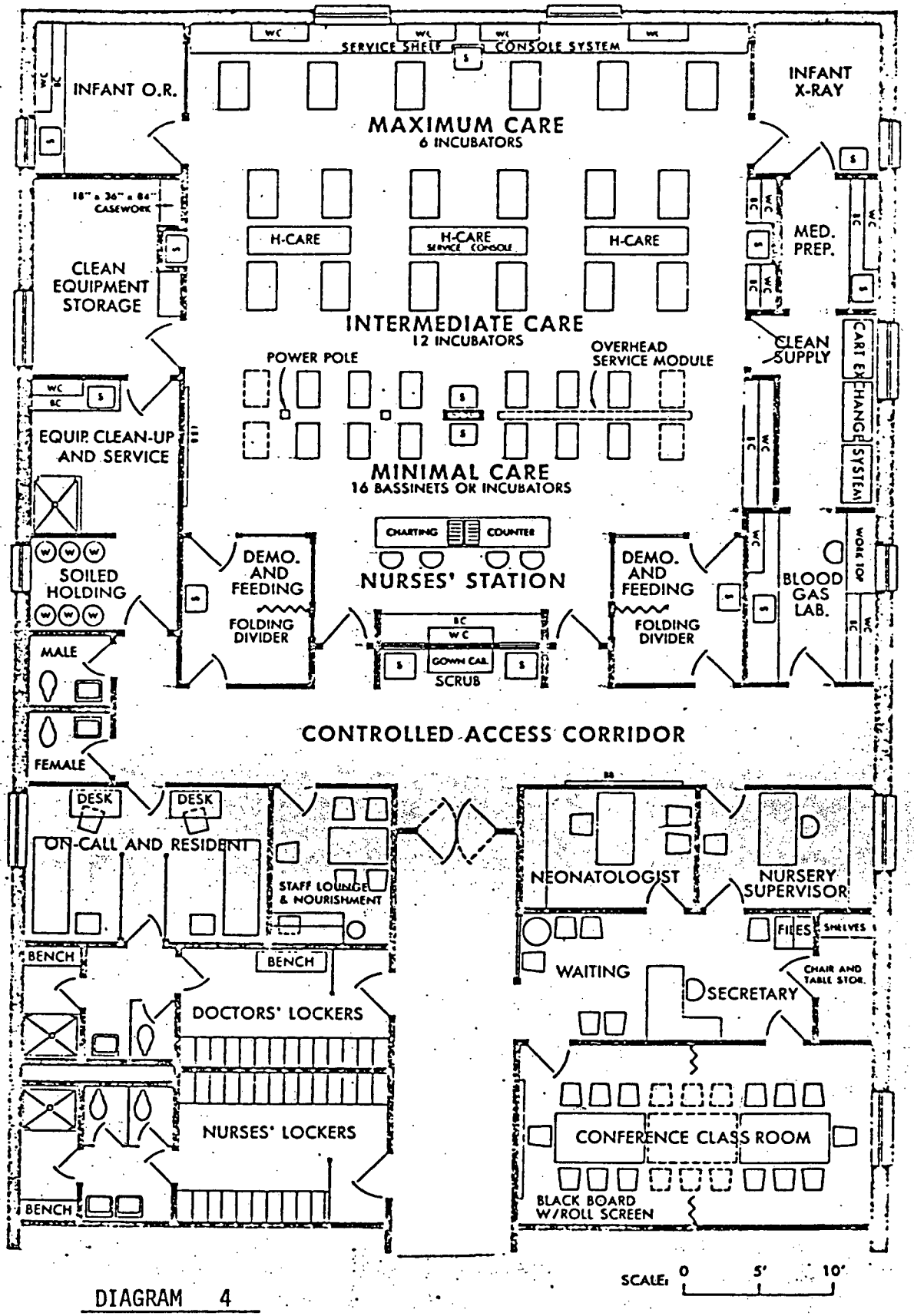


DIAGRAM 4

3.2. NEONATAL INTENSIVE CARE UNITS

3.2.1. The most desirable shape or configuration for a N.I.C.U. nursery is one that is as square as possible with a maximum of open space. Do you:

Agree ◯ Disagree ◯ (State why)

Explain: (or comment)

3.2.2. An N.I.C.U. should operate within its own environmental area, exclusive of other hospital functions and activities (such as at a dead-end corridor or in a by-pass). Do you:

Agree ◯ Disagree ◯ (State why)

Explain: (or comment)

3.2.3. Spacing between and around bassinets and incubators in the N.I.C.U. nursery would be dependent upon the mix of levels of care appropriate to the specific unit. They would, for each level, be the same as for Minimal, Intermediate or Maximal Care as suggested under Newborn Nurseries Section 3.1.5., 3.1.6., 3.1.7. Do you:

Agree ◯ Disagree ◯ (State why)

Explain: (or comment)

3.3. MECHANICAL CONSIDERATIONS

3.3.1. Heating Ventilating and Air Conditioning (Choose the appropriate answer in each column.)

	N. NURSERY	N.I.C.U.
1. In addition to any stabilized incubator air, the unit must have controlled air by:		
Heating only	○	○
Cooling only	○	○
Heating and Cooling (Air Conditioning)	○	○
Other (explain)	○	○
2. A temperature range of 68°F to 72°F (20°C to 22°C) is:		
Acceptable	○	○
Should be otherwise (state range)	○	○
3. A relative humidity of 50 percent + or - 5 percent is:		
Acceptable	○	○
Should be different (state range)	○	○
4. Incoming clean air should be filtered, not recirculated and room air changed a minimum of 12 times per hour.		
Acceptable	○	○
Should be different (state range)	○	○

3.3.2. Plumbing (Check the appropriate answer in each column)

	N. NURSERY	N.I.C.U.
1. Sinks in worktops should be:		
Stainless Steel	○	○
Porcelain Material	○	○
2. Wall mounted sinks used for hand washing should be:		
Stainless Steel	○	○
Porcelain Material	○	○

3. (Combine the appropriate number combinations in each column)

With regard to the operation of taps they should be:

A.	All taps	1.	Knee operated	
B.	Taps in Nursery Areas	2.	Foot operated	
C.	Taps in Ancillary Areas	3.	Wrist or elbow action	
D.	Other (explain)	4.	Other (explain)	

4. Give your preference for ONE of the following. In Infant Care Areas sinks should be placed:

. One per room of up to 12 infants	○	○
. Two per room of up to 12 infants	○	○
. In rooms larger than 12 infants at least one per 12 infants	○	○
. In rooms larger than 12 infants at least one per 6 infants	○	○

TBP+P

5. Briefly describe (or give the model of a similar type) the sink(s) required in the Soiled Utility Room. Also explain what function this unit performs.

3.3.3. Gas Outlets (Check the appropriate box - one per area)

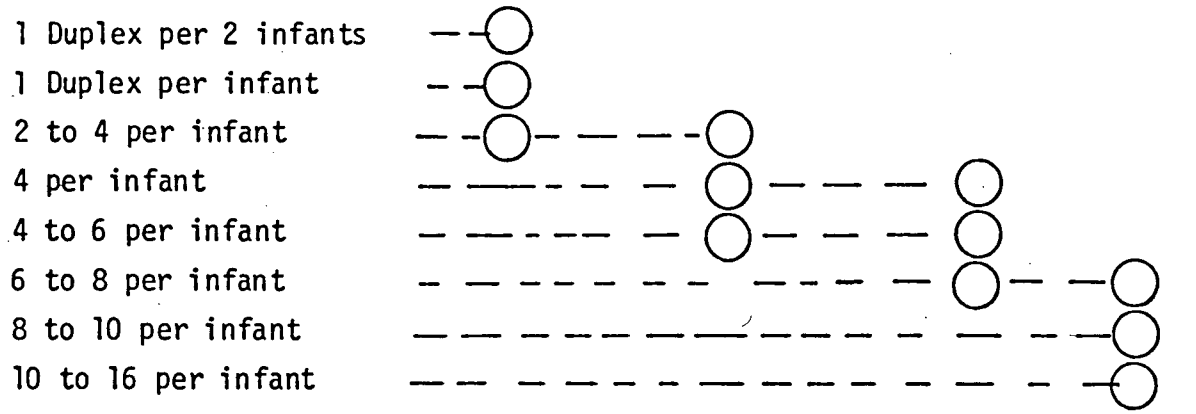
OUTLETS \ LEVEL	MINIMUM	INTERMEDIATE	MAXIMAL (N.I.C.U.)
Oxygen	1 per 2 infants ◯	1 per 2 infants ◯	2 per infant ◯
	1 per infant ◯	1 per infant ◯	3 per infant ◯
(State)	Other ◯	Other ◯	Other ◯
Vacuum	1 per 2 infants ◯	1 per 2 infants ◯	2 per infant ◯
	1 per infant ◯	1 per infant ◯	Other ◯
(State)	Other ◯	Other ◯	
Compressed Air	1 per 4 infants ◯	1 per 2 infants ◯	2 per infant ◯
	1 per 2 infants ◯	1 per infant ◯	Other ◯
(State)	Other ◯	Other ◯	

3.3.4. Heights of the gas outlets above the floor should be: (state range)

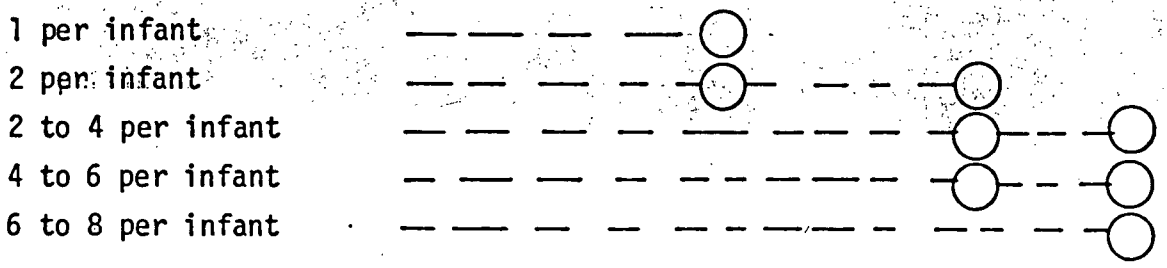
3.4. ELECTRICAL CONSIDERATIONS

3.4.1. Power

1. OUTLETS / LEVEL



2. Emergency Power Outlet



3.4.2. Heights of electrical outlets above floor should be:
(State range)

3.4.3. A suggested performance specification for illumination (artificial & natural) is as follows:
(Briefly outline criteria)

3.4.4. Telephone and Communications systems should consist of at least the following:
(Briefly outline criteria)

APPENDIX B

Round Two Questionnaire

instructions

INSTRUCTIONS

READING THE QUESTIONNAIRE

We request that you read carefully through the questionnaire BEFORE you start to answer. This will avoid the possibility of providing answers in one section that are more appropriate later. This occurred in a number of cases not allowing the panel members to utilize the space provided for the appropriate concept.

HANDLING THE VOLUME OF WORK

A number of people had great difficulty with getting started because of what they perceive to be the great volume of work involved. It caused others to rush because they may have felt it required a block of time and left it too late.

In our initial premise we recognized your time as limited and as such the three sections into which we have broken the questionnaire should allow you the option of:

(i) Doing it in three distinct phases in depth.
(ii) Developing in depth a section or parts of a section in which you have a great deal to contribute and moving over other areas rapidly.
(iii) Doing part at a time as you get time free without loss of continuity across the study.
(iv) Doing the whole questionnaire in one piece.

Please get started as soon as the questionnaire arrives so that we can receive your responses quickly.

CONDENSATION OF MATERIAL GENERALLY

Due to the quantity of answers supplied it was necessary to reduce the information in order that you could cope with a further response. This was done in the following way:

instructions

CONDENSATION OF MATERIAL GENERALLY ...continued

(i) By identifying where people were saying the same thing in different ways and rewording these into one statement.
(ii) Where there was any doubt as to whether there was actually the same thing being said statements are included which vary from the reworded one.
(iii) By summarizing a statement keeping as much of the original statement as possible.
(iv) By copying the statement as written when it would lose its meaning if altered.
(v) Where answers were more appropriate to another section we have moved them.

We realize that in doing this we may have missed nuances you intended and they have been omitted. If this is the case please use the space provided to explain the omission and it will be recorded for the next round.

SOLICITING COMMENTS

The sections required to be rated are also designed to give you the opportunity to comment or especially enlarge on the issue identified. This is where you can develop an idea that has been presented by someone else but you have some ideas about. Please use the space provided as this will enhance the results.

Please fill out:

1. NAME OF RESPONDENT:

.....

2. ARE THERE EXTRA PAGES ADDED?

YES (STATE NUMBER) ◯ NO. ◯

questions

SECTION 1

In looking at the definitions supplied it would seem that the essential elements of Nurseries and Neonatal Intensive Care would be encompassed in the following.

1.1 NEWBORN NURSERY

A Newborn Nursery would be an area which is designed for selectively holding:

(i) Well babies.
(ii) Newborns who at birth appear normal.
(iii) Full-term newborns

during their hospital stay, when not in the care of their mothers for the purpose of:

(iv) Routine care with continued observation (visual and aural) and assessment by experienced staff to detect aberrations from normal behaviour.

The built space provided must:

(v) Have all the facilities to care for these infants safely (feeding, bathing, monitoring - weight, temperature, jaundice).
(vi) Be geographically separate in each post partum unit.
(vii) Be close in proximity to the post partum ward so that mother-infant interaction is encouraged as well as father-infant-mother interaction.
(viii) Be supportive of activities aimed at furthering the education of parents, siblings, nursing and medical staff.

Do you agree that this definition includes all the elements sufficient to provide a clear concept of Newborn Nurseries?

YES ◯ NO ◯ (if no explain why)

PLEASE ADD FURTHER COMMENTS OR INCLUSIONS

1.2 INTENSIVE CARE NURSERIES

An Intensive Care Nursery is a special care unit within a hospital for the selective provision of 24 hour continuous care and observation of any high risk (compromised) infant, including the care of well neonates with whom an emergency situation has occurred. This care includes provision:

(i) Through extensive and complicated procedures using advanced technology supportive to basic physiological systems.
(ii) By ensuring staff having specialized training with the provision of on-going education.
(iv) Of graded areas of care for management of acute and intermediately ill infants.
(v) That the intensity of care will not vary during the 24 hours of any one day.

The built space provided must allow for:

(vi) The categories of care of intensive, intermediate, convalescent/growing and isolation.
(vii) Providing psychological aspects - bonding, touching and visiting areas.
(viii) Transition or observation nursing where infants at risk can be observed during the first few critical hours of life as a separate part of ICN so that unnecessary staff anxiety is reduced.
(ix) Being self contained with respect to providing equipment, supplies, materials, staff and easy access to Radiology and laboratory support.

Do you agree that this definition includes all the elements sufficient to provide a clear concept of Intensive Care Nurseries?

YES ◯ NO ◯ (if no explain why)

PLEASE ADD FURTHER COMMENTS OR INCLUSIONS

INSTRUCTIONS

INSTRUCTIONS

Your responses to the first round are collected in the following section. You are asked to rate each answer according to a value of between 1 and 5 for each of the three scales.

The three scales are described in general terms in the following pages. Read them and relate the scale definitions to each question to give you a basis for deciding.

NOTE: The three scales are separate and can be at variance. It is, for example, quite possible for something to be very important, highly desirable and completely unfeasible.

This round gives you the opportunity to see the collected responses to the first round questions. Because it is not the roll of the monitors to decide what should be considered valid, important, etc., you must collectively decide by the rating system which should be included.

Further comments are welcome and important.

INSTRUCTIONS

IMPORTANCE SCALE

Scale Reference	Definitions
1. Very Important	A most relevant point First order priority Has direct bearing on major issues Must be resolved, dealt with or treated
2. Important	Is relevant to the issue Second order priority Significant impact but not until other items are treated Does not have to be fully resolved
3. Moderately Important	May be relevant to the issue Third order priority May have impact May be a determining factor to major issue
4. Unimportant	Insignificantly relevant Low priority Has little impact Not a determining factor to major issue
5. Most Unimportant	No priority No relevance No measurable effect Should be dropped as an item to consider

DESIRABILITY/BENEFITS SCALE

Scale Reference	Definitions
1. Highly Desirable	Will have a positive effect and little or no negative effect Benefits will far outweigh costs Justifiable on its own merit Valued in and of itself
2. Desirable	Will have a positive effect with minimum negative effects Benefits greater than costs Justifiable in conjunction with other items Little value in and of itself
3. Neither Desirable nor Undesirable	Will have equal positive and negative effects Benefits equal costs May be justified in conjunction with other desirable or highly desirable items No value in and of itself
4. Undesirable	Will have a negative effect with little or no positive effect Costs greater than benefits May only be justified in conjunction with a highly desirable item Harmful in and of itself
5. Highly Undesirable	Will have major negative effect Costs far outweigh any benefit Not justifiable Extremely harmful in and of itself

FEASIBILITY/PRACTICALITY SCALE

Scale Reference	Definitions
1. Definitely Feasible	Can be implemented No research and development work required (necessary technology is presently available) No risk in its implementation. Definitely within available resources No major political roadblocks Will be acceptable to general public and staff.
2. Probably Feasible	Some indication this can be implemented Some research and development work required (existing technology needs to be expanded and/or adopted) Little risk in implementing Available resources would have to be supplemented Some political roadblocks Some indication this may be acceptable to the general public and staff
3. May or May Not be Feasible	Contradictory evidence this can be implemented Indeterminable research and development effort needed (existing technology may be inadequate) Possibly a risk in implementing Increase in available resources would be needed Political roadblocks Some indication this may not be acceptable to the general public and/or staff.

FEASIBILITY/PRACTICALITY SCALE .....continued

Scale Reference	Definitions
4. Probably Infeasible	Some indication this cannot be implemented Major research and development effort needed (existing technology is inadequate) Risky Large scale increase in available resources would be needed Major political roadblocks Not acceptable to a large proportion of the general public and/or staff
5. Definitely Infeasible	Cannot be implemented (unworkable) Basic research needed (no relevant technology exists, basic scientific knowledge lacking) High risks associated with implementation Unprecedented allocation of resources would be needed Politically unacceptable Completely unacceptable to the general public and/or staff

1.3 NEWBORN NURSERIES

Rate the following according to IMPORTANCE, DESIRABILITY AND FEASIBILITY in the column given. The comments column provides for your noting anything with respect to the individual issue rated. Any comments or additional issues you feel relate to this whole section should be placed in the ADDITIONAL INCLUSIONS space at the end, or on a separate sheet.

OBJECTIVES	IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
1.3.1 The increase of family oriented prenatal care is of primary significance and the enrivonment created should encourage parent, sibling, nursing involvement.				
1.3.2 Because of this and the possible reduced length of stay, the size and complexity of the nursery (central) should be minimized.				
1.3.3 Designers must provide flexible space which will allow for fluctuations in the numbers of infants.				
1.3.4 The design of the nursery should be such to allow the mother the choice as to whether she wishes to have the infant rooming-in or kept in the nursery between feeds, as well as having the ability to change her mind during any given day.				

1.3 NEWBORN NURSERIES ...continued

OBJECTIVES		IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
1.3.5	It should be possible for babies to spend a considerable amount of time away from the nursery with parents.				
1.3.6	An interdisciplinary approach is crucial especially considering the consumers requirement.				
1.3.7	Need to develop an attitude in patients so as to consider the time in the hospital as a time of learning (more satisfactory and complete parent education).				
1.3.8	We should design to encompass current realistic attitudes to infection based on sound modern infection control principles.				
1.3.9	Designers should develop continuous planning processes considering all aspects of the philosophy of nursing by the application of a systems approach to give planners current information on a continuous basis.				

1.3 NEWBORN NURSERIES ...continued

OBJECTIVES		IMPORT 1 to 5	DESIR 1 to 5	FEAS 1 to 5	COMMENTS
1.3.10	We should reduce costs by decreasing the length of the hospital stay with safe delivery in the hospital setting then quick discharge and trained follow-up in the community.				
1.3.11	Where length of stay is reduced smaller nurseries adjacent to the mothers room (or shared between two rooms) can be provided for those mothers/babies where the stay is longer.				

Please place any general comments on this Section or additional objectives below.

ADDITIONAL INCLUSIONS

1.4 INTENSIVE CARE NURSERIES ...continued

Rate the following according to IMPORTANCE, DESIRABILITY AND FEASIBILITY in the column given. The comments column provides for your noting anything with respect to the individual issue rated. Any comments or additional issues you feel relate to this whole section should be placed in the ADDITIONAL INCLUSIONS space at the end.

OBJECTIVES	IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
1.4.1 The size of units is a problem related to high levels of stress, complexity of work, numbers of staff, amount of machinery - there is a forced limit to size which must be recognized.				
1.4.2 These limits suggest independent subsidiary units rather than large regional centres because of size problem and family disruption.				
1.4.3 There should be recognition of the numbers of staff and the need for their support spaces e.g. individual offices.				
1.4.4 More attention to and research into all the physical aspects of the ICN which tend to increase the stress levels of staff reducing the staff morale and their ability to function optimally through a) design - an optimum size of ICN and space for infants with hidden services, unobtrusive equipment is necessary.				

1.4 INTENSIVE CARE NURSERIES ...continued

OBJECTIVES	IMPORT 1 to 5	DES. 1 to 5	FEAS. 1 to 5	COMMENTS
1.4.4 ...continued b) environment - optimum compromise between total environment for the sick infant and the personnel must must be made. c) equipment - space for storage to avoid congestion is needed. d) communications - optimize without interference upon the overall environment. e) noise level - minimize both internal and external. f) stationery equipment - make the best use possible without intrusion on overall space design.				
1.4.5 There should be recognition of need for provision of adequate disciplines involved in the ICN (e.g. social service, respiratory service, biomedical engineering, etc.)				
1.4.6 A great deal more emphasis on staff education is required.				
1.4.7 There must be improved facilities for education and preparation of the family prior to discharge - parent education programs.				

questions

1.4 INTENSIVE CARE NURSERIES ...continued

OBJECTIVES	IMP. 1 to 5	DES. 1 to 5	FEAS. 1 to 5	COMMENTS
1.4.7 ...continued - provision of bedrooms where mother and baby can room-in until mother feels sufficiently confident to go home.				
1.4.8 There must be a positive attempt to defuse the intensity of the physical environment as the infant moves nearer to discharge.				
1.4.9 There is a present major shortcoming in our inability to control bacterial colonization of neonatals. Control will require a better understanding of how bacteria spread and how units can best be designed to minimize spread. This research is needed.				
1.4.10 There is need for a suitable area within the nursery clean area where parents can have privacy to grieve and hold their dying or dead child.				
1.4.11 There will be an increase of sophisticated equipment and related nursing techniques causing an increase of Class III infants, therefore, improved transfer facilities are required.				

1.4 INTENSIVE CARE NURSERIES ...continued

OBJECTIVES	IMPORT 1 to 5	DES 1 to 5	FEAS. 1 to 5	COMMENTS
1.4.12 There is a need to develop a continuous planning process considering all aspects of the philosophy of nursing by the application of a systems approach to give planners current information on a continuous basis.				

Please place any general comments on this Section or additional objectives below.

ADDITIONAL INCLUSIONS

SECTION 2

2. FUNCTIONAL ASPECTS

In this section you will be presented with the condensed material to rate. These are the responses from all panel members with a wide range of issues addressed. Think carefully about them and rate them keeping in mind the context of Functions. This is feedback material for your evaluation.

In this section you will also be presented with your new input material related to linking of functional sequences or activities. This is developed to discover Why or How the operations take place as distinct from What operations should take place.

PLEASE REMEMBER:

(i) Read through the material carefully first.
(ii) Do not feel compelled to answer at one time.
(iii) Note that the rating scales deal with SEPARATE aspects and can be in conflict if you feel they should.

Rate the following in terms of IMPORTANCE, DESIRABILITY AND FEASIBILITY.

2.1 UNIT SIZE AND PATIENT MIX

ISSUES		IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
2.1.1	The size is a multiple of the average number of infants one nurse is considered able to care for within an area.				
2.1.2	The average infant numbers are 6-8, therefore, unit size should be multiples of 6-8.				
2.1.3	Nursing staff size should be sufficiently large to enable adequate nursing coverage during coffee-meal breaks.				
2.1.4	Minimum of 4 hours of care/ day/infant is required unless nursing ratio is increased.				
2.1.5	A nursing ratio of 1-8 infants is required.				
2.1.6	The size relates to post unit which is best at 25 patients.				
2.1.7	10-12 healthy normal term infants per nursing unit.				
2.1.8	16 infants maximum.				

questions

2.1 UNIT SIZE AND PATIENT MIX ...continued

ISSUES	IMP. 1 to 5	DES. 1 to 5	FEAS 1 to 5	COMMENTS
2.1.9 For planning purposes the size should be determined by allocating sq. ft. per crib.				
2.1.10 The patient mix should be determined by the need of the individual hospital in relation to the needs of the area/region served.				
2.1.11 There is a move afoot in Britain primarily to allow more immature and sicker infants to be nursed closer to the mother's location and often in her room to enable and facilitate family bonding. This requires upgrading of nursery skills (entails a change of staffing orientation and education). Flexibility in planning spaces is needed if such a policy were adopted here.				
2.1.12 Complete separation from ICN is essential				
2.1.13 Any well newborn - exclusive of those requiring isolation - can be housed.				

2.1 UNIT SIZE AND PATIENT MIX ...continued

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS

questions

2.2 PATTERNS OF CARE

ISSUES	IMPORT 1 to 5	DES. 1 to 5	FEAS. 1 to 5	COMMENTS
2.2.1 Mothers should have the choice as to whether they wish to have their infant in their room with them at all times or at particular times of the day and to have the ability to place them under the care of a satisfactorily trained nurse in the nursery when the mother so wishes.				
2.2.2 The encouragement of family centred concept of care would not require specific patterns of care in this area.				
2.2.3 As rooming-in increases the nursery will become a temporary holding area.				
2.2.4 In order to encourage parent involvement this can be accomplished through group participation and teaching so the nursery and post-partum ward functions as a unit.				
2.2.5 Flexibility of staffing and attitudes so that mother and father can relax and enjoy the event of the new baby.				

2.2 PATTERNS OF CARE ...continued

ISSUES	IMP. 1 to 5	DES. 1 to 5	FEAS. 1 to 5	COMMENTS
2.2.6 Patterns include the need to assess the infants during first feeding with the mother and after feeding; every shift, check for jaundice.				
2.2.7 Shift changes, etc., should not interfere with routines of care.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS

2.3 INFECTION ISSUES

ISSUES	IMP. 1 to 5	DES. 1 to 5	FEAS. 1 to 5	COMMENTS
2.3.1 It is imperative that there be adequate readily accessible sinks in optimum walking distances from every infant to facilitate good handwashing techniques.				
2.3.2 Adequate gowning facilities are essential (and related handwashing) at the access to the nursery.				
2.3.3 Controlled access to the nursery to prevent those not permitted to enter from doing so and to enable those permitted to do so and to be monitored for their infection control techniques.				
2.3.4 Policies of "dress" and handwashing must be established and provision made for teaching staff and parents technique.				
2.3.5 Important Technique include: - All staff including medical staff scrub and gown. - Nursing staff should remove watches and jewellery.				

2.3 INFECTION ISSUES ...continued

ISSUES	IMPORT 1 to 5	DES 1 to 5	FEAS. 1 to 5	COMMENTS
2.3.5 ...continued - Parents and/or siblings with symptoms of an infection should not enter nursery.				
2.3.6 As per 'Control of Infection' in Recommended Standards for Maternity and Newborn Care - Health and Welfare Canada 1975: in addition - infants born to mothers with suspect (TORCH) infections who appear healthy with no evidence of infection may be handled in the normal nursery. - infants born to mothers with known Australian Antigen shall not be isolated and may be cared for in the normal nursery. - infants born to mothers with perinatal infection shall be individually assessed usually by an MD and may be handled in the normal nursery.				
2.3.7 There must be the physical ability to separate Clean and Dirty Utility to control cross infection at the bassinette and in the general nursery area.				

2.3 INFECTION ISSUES ...continued

ISSUES	IMPORT 1 to 5	DES. 1 to 5	FEAS. 1 to 5	COMMENTS
2.3.8 Adequate sterile supply storage and turnover system is essential.				
2.3.9 Enough floor space/patient unit to reduce possibility of cross infection.				
2.3.10 No isolation room - a small area set aside with flexible use for emergencies of well babies.				
2.3.11 There is a need for separate Isolation Area(s) with provision for handwashing and gowning adjacent.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS

2.4 STAFFING ISSUES

ISSUES	IMPORT 1 to 5	DES 1 to 5	FEAS 1 to 5	COMMENTS
2.4.1 A qualified nurse must be located physically within the nursery at all times when there are babies in the nursery as constant supervision of infants with quick communication systems is essential.				
2.4.2 There is a need for a definition of adequate staff for adequate care in post-partum. After safety the most important and time consuming of all is the teaching function, therefore, reducing staff in the evening and night must be viewed with caution.				
2.4.3 The concept of a mother/baby/nurse team is used whereby one nurse looks after the total care of a mother and baby including her education.				
2.4.4 Allocation of staff will depend upon the availability of appropriately trained staff but should not exceed 1 R.N./L.P.N. to 4 mothers plus babies.				
2.4.5 Combined nursery and obstetric care should be encouraged such that nursery coverage could be reduced to 2 per 10-12 infants.				

2.4 STAFFING ISSUES ...continued

ISSUES	IMPORT 1 to 5	DES. 1 to 5	FEAS 1 to 5	COMMENTS
2.4.6 Nursing ratio 1-8 bassinettes with maximum of 16 bassinettes per room or area.				
2.4.7 Staff must have orientation, be experienced and be able to demonstrate clinical procedures.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS

2.5 PARENT ACCESS ISSUES

ISSUES		IMPORT 1 to 5	DES 1 to 5	FEAS 1 to 5	COMMENTS
2.5.1	It is vital for parents to have access to newborns to facilitate the bonding process.				
2.5.2	Since there is a conflict between the need for access to the child by parents and a need for security to prevent infection, hospital policies will vary with regard to nursery access.				
2.5.3	Hospital policy varies as follows: - some hospitals do not allow parents to enter the nursery - others encourage mothers to demand feed and encourage them to relate closely to nursery staff in the nursery but prevent mothers from entering nursery - others allow mothers free access to nursery - others allow controlled access to nursery.				
2.5.4	Free access is probably not desirable in order to prevent mothers passing any infectious diseases or viruses to other infants.				
2.5.5	Mothers should be allowed and encouraged into the nursery.				

2.5 PARENT ACCESS ISSUES ...continued

ISSUES		IMPORT 1 to 5	DES. 1 to 5	FEAS. 1 to 5	COMMENTS
2.5.6	Facility is needed for mothers who choose to stay in the nursery near supervision and support to enable observation of parent/ baby interaction, plus teaching needed.				
2.5.7	Nursery should be in close proximity to maternal ward.				
2.5.8	Where possible, the mother should be involved in normal nursing routines of her infant.				
2.5.9	When mother does not have a private room there should be a separate facility for visiting privileges for the entire family.				
2.5.10	Rooming-in should be encouraged in all cases.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS

2.6 TRAINING/EDUCATION ISSUES

ISSUES		IMPORT. 1 to 5	DES. 1 to 5	FEAS. 1 to 5	COMMENTS
2.6.1	Demonstration/conference room is needed for training and educating nurses, parents and medical staff.				
2.6.2	The hospital stay is a teaching opportunity and personnel should be designated to assist parents.				
2.6.3	Can see the emergence of Canadian "midwives" as the coming trend. Would provide not only trained individuals who could support the work of the doctor during pregnancy, labour and delivery post-partially in the hospital/ clinic settings - but would provide community follow-up for the new family unit. These programmes could be developed to provide personnel to assist with parent education.				
2.6.4	Head nurse (or nurse in charge) responsibility is significant in maintaining quality of care and should have academic background plus demonstrated experience.				

2.6 TRAINING/EDUCATION ISSUES ...continued

ISSUES		IMP. 1 to 5	DES. 1 to 5	FEAS. 1 to 5	COMMENTS
2.6.5	A planned on-going programme should be developed to assess nursing skills, methods of practice and introduce new techniques.				
2.6.6	Education is specific to the care of newborn and maternal/infant interactions so implementation of post-basic programmes is essential.				
2.6.7	Nurses should rotate perhaps for up to 1 week per year through an ICN to appreciate the care of a critically ill child so that acute emergencies which occur in a normal nursery may be more appropriately handled.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS

2.7 LOCATION IN RELATION TO OTHER DEPARTMENTS

ISSUES		IMP. 1 to 5	DES. 1 to 5	FEAS. 1 to 5	COMMENTS
2.7.1	Must be a central part of the post-partum unit.				
2.7.2	Must be close to ICN so that staff and facilities can be available very rapidly in an emergency.				
2.7.3	Adjoining to labour area is important.				
2.7.4	Access via the maternal care area will limit traffic to the nursery.				
2.7.5	Only reasonable access to diagnostic and treatment departments because need of services by well babies is infrequent.				
2.7.6	Post-partum unit (along with nursery) should be far away from areas where other patients may be nursed with infectious problems.				
2.7.7	Use of glass to maintain continuous visibility is valuable.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS

2.8 STAFF ISSUES RELATED TO STRESS IN THE WORKING ENVIRONMENT

ISSUES		IMP. 1 to 5	DES. 1 to 5	FEAS. 1 to 5	COMMENTS
2.8.1	Stress is minimal here because of nature of patients - with rooming-in and more active parental involvement.				
2.8.2	In this area stress arises from - inadequate staffing and/or inadequately prepared staff through poorly organized staff-patient care patterns.				
2.8.3	By cross-training staff with labour/delivery, maternity care and ICN, provides better utilization of staff and considerations of stress levels, due to working outside areas of expertise, is reduced.				
2.8.4	General staff meetings attended by all general duty nurses with an open forum to discuss issues of concern should be encouraged.				
2.8.5	Interdisciplinary communication is essential.				

STAFF ISSUES RELATED TO STRESS IN THE WORKING ENVIRONMENT...continued

ISSUES		IMP. 1 to 5	DES. 1 to 5	FEAS 1 to 5	COMMENTS
2.8.6	Individuals should be encouraged to discuss their concerns and frustrations as they arise and free communication between supervisory and general duty staff should be encouraged.				
2.8.7	Ability to contact the appropriate individuals immediately should there be an emergency plus having sufficient supplies contributes to easier working.				
2.8.8	Cheerful, bright environment part-and-parcel of post-partum unit.				
2.8.9	There is a need for privacy - both for staff evaulation, discussion, and for patient counselling or just to be alone for awhile.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS

questions

2.9 SUPPLY METHODS & MATERIALS MANAGEMENT

ISSUES		IMP 1 to 5	DES 1 to 5	FEAS 1 to 5	COMMENTS
2.9.1	Because the family care concept requires a mobile infant a travelling supply centre accompanies him in the hospital.				
2.9.2	No supplies should be shared between babies, each bassinette is an isolated storage area - supplies come from a central supply area within the nursery to the decentralized bassinettes.				
2.9.3	Supply distribution on a regular basis with adequate and protected storage for large amounts of linen and formulae is needed.				
2.9.4	Storage spaces must not become contaminated.				
2.9.5	Dirty equipment and supplies should be located in an area separated from clean supplies.				
2.9.6	There should be the ability of removing dirty supplies without the porters having to enter the clean nursery area (e.g. nurse servers, external access hold area, etc.				

2.9 SUPPLY METHODS & MATERIALS MANAGEMENT...continued

ISSUES		IMP. 1 to 5	DES. 1 to 5	FEAS. 1 to 5	COMMENTS
2.9.7	Access for supplies should be relatively direct and not available in an awkward location.				
2.9.8	Combined supplies and materials management with post-partum unit is important.				
2.9.9	Basic hospital policy is a major factor here and the method must be decided before unit planned as supply patterns often affect patient care patterns.				
2.9.10	Exchange cart system will eliminate overstocking and outdating of supplies.				
2.9.11	Adequate equipment storage space is needed for commonly used equipment and easy access for lab and x-ray equipment.				
2.9.12	Unit requires clean supplies for 24 hour period and dirty pick-up every 8 hours.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS

2.10 VISUAL SUPERVISION ISSUES

ISSUES		IMP. 1 to 5	DES. 1 to 5	FEAS. 1 to 5	COMMENTS
2.10.1	Window/glazed partitions for supervision and observation from nursing station to any part of the holding area is required.				
2.10.2	Nursing station can serve for both mother and infant care.				
2.10.3	Bassinettes arranged in an open area to allow 1-8 nursing ratio to function.				
2.10.4	Treatment rooms should be separate and private.				
2.10.5	Viewing windows require blinds for privacy at certain times.				
2.10.6	Siblings should have access to viewing the newborn - windows should be of appropriate height.				
2.10.7	Visual access to the nursery for the mother is essential at all times.				
2.10.8	Infants should be visible at all times from the nursing station - infants should be nursed in open cots to facilitate this.				

2.10 VISUAL SUPERVISION ISSUES...continued

ISSUES		IMP. 1 to 5	DES. 1 to 5	FEAS. 1 to 5	COMMENTS
2.10.9	Central slightly elevated nursing station is of value.				
2.10.10	Sounds of an infant struggling for air should be audible from most parts of the nursery.				
2.10.11	There should be a means for doctors and/or parents to communicate with nursery staff without coming into the nursery.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS

2.0 ADDITIONAL COMMENTS

There were the following general comments received which you should consider.

ISSUES		IMP. 1 to 5	DES. 1 to 5	FEAS. 1 to 5	COMMENTS
2.0.1	A number of the issues are inter-related such as visual supervision, location in relation to the department's supply methods, parent access, staffing issues.				
2.0.2	Bonding and patient (mother and father) training is essential.				
2.0.3	An observation nursery should be made available for observation/stabilization of the infant within the first 12-24 hours of life. This area can also serve as a procedure area for minor work.				
2.0.4	The clientell that are using hospitals for deliveries are demanding changes. Future planning should consider the total philosophy of childbirth including bonding process, and then design an environment where mothers/babies can feel comfortable and "at ease" during their hospital stay.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS

questions

	IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
Patient Mix				
2.11.1 Unit should be sized as a minimum of 1-1½ Acute Intensive Care spaces per 1000 deliveries in the service area. With a high referral ratio a maximum of 3/1000 deliveries could be required. For each Acute Intensive Care space there should be 2 Intermediate Care spaces or One Intermediate Care plus One Observational Care (Convalescent Care).				
2.11.2 To facilitate maximum efficiency of specialist resources and good care through reduced staff stress the Unit should have a mix of Intensive, Intermediate and Convalescent/ Growing patients.				
2.11.3 There should be separation between all levels of care, although not walls.				
2.11.4 There should be no separation between the Intensive and Intermediate infants since: (a) Categories change quickly. (b) There is better nursing equipment (one heavy, one light).				
2.11.5 There should be a maximum of 20 patients to each level of care i.e. 20/20/20.				
2.11.6 The actual mix of the levels of care will vary with each hospital's role but provision should be made for between 30% to 40% Intensive Care (Level III).				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS (add page)

questions

	IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
2.12 Patterns of Care				
2.12.1 Patterns of Care are highly individual to the patient and will be determined by their primary illness but Nursing Care must be consistent for 24 hours per day, 7 days per week with no allocation for busy times.				
2.12.2 For Nursing Centre to infant ratios the following apply: (i) Intensive (Level 3) = 1:1 (ii) Intermediate (Level 2) = 1:2 or 1:3 (iii) Convalescent/Growing = 1:3 or 1:4 (iv) Where Transitional Care is included within the I.C.N. a ratio of 1:4 is appropriate (v) Where isolation spaces are provided the level of care will be determined by the primary illness				
2.12.3 Encouragement of parent participation in the child's care is important so provision of access to child and staff to facilitate assistance, teaching and support is needed.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS (add page)

questions

2.13 Infection Issues	IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
There seems to be a major difference with regard to the need for Isolation Areas in the Special Care Nursery. The issues are presented in two groups. Please provide answers in both groups so that both options are addressed.				
Group One				
2.13.1 No isolation area is necessary to decrease infection, with appropriate space, careful environmental control and the consideration of the isolated environment within the incubator				
2.13.2 Provision of one discrete isolation room per unit (or per 30 bed nursery) to isolate a very sick highly infectious infant is necessary.				
Group Two				
2.13.3 Space around the infant should be large enough to create geographical and psychological barriers, especially enough space so that cohort groups of babies with potentially virulent bacteria can be kept from uncolonized infants within each zone of care.				
2.13.4 There should be space to enable easy routine cleaning of the surfaces; enclosures and equipment including taking prophilactic cultures.				
2.13.5 There must be large (surgical type) scrub facilities at the entrance to the unit with remote non-hand or arm operated taps.				

	IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
2.13.6 There must be gowning facilities at the entrance for staff and parents. Even though there is no indication that gowning decreases infection it reinforces other techniques.				
2.13.7 There must be sufficient, free standing washing facilities with non-hand or arm operating taps to enable staff to wash following examinations and the touching of any non-clean area for periods of approximately 20-30 seconds using soap and vigorous scrubbing without interfering with normal patterns of care.				
2.13.8 Air handling systems must be designed to avoid cross infection due to air turbulence and bacteria recirculation, through the use of positive pressure within the areas.				
2.13.9 There should be non-shared supplies at each bassinette.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS (add page)

	IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
2.14 Staffing Issues				
2.14.1 All nursing staff providing direct patient care will be R.N.s with at least 3 months neonatal intensive care orientation and preferably further post-graduate training or experience in intensive care or newborn nurseries.				
2.14.2 Nursing care is required for Critically Ill patients 20-24 hours per day and Intermediate Care 8-12 hours per day, 7 days per week.				
2.14.3 In order to provide this care there should be: (i) Full time Medical Staff available 24 hours a day, 7 days per week with a Medical Director who is a Neonatologist. Space should include office and on call rooms. (ii) Basic to all unit sizes should be a Head Nurse and Nurse Educator. (iii) Depending upon the unit size there should be a Charge Nurse for each shift, a Nursing Supervisor with sole responsibility for newborn care in the various sections of the Special Care Unit and Team Leaders.				

	IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
2.14.4 Depending upon the size of the unit provision should be made for locating within the unit or immediately adjacent to the unit: (i) Repiratory Therapists to assist with providing and maintaining assisted respiration ventilation and blood gas analysis (ii) A Social Worker to assist staff and parents in stress (iii) Ward Clerk/Manager to maintain non-nursing functions and (iv) Physiotherapists				
2.14.5 In addition the nurses working in this area should have delegated authority in an expanded role e.g. start I.V.s, administer medication, order stat blood tests and x-rays and follow-up standing orders for assisted ventilation and oxygen therapy.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS (add page)

	IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
2.15 Parent Access Issues				
2.15.1 Visiting of children by the parents should be unrestricted but limited only by the need for procedures to be done to the child or such routine activities such as rounds.				
2.15.2 The policy of the unit should actively encourage involvement by parents to facilitate parent-infant bonding and physical space should be provided for private access to the child for breast feeding, education, etc.				
2.15.3 Where there are siblings involved encouragement should be given by staff to involve the 'whole family' although physical access may not be possible.				
2.15.4 Parents should be involved with the child by: (i) being informed of changes to the child and the therapy being used through detailed repetitive explanation and (ii) being taught handwashing and other infection control techniques followed by the unit staff.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS (add page)

questions

2.16 Training/Education Issues	IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
2.16.1 Due to the high level of knowledge required by all personnel working in the Intensive Care Nursery and the relatively high staff turnover, continued in-service training is essential on a monthly or weekly basis. Space must be provided within the unit for group teaching.				
2.16.2 In-service Education should be of a Multi-disciplinary nature to include Respiratory Therapists, Physiotherapists, Social Workers as well as Nursing and Medical Staff. Certification Programmes should be provided to assume quality standards.				
2.16.3 In addition to continued education programmes, orientation programmes are required when new equipment, techniques or programmes are introduced.				
2.16.4 Due to the Regional and Referral nature of the Special Care Nursery a responsibility for Continuing Education of Perinatal facilities within their Region (Levels II & III) is required. This will imply individuals from other facilities being in the unit and similarly reciprocal visiting to other units. This will provide better community follow-up and "support" care for mothers and hospital staff.				
2.16.5 Parent Education should provide sound nutritional and baby care practices while the parents are available and interested.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS (add page)

	IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
2.17 Location in Relation to Other Departments				
2.17.1 The first priority for the I.C.N. is to be near the labour and delivery rooms. This is to provide rapid access for critically ill newborns.				
2.17.2 There must be easy access to diagnostic support services which are not housed within the unit. Primarily x-ray film, equipment and processing plus additional laboratory services. Blood Gas Analysis, blood sugars and serum bilirubin should be available within the unit or close enough to facilitate a few minutes turn around.				
2.17.3 Access to Surgery and Special Procedures Radiology is essential.				
2.17.4 Facility should be made in close proximity for the cleaning and storage of frequently used equipment such as: incubators, respiratory and biomedical equipment.				
2.17.5 Consideration should be given to access to Normal Nurseries, Post-Partum Wards and Medical Staff on-call facilities.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS (add page)

	IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
2.18 Staff Issues Related to Stress				
2.18.1 Of primary concern is the provision of space around the incubators so that access to services and work spaces is easy. The cluttering and overcrowding of space dramatically increases stress.				
2.18.2 Rotation of the staff through various levels of core assists in reducing the frequency of stressful situations.				
2.18.3 Provision of "private" areas for staff is essential. Either as offices, lounge areas or other spaces where the "sounds" of the I.C.N. can be omitted must be provided. These spaces must be integral for ease of access but separate so that, unwinding, counselling, or group discussion can occur.				
2.18.4 Policies related to encouraging communication between staff, social workers, all disciplines and appropriate others, to provide a forum for expressing concerns and frustrations, must be introduced.				
2.18.5 Provision of spaces immediately adjacent to or integral with but separated from the I.C.N. must be made for parents to grieve, be counselled or comforted. This will help reduce parent and staff stress.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS (add page)

	IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
2.19 Supply Methods & Materials Management				
2.19.1 Clean supplies to the I.C.N. should come protected directly through a major supply route (corridor, conveyor, etc.) from the main clean and sterile supply stores. It must not be delivered from a store area within another nursing unit.				
2.19.2 There should be two sources of supply within the Unit. One, as a central supply store for holding bulk supplies of linen, equipment, medical supplies, special trays, diapers and formula. This is required to ensure that at least 24 hours supply of all essentials are within the unit to avoid delays. Secondary supplies are at the baby's bassinette. This should represent an individual, isolated, mobile storage area not shared and stocked from the central unit storage with inventory levels controlled by the head nurse.				
2.19.3 Infrequently used equipment such as phototherapy, heating lights and other special equipment can be shared with maternity and newborn nurseries if geographically close.				
2.19.4 Dirty equipment and supplies must be located in an area physically separated from clean supplies and accessible for removal without entry to the unit.				
2.19.5 There is a need for dedicated cleaning staff within a Special Nursery, due to the volume of work involved, to allow nursing staff to concentrate on patient care.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS (add page)

	IMPORT. 1 to 5	DESIR. 1 to 5	FEASIBL. 1 to 5	COMMENTS
2.20 Visual Supervision and Location				
2.20.1 Babies should be located so that during break times nurses can supervise an adjacent nurse's babies.				
2.20.2 Due to the high ratio of staff to babies supervision takes place at the bedside and not from a central area.				
2.20.3 There should be a communication centre where all incoming and outgoing calls, specimens, etc., are channelled. This should be as separate as possible but visible to the other areas and activities of the unit.				
2.20.4 There should be a control point over who has access to the unit and may be the communication centre.				

Please place any general comments on this Section or additional issues below.

ADDITIONAL INCLUSIONS (add page)

SECTION 2 PART TWO

ACTIVITY DESCRIPTIONS

It is important to understand the activities that take place by Nursing Staff, Medical Staff, Parents and support staff in each area. This will enable us to develop a useful picture of the ramifications of the care process. If spaces are to be developed which provide for functions then a categorization of the activities within accepted components of the units must be described.

List the activities under each category you consider must take place regardless of patient care significance. It is not important to list a series of tests done in one place or things written while sitting. The act of moving, sitting, etc. is of importance. Concentrate on the activities with which you are most familiar by specialty i.e. Nursing/ Medical/Administration but also add significant support staff activities, parent activities, activities of other professionals that impact space.

2.1 NEWBORN NURSERIES

2.1.1 Patient Centred Activities

(a) Patient Comfort (feeding, toiletting, visiting, etc.)

(b) Routine Clinical Procedures (preparation, medication, treatment, tests, etc.)

(c) Special Clinical Procedures (monitoring, treatment, therapy, etc.)

(d) Parent Involvement (assisting, teaching, communicating, etc.)

2.2.1 Staff Support Activities

(a) Monitoring and Surveillance (routine, special, remote, direct, etc.)

(b) Medical Record Keeping (gaining data, recording, retrieving, etc.)

(c) Medical Preparation (preparing, maintaining supplies, etc.)

(d) Equipment and Supply Management (routine use, emergency use, maintaining, etc.)

(e) Unit Control and Communications (admitting, discharge, visitor control, co-ordination, etc.)

(f) Staff support and Convenience (conferring, meetings, breaks, etc.)

On a separate page(s) list the above activities.

2.2 NEONATAL INTENSIVE CARE

2.2.1 Patient Centred Activities

(a) Patient Comfort (eating, cleaning, toiletting, visiting, etc.)

(b) Routine Clinical Procedures (arrival, preparation, vital signs, medication, assisting, etc.)

(c) Emergency Procedures (resuscitation, defibrillation, catherization, etc.)

(d) Bedside Monitoring (attaching sensors, readings, routine and emergency monitoring, etc.)

(e) Parent Involvement (assisting, teaching, communicating, etc.)

2.2.2 Staff Support Activities

(a) Monitoring and Surveillance (routine, intensive, adjusting, direct observation, etc.)

(b) Medical Record Keeping (obtaining data, recording, retrieving, analyzing, etc.)

(c) Medical Preparation (receiving, preparing, maintaining levels, etc.)

(d) Equipment and Supply Management (ordering, maintaining stocks, routine use, etc.)

(e) Unit Control and Communications (admitting, discharge, reception, visitor control, co-ordination, communications, etc.)

(f) Staff Support and Convenience (conferring, meeting, resting, refreshments, etc.)

On a separate page(s) list the above activities.

questions

LIST OF QUESTIONS ASKED IN ROUND 1 OF THE STUDY
AND DIAGRAMS 1 TO 4 SUPPLIED

3.1.1. Staffing and Work flow pattern created by Diagram 1 are inefficient due to the multiple workrooms, and travel between nurseries and/or washrooms is time consuming because of continual gowning and scrubbing. This type of layout would be unacceptable for a new facility. Do you:

3.1.2. The workroom itself is unsatisfactory in Diagram 1, because it must support many dissimilar functions such as entry, gowning, clerical, charting, utilities and examination-treatment of the infant. Dissimilar functions require formal separation. Do you:

3.1.3. The American Academy of Pediatrics, Standards and Recommendations for Hospital Care of Newborn Infants (5th Ed.) says about Isolation rooms:

> Isolation rooms per se are unnecessary when (1) there is adequate nursing (see page 14) and medical staff so movement between patients is unhurried and there is always time for thorough hand washing; (2) there is sufficient space in the intensive care, observation, and intermediate care areas for a physical separation of 3 or 4 ft between infants (and the temptation is reduced to move from patient to patient without washing hands); (3) there are two wash basins for each nursery area; and (4) there is a continuing program of instruction for all nursery personnel on the mode of spread of infections.

3.1.4. In both Diagrams 2 and 3 the traffic patterns have been built around the concept that it is essential for nursery-staff traffic to be positively separated from general hospital and public traffic patterns. This necessitates an internal corridor linking all nursery components and another corridor for general traffic and parent viewing. This would then be a basic requirement of any new nursery facility. Do you:

3.1.5. The spacing shown on the insert of Diagram 2 provides the following standards for Term or Minimal Care nurseries.

(i) Clear space between sides of bassinets of 2'-0" (60 cm)
(ii) Clear space of aisle between sides of cribs of 4'-0" (120 cm)
(iii) A minimum area of 21 sq. ft. (2 sq. m) per bassinet of floor for the enclosed room space containing the infants.
(iv) Bassinet set clear of wall or obstruction by 6" (15 cm)

3.1.7. Maximal Care would be the same as NICN spaces, namely:

(i) Space between 4'-0" (120 cm)
(ii) Aisles clear of protrusion 5'-0" (150 cm)
(iii) An area of 55 sq. ft. (5 sq. m) in addition to the size of each incubator for the enclosed room space containing the infants.

3.1.6. Intermediate

(i) Clear space between the sides of the incubator or bassinets to be a minimum of 3'-0" (90 cm)
(ii) Clear aisle width of 4'-0" (120 cm) from any protrusion on incubator or bassinet.
(iii) An area of 30 sq. ft. (2.8 sq. m) in addition to the size of each incubator or bassinet (assume 6 sq. ft. (56 sq. cm) for the enclosed room space containing the infants.
(iv) Bassinets or incubators set 6" clear of wall or unit.

3.1.8. Where the requirements for doing without an isolation nursery cannot be met (ref. 3.1.3.) the following are the proposed minimums:

(i) Required to have a minimum of two spaces with an acute room and nursery proper. Access to nursery is through anteroom.
(ii) The anteroom must contain space for a scrub unit, gowning space, charting area and supply cabinet or shelves and cart and soiled linen hamper.
(iii) The Isolation nursery must contain a maximum of two incubators with an enclosed space of 33 sq. ft. (3 sq. m) per incubator.
(iv) Incubators must be spaced 3'-0" (90 cm) apart.
(v) Aisle width of 4'-0" (120 cm) required.

3.2.1. The most desirable shape or configuration for a N.I.C.U. nursery is one that is as square as possible with a maximum of open space. Do you:

3.2.2. An N.I.C.U. should operate within its own environmental area, exclusive of other hospital functions and activities (such as at a dead-end corridor or in a by-pass). Do you:

3.2.3. Spacing between and around bassinets and incubators in the N.I.C.U. nursery would be dependent upon the mix of levels of care appropriate to the specific unit. They would, for each level, be the same as for Minimal, Intermediate or Maximal Care as suggested under Newborn Nurseries Section 3.1.5., 3.1.6., 3.1.7. Do you:

3.3.1. Heating Ventilating and Air Conditioning (Choose the appropriate answer in each column.)

1. In addition to any stabilized incubator air, the unit must have controlled air by:
   Heating only
   Cooling only
   Heating and Cooling (Air Conditioning)
   Other (explain)

2. A temperature range of $68^{o}F$ to $72^{o}F$ ($20^{o}C$ to $22^{o}C$) is:
   Acceptable
   Should be otherwise (state range)

3. A relative humidity of 50 percent + or - 5 percent is:
   Acceptable
   Should be different (state range)

4. Incoming clean air should be filtered, not recirculated and room air changed a minimum of 12 times per hour.
   Acceptable
   Should be different (state range)

questions

LIST OF QUESTIONS ASKED IN ROUND 1 OF THE STUDY
AND DIAGRAMS 1 TO 4 SUPPLIED

3.1.1. Staffing and Work flow pattern created by Diagram 1 are inefficient due to the multiple workrooms, and travel between nurseries and/or washrooms is time consuming because of continual gowning and scrubbing. This type of layout would be unacceptable for a new facility. Do you:

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3.1.4. In both Diagrams 2 and 3 the traffic patterns have been built around the concept that it is essential for nursery-staff traffic to be positively separated from general hospital and public traffic patterns. This necessitates an internal corridor linking all nursery components and another corridor for general traffic and parent viewing. This would then be a basic requirement of any new nursery facility. Do you:

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(ii) Clear space of aisle between sides of cribs of 4'-0" (120 cm)
(iii) A minimum area of 21 sq. ft. (2 sq. m) per bassinet of floor for the enclosed room space containing the infants.
(iv) Bassinet set clear of wall or obstruction by 6" (15 cm)

questions

3.1.6. Intermediate

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(ii) Clear aisle width of 4'-0" (120 cm) from any protrusion on incubator or bassinet.
(iii) An area of 30 sq. ft. (2.8 sq. m) in addition to the size of each incubator or bassinet (assume 6 sq. ft. (56 sq. cm) for the enclosed room space containing the infants.
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3.1.7. Maximal Care would be the same as NICN spaces, namely:

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(v) Aisle width of 4'-0" (120 cm) required.

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3.2.2. An N.I.C.U. should operate within its own environmental area, exclusive of other hospital functions and activities (such as at a dead-end corridor or in a by-pass). Do you:

3.2.3. Spacing between and around bassinets and incubators in the N.I.C.U. nursery would be dependent upon the mix of levels of care appropriate to the specific unit. They would, for each level, be the same as for Minimal, Intermediate or Maximal Care as suggested under Newborn Nurseries Section 3.1.5., 3.1.6., 3.1.7. Do you:

3.3.1. Heating Ventilating and Air Conditioning answer in each column.)

1. In addition to any stabilized incubator air, the unit must have controlled air by:
   Heating only
   Cooling only
   Heating and Cooling (Air Conditioning)

2. A temperature range of 68^{0}F to 72^{0}F (20^{0}C to 22^{0}C) is:

3. A relative humidity of 50 percent + or - 5 percent is:

4. Incoming clean air should be filtered, not recirculated and room air changed a minimum of 12 times per hour.

TBP+P

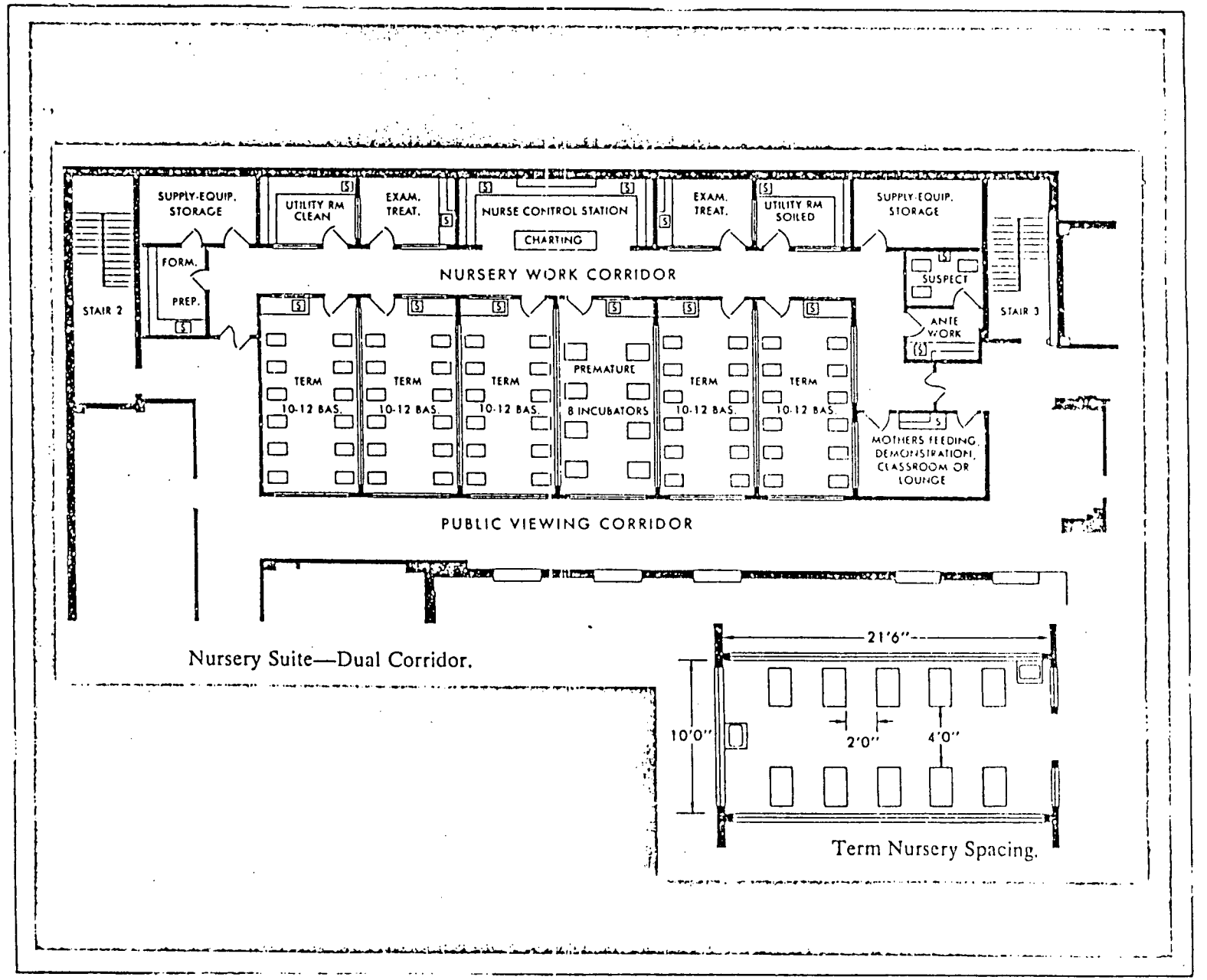
DIAGRAM 1

Conventional Nursery Suite.

From Planning Guidelines by Ross Laboratories, Milwaukee, Wis. U.S.A.

TBP+P

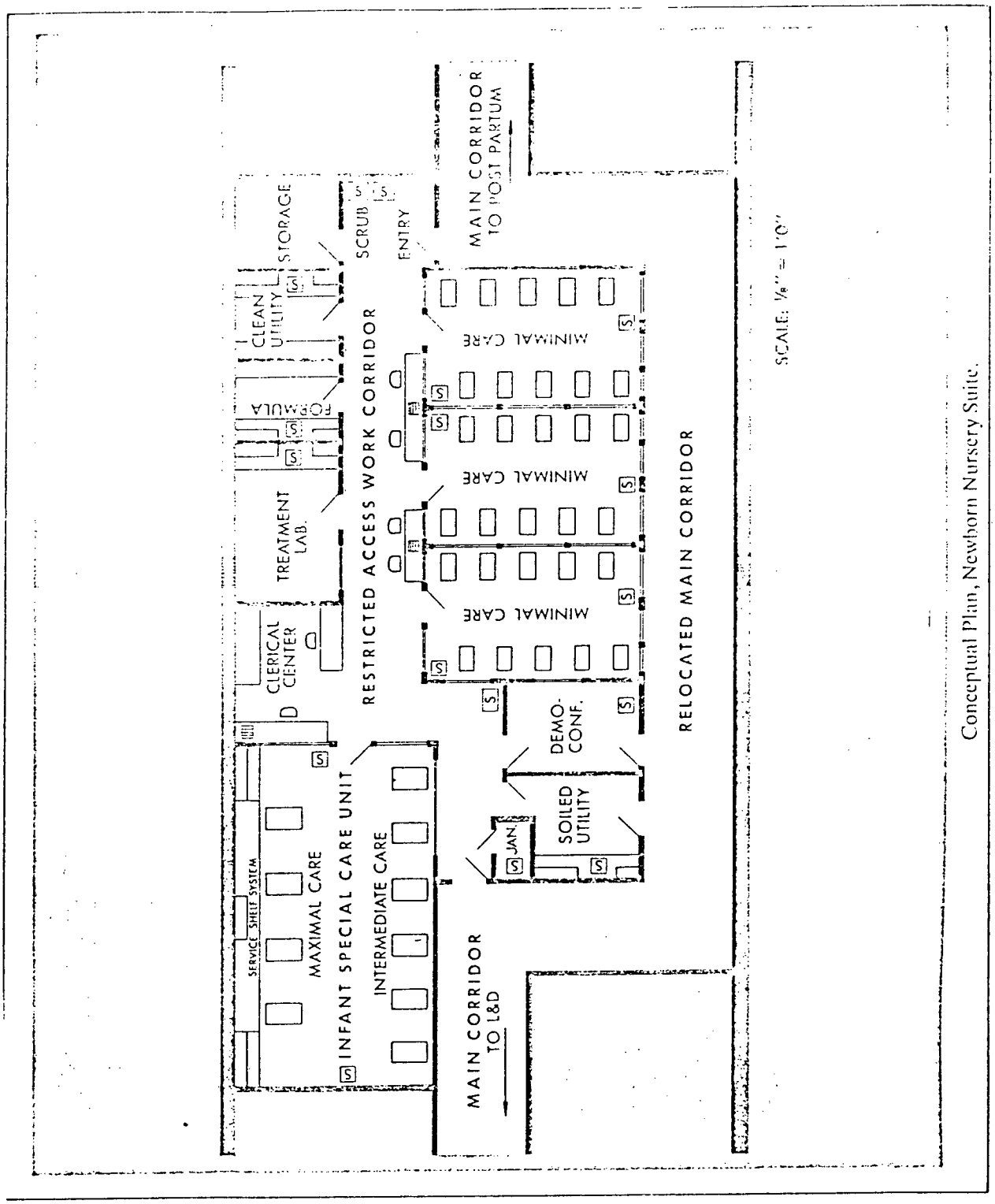
DIAGRAM 2



From Planning Guidelines by Ross Laboratories, Milwaukee, Wis. U.S.A.

question

questions



From Planning Guidelines by Ross Laboratories, Milwaukee, Wis. U.S.A.

DIAGRAM 3

TBP+P

questions

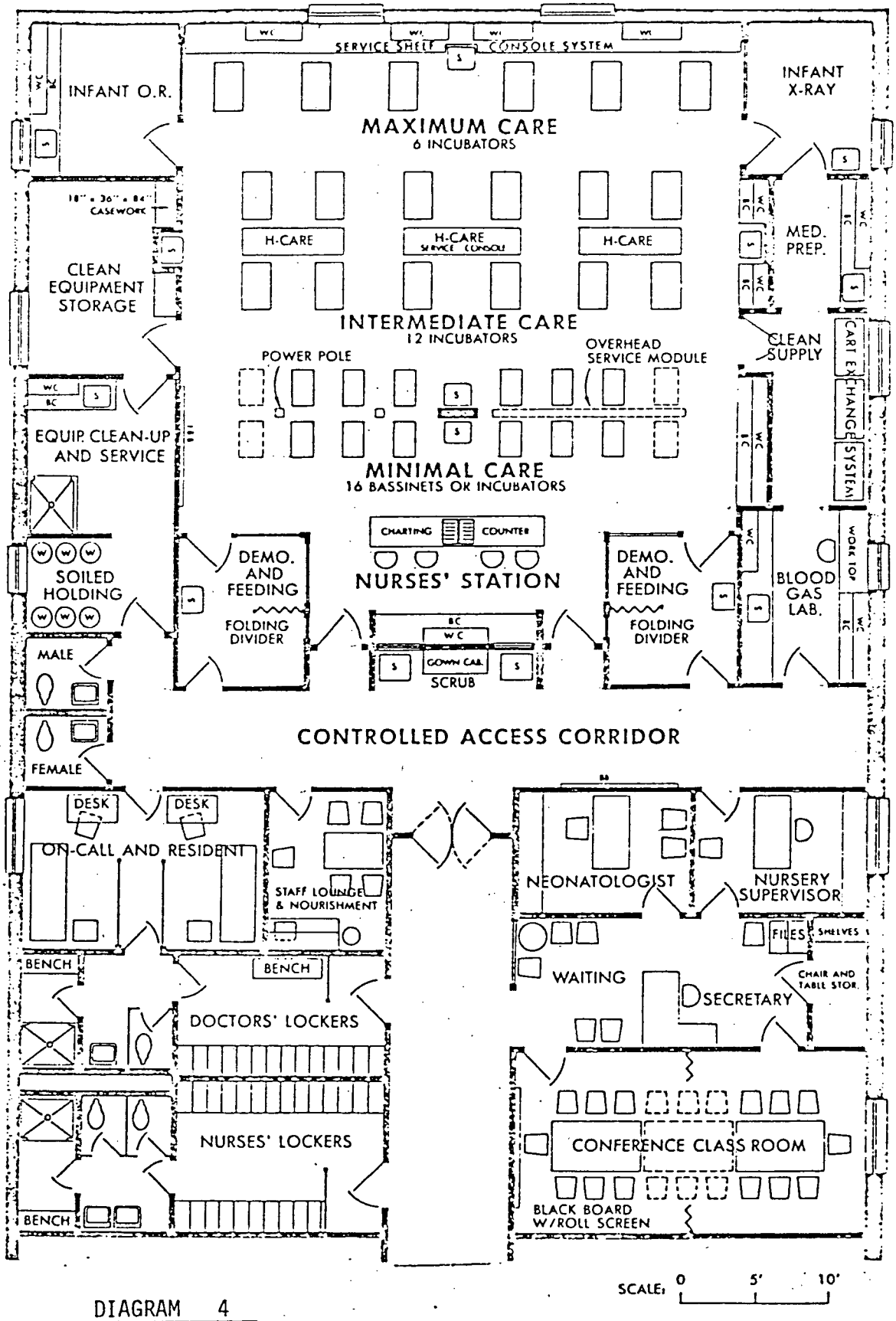


DIAGRAM 4

TBP+P

SECTION 3 ARCHITECTURAL ASPECTS

In the first part of this section we have done some simple statistical analysis of the answers to give you a gross picture of how people felt about the issues as asked.

There were a number of comments offered which have been presented for your consideration, further comment and additional rating.

NURSERIES

3.1.1	Strongly Agree	41.7%	Staffing and Work Flow
	Agree	33.3%	
	Neutral	16.7%	
	Strongly Disagree	8.3%	

COMMENT

Since 75% of respondents agreed that the single corridor system is unacceptable, you should be aware of comments made by those who felt neutral about the concept. However it would appear that we should accept the vote of unacceptable.

3.1.2	Strongly Agree	30.8%	Dissimilar Function
	Agree	38.5%	
	Neutral	30.8%	

COMMENT

Again the 69.3% agree vote together with the detailed comments given would indicate that we should accept the idea that separation of dissimilar function is sound.

3.1.3	Strongly Agree	50.0%	Isolation Room
	Agree	25.0%	
	Strongly Disagree	25.0%	

COMMENT

In this instance the voting does not convey the strength of issues presented in the comments and in fact there is a clear polorization. You should address both sides of the issue.

3.1.4	Strongly Agree	61.5%	Traffic Pattern
	Agree	23.1%	
	Neutral	7.7%	
	Disagree	7.7%	

COMMENT

Clearly we can accept the principle of traffic separation.

3.1.5	Accept	66.7%	Minimum Care Areas
	Not	33.3%	

COMMENT

While we could accept the vote as acceptance of minimum requirement, the comments indicate that sufficient people feel that it is too minimal. There is room for more space for work and feeding areas in addition to the 21 st. ft. per bassinet offered.

3.1.6	Accept	66.7%	Space Intermediate
	Not	33.3%	
3.1.7	Accept	50.0%	Space Maximal
	Not	50.0%	
3.1.8	Accept	46.2%	Without Isolation
	Not	53.8%	

COMMENTS

In each of these three areas the statistics given without comment, plus the large share of not acceptable votes indicate we have to relook at this again. We have asked some additional questions about concept.

I.C.N.

3.2.1	Agree	69.2%	Shape N.I.C.U.
	Disagree	30.8%	
3.2.2	Agree	58.3%	Access I.C.N.
	Disagree	41.7%	

COMMENT

On these two issues the voting and comments confirm acceptance of a large square shape as a trend and relative isolation of N.I.C.U.s.

3.2.3	Agree	84.6%	Space around I.C.N.
	Disagree	15.4%	

COMMENT

The overwhelming agreement here is in fact a contradiction. People agreed with "Dependent upon appropriate mix for size" issue but they had disagreed strongly with the size itself earlier. We, therefore, assumed that this question still holds true if the size issue is resolved by 3.1.6 to 3.1.8.

3.3.1.1	Air Conditioning	90.9%	Nurseries & N.I.C.U.
	Other	9.1%	Nurseries & N.I.C.U.
3.3.1.2	Accept	69.2%	Nursery
	Other	30.8%	
	Accept	46.2%	I.C.N.
	Other	53.8%	
3.3.1.3	Acceptable	92.3%	Humidity Nurseries
	Other	7.7%	
	Accept	84.6%	I.C.N.
	Other	15.4%	

3.3.1.4	Accept	100%	Filtered Not Recirc. N.N.
	Accept	88.9%	I.C.N.
	Other	11.1%	

COMMENT

The voting and the comments were consistent for all these sections. Where there was disagreement alternates were offered. It was curious to note that there was 100% concensus on Filtered non-recirculating air in Normal Nurseries but not in the N.I.C.U. where you would have expected it.

3.3.2.1	Stainless	100%	Sink in Work tops N.N.
	Stainless	100%	Sink in Work tops I.C.N.
3.3.2.2	Stainless	91.7%	Wall mounted N.N.
	Porcelain	8.3%	Wall mounted I.C.N.

COMMENT

Stainless Steel should be used.

TAP PREFERENCES

N.N.

46.2%	All taps knee operated
23.1%	Taps in N. foot operated
15.4%	Taps in N. knee operated
7.6%	All taps foot operated
7.7%	Other

N.N.

15.4%	All taps knee
7.7%	Nursery taps knee
46.2%	Ancillary wrist/elbow
15.4%	Ancillary knee
7.7%	All taps foot
7.6%	Other

I.C.U.

46.2%	All taps knee
15.4%	All taps foot
15.4%	Nursery knee
15.4%	Nursery foot
7.6%	Other

I.C.U.

15.4%	All taps knee
7.7%	All taps foot
23.1%	Ancillary taps knee
46.2%	Ancillary taps wrist/elbow
7.6%	Other

COMMENT

While the preference is clear generally for knee operation and wrist/elbow in ancillary areas, there are sufficient other preferences to suggest that cost might have to be a significant factor in many ultimate decisions due to a lack of unilateral preference.

3.3.3 GAS OUTLETS

Oxygen

Minimum		Intermediate		Maximum	
1:2	36.4%	1:2	36.4%	2:1	54.5%
1:1	9.1%	1:1	27.3%	3:1	27.3%
Other	54.5%	Other	36.4%	Other	18.2%

Vacuum

Minimum		Intermediate		Maximum	
1:2	45.5%	1:2	36.4%	2:1	72.7%
1:1	0 %	1:1	36.4%	More	18.2%
Other	54.5%	Other	27.3%	Other	9.1%

Air

1:4	30.0%	1:2	40.0%	2:1	80.0%
1:2	10.0%	1:1	30.0%	Other	20.0%
Other	60.0%	Other	30.0%		

3.4.1 ELECTRICAL

1. Outlets

Minimum		Intermediate		Maximum			
				Nursery		I.C.U.	
1:2	33.3%	2-4:1	44.4%	4:1	16.7%	6-8:1	33.3%
1:1	55.6%	4:1	11.1%	4-6:1	16.7%	8-10:1	22.2%
2-4:1	11.1%	4-6:1	22.2%	6-8:1	66.7%	10-16:1	44.4%
		6-8:1	22.2%				

2. Emergency Power

Intermediate		Maximum			
		N.N.		I.C.U.	
1:1	50.0%	2:1	40.0%	2-4:1	25.0%
2:1	33.3%	2-4:1	40.0%	4-6:1	62.5%
Other	16.7%	4-6:1	20.0%	6-8:1	12.5%

COMMENT

All of these areas provide evidence that there is no real concensus. There is a need to look more specifically at exactly what is required from what equipment is used.

3.1 NEWBORN NURSERIES

3.1.1 Staffing and Workflow from Diagram 1.

On being asked whether the solution was unacceptable - those who voted:

Strongly Agree commented

(i) Degree of safety questionable because staffing such a nursery safely is uneconomic.

(ii) Outdated because there is no consideration of family care concept. Nurseries should not be separate departments from post-partum units.

Neutral commented

(i) Surely the comments will depend on the size and location of the Postpartum Module. Ideally the Nursery should be closely adjacent to the location of each mother in Postpartum Module. In both diagrams it is obvious that mothers are remotely separated from their babies. These plans do not meet current consumer demands that an obstetric facility considered the needs of families. They cater solely to the health professional, therefore, they will continue to discourage many families from considering a hospital as a suitable place in which to have the normal baby being anticipated.

(ii) With a smaller number of babies in each location provided the staff and work flow locations are well thought out, it need not be necessary to separate the public and staff/work traffic as neither should be excessive.

(iii) I cannot agree that gowning and scrubbing should be a major problem in Diagram 1. Once the nurse is in the Nursery Work Room Area and if she is organizing her work well and the hospital policies are reasonable, then there should be very little need for her to leave that work room area and consequently very little need for repeated gowning and scrubbing. I suspect this statement is a result of poorly thought out hospital policies rather than planning.

3.1.1 Staffing and Workflow from Diagram 1 ...continued

Do you feel

All comments are valid ◯

Some only are valid ◯

(Please say why)

FURTHER COMMENTS

3.1.2 The Workroom in Diagram 1 and Dissimilar Functions

On being asked to give an opinion on the treating of dissimilar functions with formal separation - those who voted:

Strongly Agree commented with respect to Exam-Treatment-Aspects

(i) Exam - treatment can effectively be accomplished within the nursery.

Agree commented

(i) Workrooms should be as small as possible. Only minimal cleaning soiled equipment and supplies storage should be necessary.

(ii) The fault is less dissimilar functions as it is that some of the functions, e.g. control center tasks, should be placed where there is visual contact with infants.

3.1.2 The Workroom in Diagram 1 and Dissimilar Functions ...continued

(iii) Examination of a normal full-term infant should occur in the Nursery area itself by the mother's bed. The doctor should be prepared to enter the Nursery in the proper fashion to examine the baby. Normal full-term babies do not require the facilities of a Treatment Room except possibly for circumcisions, therefore an Examination Treatment Room is better named a Circumcision Room and can be shared by several Nursery areas. The Workroom in Diagram 1 acts as a control point. There is no such control point in Diagram 2. I agree that there are too many functions occurring in the Workroom as shown in Diagram 1, but why can't this central workroom area be better designed to meet the various functions more satisfactorily.

Do you feel

All comments are valid ◯

Some only are valid ◯

(Please say why)

FURTHER COMMENTS

3.1.3 Isolation Rooms and the American Academy of Pediatrics Standard

On being asked to comment about the recommendation - those who voted:

Strongly Agree commented

(i) The practice is usually to group infants dependent upon their particular need for care. For example isolated infants may be grouped in one part of the nursery with some distance between this group and others.

(ii) This practice could be designed into a nursery with psychological barriers providing the reminders that special technique is necessary and intensive care needs provided in the area too.

(iii) Physically separating a small number of infants because they are potentially infectious is a dangerous practice. These infants require care and attention but may not receive it if separation causes difficulties of access by staff members.

(iv) I agree but find that it is usually not possible to have the nursery staff available on such a fluctuating area.

(v) Also difficult if a baby's condition is such that it might require isolation technique to guarantee sufficient space of 3 to 4 ft. between infants.

Agree commented

(i) But - there should be allowances made so that a "nursery pod" could be vacated for terminal cleaning of walls, windows, etc. This is rotational - not an "isolation nursery".

If a newborn - born outside the hospital is admitted - they can be cared for in isolette.

Strongly Disagree commented

(i) This is a typically idealogical statement which in practice, and when dealing with human beings, does not work. With the advent of more resistant bacteria and the survival of more immature babies with very immature immunological mechanisms infections can be a headache in a Special Care Nursery, and to a lesser extent in a normal nursery.

3.1.3 Isolation Rooms and the American Academy of Pediatrics Standard ...continued

(i) ...continued

The number and virulence of the bacterial help to determine the level of risk of that infection being passed from one infant to another. Good policing of handwashing is almost impossible; no one, not even me, washes their hands consistently adequately, especially when tired or when dealing with an emergency, as may happen frequently in these areas. Three to four feet between intensive care infants is insufficient physical separation when one has also to consider the amount of equipment and number of personnel congregating around the infant at various times of the day. Motivation and emergencies determine whether hands are washed at all, and if washed, how well. Two washbasins in each Nursery area may not be sufficient depending on the size of the Nursery area and their location. In regard to education, many people do not listen and digest the information. No Nursery visited to date, and probably in the future, will have adequate staff, particularly with the pressure by Government and Society to contain the cost of health care.

(ii) The problems for which a baby requires Isolation are of a highly contagious nature. Recent research would tend to indicate that although the factors as listed above are important - there are still circumstances where Isolation is warranted. Babies with specific colonization could be nursed (e.g. using a "cohort" system) more effectively should Isolation rooms be available.

Given that there is a great difference of opinion we need to address both issues. Please answer on a separate sheet the following additional questions.

1. What are the criteria for determining when an Isolation Room is required or not.

2. What should be done where there is (i) No Isolation area and (ii) An Isolation area, to overcome the problems raised by the comments presented.

3.1.4 Traffic Patterns and the Separation of Public and Staff as seen in Diagrams 2 and 3

On being asked whether separation is a basic requirement one vote was Neutral and commented

> Both diagrams ignore the need for nurseries to be intimately involved with post-partum units with parents in the nursery.

FURTHER COMMENTS

3.1.5 Spacing for Term or Minimal Care Nurseries

Those commenting who found the sizes Not Acceptable were:

(i) I think that the acceptable square foot allocation per term infant in a minimal care nursery should be at least 30 sq. ft. per bassinet of floor space and ideally 35 sq. ft. Having the infants closer together tends to defeat good technique and to encourage crowding where discrete visualization of a given infant is difficult.

(ii) Item (i) Two feet is very little space between bassinettes for an individual to work at the bassinette with the baby. It would be almost impossible not to interfere with the adjacent bassinette when examining, changing or handling the infant.

Item (ii) Four feet is probably adequate as aisle space, if this is all it were to be used for.

Item (iii) 21 sq. ft. is a very minimal amount of space for a bassinette; does this include all the other backup facilities and spaces needed in this area?

3.1.5 Spacing for Term or Minimal Care Nurseries ... continued

Item (iv) Whatever an Architect or Planner decides about the location and arrangement of bassinettes, it will be impossible to guarantee that this will be followed once the nursing staff move into the new facility - they will arrange their babies as they desire, probably on the basis of habit. Some will be placed in the center of the room, while others will be located around the edges of the room.

From Diagram 2 it is obvious there is very limited space for a nurse to sit and feed an infant if the mother is unable to do so. Nurses prefer to feed infants sitting in rocking chairs. If this were done in this Nursery the Bassinettes would be shoved closer together. I find it difficult to believe that the nurses do not require a little work surface area within the Nursery space itself. The sink set in the corner of the counter-top is an unsatisfactory way to handle a sink, in fact, looking at Diagram 2 the detailed term Nursery spacing and overall plan incorporate different features.

N.B. Babies in bassinettes require less floor space than those in incubators. All babies will be in bassinettes in Newborn Nurseries. In the Minimal Care (Convalescent/Growing Nursery of our I.C.N.) some infants may be in incubators. Therefore more space is needed in these areas as opposed to a Newborn Nursery.

Do you feel

All comments are valid ◯

Some only are valid ◯

(Please say why)

FURTHER COMMENTS

3.1.6 Diagram 3 Special Care Unit Intermediate Care Sizes and Space Standards

Those who commented on finding the suggestions Not Acceptable said:

(i) 80 - 90 sq. feet should be minimum requirement with a minimum of 6 feet between incubators.

(ii) I think that minimum square footage for intermediate care should be approximately 80 sq. ft. per patient net as with busy intensive care units, these infants often require monitoring, x-rays, ease of accessibility for performing procedures in cases of acute deterioration and may require transfer back to intensive care. Six inch clearance from wall or unit is inadequate as these are usually closed incubators and access to the infant should be available from at least 3 - 4 sides at all times and more than six inches would be required to have support facilities such as suction bottles, oxygen, humidifiers, etc. plugged-in in proximity to the infant.

(iii) Item (i) An intermediate baby may have varying quantities of equipment surrounding the baby. Depending on one's definition of intermediate in intensive care, some intermediate babies may be connected to a ventilator, to intravenous feeding (in which case there may be three to four intravenous bottles plus associated constant infusion pumps attached) and heart rate and respiratory monitors. With these items around such an incubator, in addition to maybe anywhere between 6 and 10 staff on Ward Rounds, three feet between the sides of the incubator is inadequate.

Item (ii) Who is to decide how much protrusion there will be from an incubator? In different Nurseries different types of equipment may project beyond the incubator, such as ventilators, etc. This would depend on the orientation and practices of the individual Nursery. Four feet from the bottom of one incubator to the bottom of another incubator leaves little opportunity for flexibility and within a short period of time in many nurseries if not all, this space would be encroached upon.

3.1.6 Diagram 3 Special Care Unit Intermediate Care Sizes and Space Standards ...continued

Item (ii) ...cont'd When moving an infant from its location in the Nursery to another space or to another part of the hospital for treatment or an investigation, a 3'-6" door is barely adequate for moving all the equipment with the personnel attached. Therefore, four feet is an unacceptable minimum dimension between the ends of any incubator; it does not leave enough corridor space; if in doubt see V.G.H. Nursery.

Item (iii) 36 sq. ft. for each intermediate bassinette is totally inadequate space. With this area one is treating the staff working in this location as if they are also small and need less operational space than a nurse in an adult ward. The size of the personnel and equipment supporting the patient is similar, whether it be an infant or an adult; this has not been appreciated in Nursery designs to date; all personnel working with babies are expected to be "pint sized".

Item (iv) This is acceptable. (Bassinettes or incubators set 6" clear of wall).

N.B. Bassinettes = cribs not incubators. Intermediate babies will not be nursed in cribs, they will only be nursed in incubators or under overhead heaters.

Of those commenting on voting An Acceptable Minimum the comment was:

(i) Emergency situations are not expected in this type of nursery, therefore, it can be acceptable to plan for less than optimal space.

Do you feel

All comments are valid ◯

Some only are valid ◯

(Please say why)

FURTHER COMMENTS

3.1.7 Maximal Care Space Suggestions

Those who commented on finding the suggestions Not Acceptable said:

(i) 120 sq. ft. should be minimum. 6 - 9 feet minimum between incubators. 6 - 8 feet minimum aisles.

(ii) Ideal sq. ft. per patient would be 120 - 140 sq. ft. per patient. Aisle size should be approximately 6 - 7 ft. so that it will easily accommodate a portable x-ray machine, a transport incubator being pushed by 2 - 3 personnel, etc. Space between infants should be 6 ft. to allow for apparatus such as phototherapy, respirators, monitors and other devices to be utilized for the infant and still allow adequate separation of patients. Where overhead radiant warmers are utilized, lateral separation may have to be increased as these tend to take up more sq. ft.

(iii) By and large far more space is required for intensive care babies as on average they have more equipment and more personnel around them. We, when planning the Special Care Nursery, discussed at length with the Senior Nursing and Medical Staff working in the Intensive Care Nursery, the optimal space between incubators to allow a nurse to double-up and look after two infants, or to effectively look after one extremely sick infant. Tne consensus of opinion was 6' between sides of an incubator; at night this may look excessive but at peak periods of the day there is never enough room. As a result communications between the Team are severely jeopardized to the detriment of the infant. 60 sq. ft. is inadequate for these type of infants, it is the space we have in the Intensive Care Nursery now. Discussing with individuals in other units who have 100 - 120 sq. ft. this seems a reasonable amount of space if well planned. I find it amazing, when looking at the overall prospective of the number of infants being cared for in Special Care Nurseries, and looking at the space a similar number of patients would require in an adult setting, that there is no reasonable comparison in the amount of space allocated per intensive care baby. The only difference between an intensive care baby and an intensive care adult is the size of the bed on which the patient is lying. The same supportive facilities and staff are required to support each human being often with very similar basic problems.

3.1.7 Spaces for Intermediate and Maximal Care (continued)

ADDITIONAL QUESTION

It is clear that comments received indicated the spaces offered (30 sq. ft. Intermediate and 55 sq. ft. Maximum) did not satisfy a large group. They were most forceful in commenting. Since we originally listed Intermediate and Maximal Care under Nurseries as different from N.I.C.U., we assumed that there is a place for Intermediate and Maximal Care in a non-N.I.C.U. location. There may be a conceptual problem.

There appears to be a need to resolve the issue of terminology with respect to where it is appropriate to use the terms Maximal, Intermediate and Minimal Levels of Care.

3.2.4 Briefly outline what you believe to be the accepted usage of the terms Maximal, Intermediate and Minimal Levels. Address such issues as when they are appropriate to tertiary level (or referral) hospitals and when they are appropriate to Nurseries in community hospitals.

3.1.8 Where the Requirements (A.A.of P.) Cannot Be Met and Proposed Spaces as Alternates

The comments received for this section suggest that a complete relook at this aspect should take place. The comments received from those voting Not Acceptable are as follows:

(i) I believe that any new facility must meet the requirements of 3.1.3 of the American Academy of Pediatrics. Specifically:
1. Adequate nursing must be available in order to establish a newborn intensive care facility. Provision of a separate isolation nursery will not resolve this problem.
2. Sufficient space must be available and where it is not, lower census must be accepted to provide appropriate care. A separate isolation nursery requires more sq. ft.
3. Appropriate wash basins must be put in in any new facility and an existing facility must be upgraded so that washing facilities are available and the establishment of a separate isolation facility does not correct this deficiency.

3.1.8 Where the Requirements (A.A. of P.) Cannot Be Met and Proposed Spaces as Alternates ...continued

(i) ...continued

4. A continuing program of infection control is a prerequisite for any successful intensive care area and would be part of the ongoing education within the unit.

(ii) This section is unclear to me. First, what are we talking about, how large is the Obstetrical Unit, does this refer to normal infants as opposed to intensive care infants, or what? Where is the anteroom being discussed, is this an anteroom attached to the Isolation Area, or an anteroom shared with a Clean Nursery?

It is totally ridiculous to consider 33 sq. ft. per incubator for isolation. This is incredibly minimal space. The type of isolation facilities needed will depend on the type of problem encountered and the level of care which the infant requires.

To me it is totally impossible to answer any questions sensibly without more understanding, there may well be more than one type of isolation facility which should be provided in any Perinatal Centre, if this is what is being discussed.

(iii) The only way these space criteria can be acceptable is if the isolation nursery is immediately adjacent to the main nursery and can be visualized through glass while a nurse is sitting in the main nursery OR if the numbers of infants requiring isolation are large enough to maintain a constant staff assignment.

(iv) Not enough space for intensive care. Full anteroom is not necessary - sink and gown space can be provided in corridor, allowing more area for patient care. The two incubator design is awkward since the patients would not necessarily be suffering the same infection. A fuller separation of isolettes is desirable - interposed sink to allow smooth movement between babes.

(v) I feel that for Isolation babes spaces allotted for (iii) (33 sq. ft. per incubator) (iv) (incubators 3'-0" apart) and (v) (aisle width of 4'-0") should be as for Maximal Care or N.I.C.U.

3.1.8 Where the Requirements (A.A. of P.) Cannot Be Met and Proposed Spaces as Alternates ...continued

(vi) The Anteroom does not have to contain charting area but should contain clean supply area, soiled linen hamper (or alternate method of holding soiled laundry) should not be in anteroom with clean supplies - should be alternate method such as double doored cupboard to hall.

NEW QUESTION

3.1.8 Where an Isolation Nursery is required briefly outline what the criteria should be for:

(i) Normal Nurseries.
(ii) Intensive Nurseries.
(iii) The overall space related to your suggested criteria (e.g. per bassinet, per overall unit of certain size, etc.)
(iv) The ancillary spaces need to be a part of the unit and those shared or in general space (e.g. corridors).

3.2 NEONATAL INTENSIVE CARE UNITS

3.2.1 The Most Desirable Shape and Need for Open Space

Those who Agreed that as square a space as possible was desirable commented:

(i) A circular space would be even better.
- approximately equal distance to each patient unit from a
- centrally located control center
- possibility of every patient being seen from every point in the nursery.

(ii) A square or rectangle tends to allow more open visibility, less corners which are difficult to work with and ease of movement through the unit for better traffic patterns.

Those who Disagreed commented:

(i) How can one make a statement on this without knowing some other information, such as, the number of infants in an N.I.C.U. I think it is impossible to say what the most desirable shape or configuration of such a Nursery should be as this is dependent on many other uncontrollable factors in planning even a new hospital, and the shape of the space will probably regularly depend on that which fits in with other areas to be located. I personally think it is almost impossible to consider the desirable shape because the number of variables are too many.

(ii) There is more wasted space and staff walking time is increased.

(iii) I favor more complete zoning of levels of care and strongly dislike the "huge open area" concept of Figure 4.

Do you feel

All comments are valid ◯

Some only are valid ◯

(Please say why)

FURTHER COMMENTS

3.2.2 An N.I.C.U. Operating in its Own Environment

Of those commenting that Agreed that it should, the comments were"

(i) Need to minimize daylight and view. Doesn't preclude interface - High-Rate delivery rooms, satellite laboratory, equipment resources (respirators, incubatory cleaning, etc.).

(ii) It is imperative that an N.I.C.U. functions almost exclusively within its own environmental area if there is to be adequate control of the environment and personnel functioning within that environment.

(iii) Agreed with the proviso that there is adequately controlled access for relevant hospital personnel and services to the area.

(iv) General traffic must be minimal but with no hindrance to parent access or access to other care departments as necessary.

An excellent means to reduce possibility of introduction of organisms.

Of those commenting that Disagreed said

(i) The N.I.C.U. must rely on support services within the hospital and provide services to the delivery area. As a result the facility must be closely linked to the delivery area, x-ray facilities, and O.R. facilities and include or be close to a blood gas facility and a laboratory facility. An N.I.C.U. need not duplicate all of the facilities that exist within the hospital.

(ii) 1. Staff stress - due to isolation.
2. It is not practical in the medium sized hospital - Laboratory and Radiology must be available.

(iii) Must be adjacent to labor and delivery and easily accessible to parents, hospital personnel and Doctors but away from general hospital traffic.

If infant transport from other hospitals - the area should be close or within easy access to heliport and/or ambulance entrance.

3.2.2 An N.I.C.U. Operating in its Own Environment ...continued

Do you feel

All comments are valid ◯

Some only are valid ◯

(Please say why)

FURTHER COMMENTS

3.2.3 Spacing Around Bassinettes/Incubators in N.I.C.U. Dependent Upon Appropriate Mix of Levels for the Unit But the Same as For Minimum, Intermediate and Maximum

Those commenting who Agreed said:

(i) Spacing to be provided in proportion to the level of facility.

(ii) This obviously follows on from the previous sections, but it is important to note here that it is virtually impossible to decide on the mix between High Intermediate and Maximal Care. In at least 4 Intensive Care Nurseries reviewed recently, both the Nurses and Neonatologists have stated that these babies are nursed in the same geographical area side-by-side, both for nursing convenience and also as it is very difficult to predict the rapidity with which one infant may move from one group into another group.

3.2.3 Spacing Around Bassinettes/Incubators in N.I.C.U. Dependent Upon Appropriate Mix of Levels for the Unit But the Same as For Minimum, Intermediate and Maximum ...continued

(ii) ...continued

It is inappropriate to be continually moving infants with all their supporting equipment from one location to another because their level of care has changed from being Intermediate to requiring Maximal Care. Therefore, I do not think, as in the Ross Plan, that it is possible to talk about Maximal and Intermediate Care as two totally distinct groups, there is a certain amount of mixing of Maximal and High Intermediate Care despite what planners may decide. This is precisely what happened in the Intensive Care Nursery at V.G.H. Our Nursery does not operate as conceived prior to the infants and staff moving in.

(iii) I generally agree with the above statement but depending on the design and geographic configuration of the unit, certain space requirements may be required to allow facilities such as portable x-ray machine, large ventilators or monitors, and other support services to be moved within close proximity to the patient. This would depend on the overall configuration and geography of the specific unit.

(iv) The difficulty is how big (how much floor space) can a nursery get before visual supervision is compromised and people and machinery overwhelm the situation.

Do you feel

All comments are valid ◯

Some only are valid ◯

(Please say why)

FURTHER COMMENTS

3.3 MECHANICAL CONSIDERATIONS

3.3.1 Heating, Ventilating and Air Conditioning

PT. 1 Of those suggesting Other the following were mentioned:

(i) Should be a separate control system from the rest of the hospital.

(ii) Humidity (control) should be available in I.C.N.

Another comment of a general nature was:

(i) Nursery environments should remain constant to reduce the adjustments incubators have to make to a fluctuating temperature in the room and to reduce the stress infants may be under to do similarly.

Air conditioning units are potentially sources of pathogenic organisms.

PT. 2 Of those offering Other temperature ranges the following were given:

(i) Both N.N. and N.I.C.U. - 28°C to 30°C.

(ii) Both N.N. and N.I.C.U. at 72° - 76°F.

(iii) N.I.C.U. at 70°F to 80°F (21°C - °C)

(iv) N.I.C.U. at 25°C - 27°C.

(v) N.I.C.U. should be warmer than 68° to 72°F.

(vi) N.I.C.U. at 68° - 75°F (20° - 23°C)

(vii) N. Nursery at 68°F to 78°F.

(viii) This temperature range I know is too low for both areas. The Canadian Standards 28° to 30° C are also too high for staff comfort. There are two considerations here, that of the comfort of the staff, and the needs of the infant. The higher the ambient or room temperature the less radiant heat the infant will lose to its immediate environment. The colder the infant the higher the incubator temperature has to be set in order to compensate. Above a certain incubator temperature the infant develops frequent periods of apnea (cessation of breating). I do not know what the ideal temperature should be, from bitter experience staff will tolerate very high temperatures and humidities. Currently I.C.N. has a temperature of 78°F with a humidity ranging between 30 - 40%. This is comfortable most of the time.

3.3.1 Heating, Ventilating and Air Conditioning ...continued

PT. 3 On the issue of Humidity the following comment was:

I do not know what the ideal relative humidity should be, certainly the high room temperatures a very tiny sick infant requires may be difficult for staff to tolerate if the humidity is too high.

PT. 4 On the issue of Incoming Air, recirculation and number of air changes, the following comment was received:

I do not know what the ideal for a normal nursery or an I.C.N. should be. You are going to get an honest objective answer to this question from any of the individuals asked to complete the questionnaire. None of us are technical experts in this field. Surely this will vary with the size and design of each individual nursery.

MONITORS COMMENT

It would seem in checking with various Mechanical Engineers who have had experience in the Hospital field that there is no "ideal" number of air changes in a room. In Canada, U.S.A. and Europe there is a great divergence among recommended air changes for different areas and the Engineers themselves would seek guidance from the users as to their preference. The option offered would seem to be a reasonable minimum.

3.3.2 Plumbing

PT. 2 On the issue of wall mounted sinks the following comment was received:

I think this is an unsatisfactory question, it depends entirely on the design of the sink. There should be no waste overflow as bugs accumulate in this area; the sink should be adequate for the function desired, that is, water should not be allowed to pool at the bottom of the sink and allow proliferation of bacteria to occur. The sinks should be large enough and designed to prevent splashing.

ADDITIONAL QUESTION

3.3.2.2 With respect to sinks used for (i) Handwashing and (ii) Sinks in Workshops, briefly outline the criteria for the design of these sinks and what problems have to be addressed in their use.

COMMENT

PT. 3 On the issue taps, in the sinks, the following comments were received:

(i) There are other ways to solve the problems than those mentioned. The need in the Clean Controlled Nursery Areas is for the flow of water to be controlled without requiring hand or arm operation. This can either be knee or foot operated, or operated by some mechanical means.

(ii) Knee operated taps contribute to better handwashing technique and leave the floor free for more effective cleaning.

PLEASE ADD ANY FURTHER COMMENTS (with respect to the criteria for tap operation)

3.3.2 Plumbing ...continued

PT. 4 On the issue of location of sinks the following comments were received:

(i) The number of sinks depends on the level of care the infants require and the spacing of the infants away from a sink. The distance an individual has to walk in order to wash their hands is probably of primary importance. The sink should be easily accessible and not placed in a corner of the room or between bassinettes or incubators, it should be clearly visible with easy access from all areas. In the Neonatal Intensive Care Unit one sink should probably be shared between 4 infants if it is to be used appropriately and functionally useful.

(ii) The most important consideration is the placement and the consequent ease of accessibility. One sink/6 patient units may be inadequate dependent upon this factor. The criterion used - 12 infants/room is questionable from a staffing point of view.

In view of the above comments would you feel it reasonable to say that in addition to the vote on the numbers of sinks per infant that more sinks may be required if the planned layout does not allow (a) ready access and visibility to the infant, (b) within a space unencumbered by stores, supplies or equipment and (c) within an acceptable walking distance.

DO YOU AGREE ◯ DISAGREE (comment) ◯

ADDITIONAL QUESTION

There should be no more than _____ft. (meters) from any infant to handwashing sinks. (Give number)

COMMENT

3.3.2 Plumbing ...continued

PT. 5 Soiled Utility Room Sink and its Purpose

In examining the answers given the following contains the elements given:

(i) The Soiled Utility Room

Essentially a holding area in which all dirty equipment, supplies, linen, bottles, etc. are deposited prior to them being collected and removed from the Unit. All used, half-used, dirty equipment, linen and supplies are channelled through this room which also becomes a central collecting area. Therefore, a large amount of floor space is needed as very large quantities of linen (particularly gowns, diapers, cot linen) formula bottles, large 2 litre empty bottles of distilled water, (used for topping up incubators and for use in humidifiers) supplies returning to Pharmacy, empty IV bottles, all garbage and gross cleaned equipment must be stored here.

There should be room for containers of glass and sharp objects.

(ii) The Purpose of the Sink Unit

For washing of soiled major and minor equipment either for re-use or sending on to C.S.R. or other departments for processing. These include: used surgical trays, used oxygen equipment, ventilator circles, nebulizers, oxygen hoods, incubator mattresses, suction bottles, stethoscopes and leads.

(iii) The Sink Unit

The Unit should contain the following elements:
. Stainless steel
. Adjacent work space
. Two bowls for washing and rinsing
. The bowls should be 23" square and 15"-18" deep
. A flushing rim action should be available
. There should be a hand held spray mechanism
. There should be taps with knee or wrist action to facilitate handwashing after cleaning is complete
. Water of a high temperature should be available

DO YOU AGREE ◯ DISAGREE (comment) ◯

COMMENT

3.3.3 Gas Outlets

The following alternates were given for each of the different levels of care and type of outlet:

LEVEL / OUTLET	MINIMUM (N.N.)	INTERMEDIATE	MAXIMUM
OXYGEN	1 per 4 to 6 1 per 6 1 per 6 to 8 MINIMUM (I.C.N.) 1 per 3	2 per infant	4 per infant
VAC.	1 per 4 to 6 1 per 6 1 per 6 to 8 MINIMUM (I.C.N.) 1 per 3	2 per infant	3 per infant
COMPRESSED AIR	1 per 6 to 8 and none required	2 per infant	-

3.3.4 Height of Gas Outlets Above the Floor

Of those giving a height the range was 4'-0" to 5'-0" with some at waist height or 3'-0". Those who commented were as follows:

(i) Ideally - patient incubators do not have to be near the wall (but if so 5').

If a patient area is an island - equipment (O_2, Compressed air, electrical outlets) could come from a ceiling telescope - 5'-5" above floor or if open incubator 6'-3" above floor.

(ii) These can be separated into outlets that will be used frequently during a day and those which will not (such as, air and oxygen outlets to blender or to ventilator. Those services which are altered frequently in a day need to be at an ideal height, that is, suction, oxygen blender, oxygen flow meters). Ideally these should be at a height at which the individual neither needs to bend or stretch upwards to control; an ideal height is probably around 39". If placed too high, personnel and visitors are aware of clutter on the wall.

3.3.4 Height of Gas Outlets Above the Floor ...continued

(iii) A specific height is not a useful standard. Principles to be considered . visual and physical ease of accessibility . protection of the (units) outlets from jostling settings or damage caused by equipment and personnel banging against the outlets.

ADDITIONAL QUESTION

3.3.4.1 In view of the comments received would you say it is reasonable to make the following basis for determining the height of gas outlets

(a) Where incubators/bassinettes are against a wall the height should be between 4'-0" and 5'-0" to facilitate ease of reading meters.

(b) Where gases are on freestanding cabinet units the height should be between 36" to 40".

(c) Where the bassinettes/incubators are freestanding they are served from overhead strips at 6'3" above the floor or integrated ceiling mounted columns at 5'-5" above the floor.

(d) All dimensions notwithstanding the criteria for the height of gas outlets should be to give priority to those which are altered frequently at the most appropriate height for reading and changing position.

DO YOU AGREE ◯ DISAGREE ◯ (Explain)

FURTHER COMMENT (Explain)

3.4 ELECTRICAL CONSIDERATIONS

3.4.1 Power

With respect to comments in regard to provision of Emergency Power, all were concerned that emergency power be provided to all infants especially in the N.I.C.U.

3.4.2 Heights of Electrical Outlets Above the Floor

Of those just supplying a height and no comment the range was from 18" to 6'-0" with a majority in the 4'-0" to 6'-0" group.

Of those who commented, the following were important:

(i) Electrical Outlets should be basically at different levels:

1. Basic equipment such as incubators, phototherapy lights, ventilators - our nurses prefer the electrical outlets near the floor.

2. For equipment that sits near or around the top of the incubator, such as, constant infusion pumps, they request the electrical outlets to be as near to countertop level as possible but not on or above the countertop.

3. One duplex at countertop level is also desirable. Too many at this level will mean electrical leads will be invading the countertop space.

4. More electrical outlets should be supplied at the level at which the Monitors are placed.

The following comment was of a specific nature but indicates concern over providing certain kinds of outlets at heights for certain functions. Possibly duplex outlets should give way to single outlets where plugs are too large.

(ii) Problem encountered - plugs of many pieces of equipment are so large they overlap on the duplex outlet making the second outlet nonfunctional. The permanent plug-in of the patient unit should be separated from the plug-in used for other equipment. The outlets must be protected from jostling and banging by equipment being moved around the patient unit.

3.4 Electrical Considerations ...continued

ADDITIONAL QUESTION

3.4.2.1 Do you feel in the light of the above comments that the height of outlets should be determined by the following factors:

(a) That equipment which is not altered frequently should be plugged at between 12" to 18" above the floor.

(b) For equipment on counters that will require more frequent changes, the height be close to counter height or between 2'-0" and 3'-0" but not above counter height.

(c) For equipment mounted near a wall additional outlets be mounted between 4'-0" and 6'-0".

(d) All monitor outlets should be mounted as close to the monitor height as possible.

DO YOU AGREE ◯ DISAGREE (Explain) ◯

COMMENTS (explain)

3.4.3 Performance Requirements for Illumination

The following cover the collected criteria for illumination:

(i) Access to outside windows should be provided to produce distant focus to rest the eyes of the staff so as to improve the morale by relieving stress.

(ii) Where there is a possibility with natural light of low level direct sun penetration, screening must be provided to reduce heat build-up and glare.

(iii) Artificial light should be as close to daylight as possible with a mixture of warm or cool white light.

(iv) There should be high levels of light at the work places, so that personnel can clearly see an infant, skin colour and general condition, in the order of 100-120 ft. candles.

(v) Due to the unknown effect of continual 24 hrs. per day effect of high levels of general illumination an attempt to vary light levels away from task areas should be achieved (e.g. multi-switching circuits).

(vi) Lights should not be placed directly over an incubator.

(vii) Pockets of shadow must be avoided and consideration given to the placing of lights with respect to overhead service equipment.

(ix) Switches should be accessible, controlled and understandable.

(x) For ancillary spaces such as Nursing Stations, Charting areas, fluorescent lights with individual switches should be provided.

DO YOU AGREE DISAGREE (Explain)

COMMENTS (explain)

The following is a series of suggested additional criteria from Gaarder, Lovick Engineering who are electrical specialists in the Health area. Their current projects include Royal Columbian Hospital, U.B.C. Acute Care and St. Paul's Hospital.

Read and comment if you wish, especially with respect to which concept you feel ought to be adopted or which you disagree.

PERFORMANCE REQUIREMENTS FOR ILLUMINATION

NURSERIES:

1. LIGHTING SYSTEMS

1.1 General Lighting

The general lighting should be in the order of 30 to 40 footcandles. This is adequate for performing normal work in the area.

1.2 Observation Lighting

Additional lighting to perform more careful observation should be provided. Lighting level should be in the order of 100 footcandles. This system could either be integrated with the general lighting system using a 2 level switching system or be provided on a local basis. It is important to note that the 100 footcandle level should not be kept on too long in order to avoid retinal overexposure. (The infant does not have the ability to roll over or employ adult protective mechanism)

1.3 Examination Lighting

Lighting levels above 100 footcandles are seldom needed in a standard nursery. It is suggested that provision be made for plug-in of portable examination lights in cases where high lighting levels are required.

1.4 Night Lighting

Simulation of night should be considered with a system providing levels of 5 - 10 footcandles. It is important that adjacent spaces be provided with reduced general lighting levels during nights in order for nurses to adapt fast to the low lighting level in the nursery. Areas requiring higher levels during night, such as charting stations, etc., should be provided with localized and screened lighting systems.

2. LIGHTING BRIGHTNESS

Lights that are on most of the time, such as general lighting, should meet the following criteria:

- provided with low brightness lenses not exceeding 90 footlamberts viewed from the bassinet position.
- not be located immediately above the bassinet location.

3. LIGHTING SOURCE

The light sources should permit critical colour observation. While day lighting is considered essential during the day, it should be replaced at night with a source for superior colour discrimination. It is recommended to use light sources in the higher kelvin ranges with a relatively flat spectral power distribution (fluorescent 5000° K/daylight).

4. STANDBY LIGHTING

As a minimum, the night lighting system should be connected to the standby lighting source.

NEO-NATAL INTENSIVE CARE

1. General Notes

Lighting requirements in Neo-Natal Intensive Care area is similar to that in Nurseries except that night lighting is not required and examination lighting more frequently used. The more sophisticated units do have examination lights as an integral part of the unit. The use of portable examination light is sometimes difficult in an already congested area. Fixed mounted ceiling or wall mounted light fixtures might be considered.

It is recommended that all lighting systems in the area be connected to standby power.

DO YOU GENERALLY AGREE ◯ DISAGREE (Comment) ◯

ACCEPT THEN FOR INCLUSION ◯ REJECT SOME ◯

REJECT ALL ◯ OTHER ◯

COMMENTS

APPENDIX C

Round Three Questionnaire and the Patterns

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instructions

INTRODUCTION

Over the past few years an expert group of Medical, Nursing and Architectural volunteers in British Columbia and Alberta have been developing a new kind of Design Guideline for Nurseries in hospitals.

This Design Guideline is intended to be a dynamic tool which not only states the problem to be addressed as well as the solution that will solve the problem, but also the context for the problem. It is dynamic because we believe that this Guideline can easily be changed, corrected or restated. This would happen after testing by practical application. Each pattern always makes statements of fact (hypotheses) that welcome empirical testing.

When these guides are found to be truly correct they will become a vocabulary which will always be useful in providing optimal design solutions. They do not of themselves constitute a design solution. They guide the process.

We believe that this flexible system of guides, once developed, will be usable in all areas of hospital planning. They will provide a basis for dialogue between architects, the users themselves and a dialogue with funding authorities.

THE STUDY

The study that has produced these guidelines has taken a series of "rounds" of questions and answers in which an enormous number of issues, concerns and solutions have been presented. This input has been distilled to create a series of simple statements called "Patterns". Each Pattern deals with one area of concern and Guides action toward the resolution of problems in the design context.

There are a great many more patterns yet to be developed to cover every aspect of designing Newborn Nurseries. Here are a few, together with some more general patterns that hold universal truths about people and spaces they occupy. Your response to them is important to the further development of the patterns (or Guides) for design.

instructions

THE TASK

In the following pages are a set of questions we would like you to answer, once you have read the Patterns. The instructions are clear and should provide for easy input.

Please assist us with this task and hopefully all professionals who are associated with health facilities design, will benefit in the long term.

RESULTS

As soon as we have developed a reasonable group of Guidelines we will publish them in the hope that others will incorporate them and add to them, or correct them. You will be sent a copy of these results for your use. We hope as you use them, there can be continuing dialogue so all can learn more.

TIME

The time is now short and we hope to complete the bulk of our work by the end of this year (1981). If you could answer your questions by the middle of December we would appreciate your co-operation. Please answer on THE ANSWER SHEETS provided and return THE COMPLETE BOOKLET. You will be given the corrected patterns for your use later.

instructions

INSTRUCTIONS

Individual Patterns

Read all the Patterns through before you begin to answer the questionnaires which you will find after each pattern. This will give you a sense of the range of patterns that exist on the topic. It is important to understand whether concerns you have are covered by one or other of the patterns before you answer.

Add comments about anything you feel relevant on each questionnaire which help explain your answer or where you feel an improvement can be made.

The Language

In the final section a linkage of the patterns has been made to create the "Language" for communicating about a specific facility. Answer the questionnaire about this section with a view to the usefulness of the collection of patterns as a design process.

DETAILS (Fill out)

NAME: _____

ADDITIONAL SHEETS INCLUDED: _____

If you have no objection to having your name included in any list of participants that may be published in respect to this project, please sign below as authorization:

_____

The Birth Home

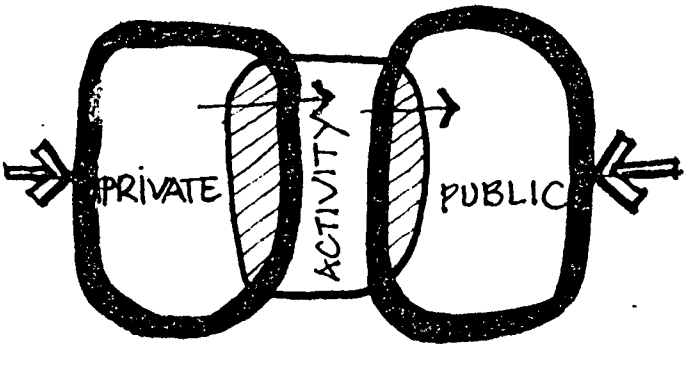
THE PLACE A MOTHER GIVES BIRTH MUST ALLOW HER TO FEEL AT HOME.

For people to continue having their children in hospitals, it is important that it become a birthing home. This means areas where people are in beds should become as their bedrooms at home; areas where people eat, socialize, do family work activities - should function as do these spaces at home.

Families have started to complain that the clinical environment of hospitals is not satisfactory for the "non-sick" birthing process. What people are doing is to seek ways of having babies at home in the hope of achieving this home setting. To the concern of medical practitioners they run the risks of complications even the death of a child. This process can be avoided if a hospital setting could provide a risk free home environment.

What are the elements of a home that we all recognize as being essential to our personal well being? We begin to recognize that there are zones in a house where we can choose to do things alone or with others. A house is divided to allow us to perform different functions in different zones and to change from one role to another. In some zones we are parents in others we are hosts and in others lovers. In addition, through collective social norms recognition of these zones allow others to recognize where they are welcome or not. A home belongs to a family and welcomes its guests according to social rules.

THEREFORE: WHEN PLANNING A MATERNITY UNIT, ENSURE THAT THERE EXISTS A SERIES OF DEFINITE ZONES OF ACTIVITY WHICH ARE ARRANGED IN A HIERARCHY BY DEGREES OF PUBLIC AND PRIVATE ACCESS. THESE ZONES WILL RANGE FROM PUBLIC SPACES TO PRIVATE SPACES IN A CONTINUOUSLY LINKED SERIES WITH THE WORK ACTIVITY AREAS IN THE MIDDLE.



We are at our most private in bed or when we are bathing. It is only our most intimate others who share this space. We are at our most public when we welcome guests into our living rooms. At our most cordial when enjoying the timeless ritual of sharing a meal with friends. We have functional spaces such as kitchens or studios where we work, learn, or teach others. These functional spaces are where we vary from intense self-centered activities, to where we share tasks with others for some mutual benefit. The space you occupy and with whom you share it should always be by choice. This choice is dependent upon which of the available spaces is appropriate to your need.

Just as the spaces within ones home are planned so that the bedrooms are the most secluded and the living room the most publicly accessible, so too must the hospital be planned. Bed areas are to be the most remote and most accessible must be space for noisy, joyful public visiting. Too often in a hospital the only place for visiting is the bedroom. This provides reinforcement to the "sick/bedridden" image of hospital visits. Alternatively both guest and resident feel uncomfortable as they unconsciously recognize the invasion of a private space in the bed area.

Between these extremes are those functional spaces which allow out of bed activities either exclusively with one or more mothers and their babies or they can be with staff, with husbands or other parents. By providing within these zones various spaces for more specific purposes, the choice of location and activity can be made by any individual. Because the functions of these spaces are clearly understood and through knowing what to expect from others within the spaces, ease and comfort is ensured. All share a common awareness of the social order.

In a well planned house these things have been recognized for centuries. We have only to take the same "living" solutions into the hospital to provide a Birth Home.

questions

1. CONTENT

The material in the pattern is a mixture of published and unpublished data. It is presented as factual. It is therefore a hypothesis. This hypothesis may be known to be incorrect. Therefore answer:

1.1 DO YOU KNOW OF DATA WHICH WOULD SUGGEST THAT THE FACTS IN THIS PATTERN ARE: (TICK ONE)

( ) TOTALLY INCORRECT
( ) MOSTLY INCORRECT
( ) IN SOME ASPECTS INCORRECT
( ) SUPPORTIVE OF WHAT IS STATED
( ) PROVES CONCLUSIVELY WHAT IS STATED

GIVE ANY SOURCES

_____

_____

_____

_____

1.2 DO YOU FEEL THAT THE ISSUES COVERED BY THE SCOPE OF THIS PATTERN ARE: (TICK ONE)

( ) WELL COVERED
( ) SUFFICIENT FOR THE PURPOSE
( ) INCOMPLETE (explain in comment below)

COMMENTS

_____

_____

_____

_____

questions

1.3 DO YOU FEEL THAT WHAT IS DESCRIBED MAKES CLEAR:

(i) THE PROBLEM ( ) YES ( ) NO (Explain)

(ii) THE SOLUTION ( ) YES ( ) NO (Explain)

(iii) THE CONNECTION BETWEEN THE TWO

( ) YES ( ) NO (Explain)

1.4 IS THIS PATTERN IMPORTANT FOR PLANNING A NURSERY

( ) YES, IN ALL CASES

( ) IN SOME CASES ONLY

( ) NO, NOT AT ALL

COMMENTS

1.5 ADD ANYTHING BELOW THAT SHOULD BE BUILT INTO THIS PATTERN THAT WOULD MAKE IT BETTER.

2. FORMAT

The pattern has a specific format. It has an expressive title which captures the topic of the pattern. The front page has under the title an initial statement which provides a context for the pattern. The front page has the problem solution as well as a diagram to represent the essence of the solution. It is not a "plan" of how to do it. In some patterns there is a picture to illustrate the mood of the pattern. All of this is given on the first page so that it is a summary of Problem and Solution. The detailed basis follows in order to be explored later.

2.1 IN YOUR OPINION IS THE INTENT OF THE FORMAT

( ) VERY CLEAR

( ) UNDERSTANDABLE

( ) NOT TOO CLEAR

( ) CONFUSING (explain)

COMMENTS

_____

_____

_____

_____

2.2 WHEN YOU READ THE PATTERN DO YOU FEEL THERE IS NEED FOR IMPROVEMENT WITH: (TICK ONE FOR EACH)

(i) TITLE'S LETTERING STYLE ( ) YES ( ) NO

(ii) DIAGRAMS OR PHOTOGRAPHS ( ) YES ( ) NO

(iii) THE LANGUAGE STYLE ( ) YES ( ) NO

(iv) THE LENGTH BEING TOO LONG ( ) YES ( ) NO

(v) THE LENGTH BEING TOO SHORT ( ) YES ( ) NO

2.2 .....continued

COMMENT

_____

_____

_____

_____

2.3 DO YOU FEEL THE FORMAT OF THIS PATTERN IS USEFUL IN PLANNING (TICK ONE) ( ) YES ( ) NO

2.4 DO YOU FEEL THE STYLE OF THIS PATTERN IS GENERALLY: (TICK ONE)

( ) TOO TECHNICAL FOR NON EXPERTS

( ) TECHNICAL BUT UNDERSTANDABLE

( ) BARELY TECHNICAL ENOUGH TO BE CONVINCING

( ) TOO COLLOQUIAL TO PRESENT TO TECHNICAL USERS

( ) A GOOD STYLE FOR USE IN PLANNING DISCUSSIONS

OTHER COMMENTS

_____

_____

_____

_____

Visitors Place

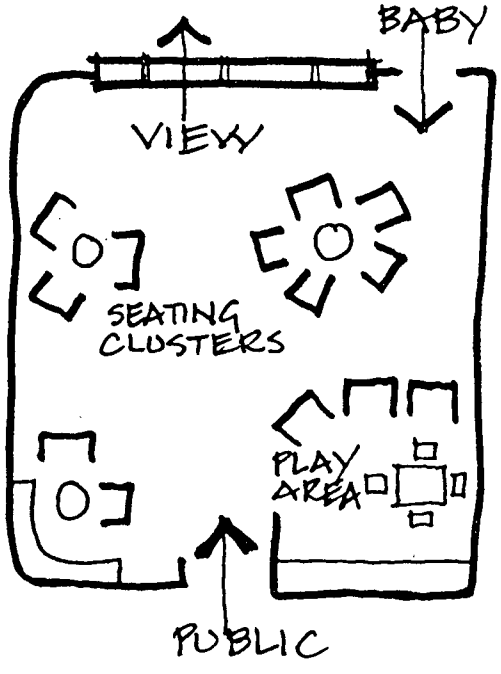
WITHOUT DOUBT, THE OPPORTUNITY TO VISIT WITH FAMILIES, FRIENDS AND OTHER CHILDREN ARE MOST IMPORTANT TO MOTHERS.

The hospital stay is a resting, recovering, learning experience but one which requires sharing with family and friends.

Since there is concern about introduction of common infections which can be harmful to new born children, control of public access becomes a major problem. If the staff wish to promote a family centred concept, open visiting is required. If they do not want infection, the visiting place must not allow babies to be collectively exposed.

THEREFORE: PROVIDE A SPECIAL AREA WHICH IS SET ASIDE FOR VISITING WITH THE PUBLIC. IT MUST HAVE CLUSTERS CREATED BY DIVISION OF FURNITURE THAT ALLOW SMALL OR LARGER GROUPS TO FORM BUT HAVE VISUAL AND ACOUSTICAL PRIVACY. THE SPACE MUST LOOK INTO THE NURSERY AND MUST HAVE A SPACE FOR VISITING CHILDREN TO PLAY. ACCESS TO THIS VISITORS PLACE MUST BE DIRECTLY OFF THE MAJOR ENTRANCE POINT AND HAVE CONTROLLED ACCESS TO THE NURSERY. IT MUST BE ACOUSTICALLY SCREENED FROM THE NURSERY.

In many hospital settings the only place to visit is the mother's bedside. This is reasonable for very close relatives or when a mother is incapable of moving to another location. It is much preferred that a special visiting place exists where small or larger groups can meet in an environment which is similar to a family living room.



This space should have a comfortable environment with the seating grouped so that a variety of group sizes can be accommodated.

There should be access for the mother to collect her baby and wheel in the bassinette and be with the visiting group. This visiting space should allow large groups of visitors to be with the mother and the child. The mother can choose to visit with friends and if there is a concern of infection, show them the baby through a window, but still be a part of the visiting event.

This visiting place must provide proper visiting facilities for siblings and other children. What is needed is a place for some toys, a small children's table, chairs and some books. This area must be placed where visiting friends or the parents can talk and watch over the children playing. If the siblings can be entertained or enjoying themselves, the parents can relax and visit and it is meaningful to older siblings.

Mothers' Exchange

MOTHERS NEED A SPACE TO SOCIALIZE AND SHARE EXPERIENCES REMOVED FROM HOSPITAL ROUTINE.

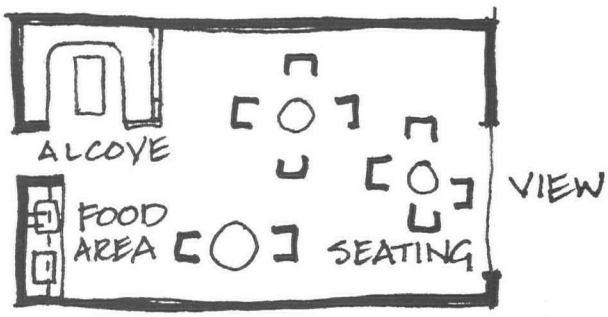
The hospital stay for most post-partum mothers is a time filled with the happiness of the birth and intense interest in the event. A space for socializing between mothers within the privacy of their post-partum bed zone is required.

Too often the only place for mothers to meet informally is when they share a multi-bed room or in a day room which may be used also by visitors. If a mother decides to have a single room or 24 hour rooming-in she may miss the opportunity to share the social interaction with other mothers.

The opportunity to meet, discuss, and share experiences with the "extended family" of mothers can be a rewarding experience. The opportunity to eat together rather than as invalids in bed can be the focus of such a space.

In the same way that the nursery provides a transition for the baby from protected womb to unprotected external environment, the mother must transition back to her normal routine. She will need to begin to assume the roles required of her at home and can use the brief hospital stay to become accustomed.

THEREFORE: PROVIDE A ROOM WITHIN THE POST-PARTUM ZONE THAT IS FOR MOTHERS TO GATHER AND RELAX. IT MUST HAVE A PLACE SET ASIDE WITH COUNTER, SHELVES, REFRIGERATOR AND SINK FOR FOOD OR DRINK PREPARATION BY MOTHERS. PUT A SERIES OF TABLES AROUND THE ROOM SUFFICIENT TO ACCOMMODATE ONE HALF OF THE POST-PARTUM MOTHERS ON THE UNIT. MAKE THE SPACE LARGE ENOUGH SO THAT CHAIRS CAN BE PULLED BACK COMFORTABLY. MAKE THE TABLES IN GROUPS OF 2's AND 4's. PUT A LIGHT OVER THE TABLES TO CREATE POOLS OF LIGHT IN CONTRAST TO THE GENERAL LEVEL OF LIGHT IN THE ROOM WHICH MUST BE LOWER.



Most mothers if not immediately following delivery, toward their discharge, will be capable of self-care provided the facilities to do so are available. Particularly with respect to getting fluids, and other nourishment, a space with tables and chairs, supply of juices, coffee and tea making facilities, or even toasting and microwave facilities will become the "kitchen nook" of the unit.

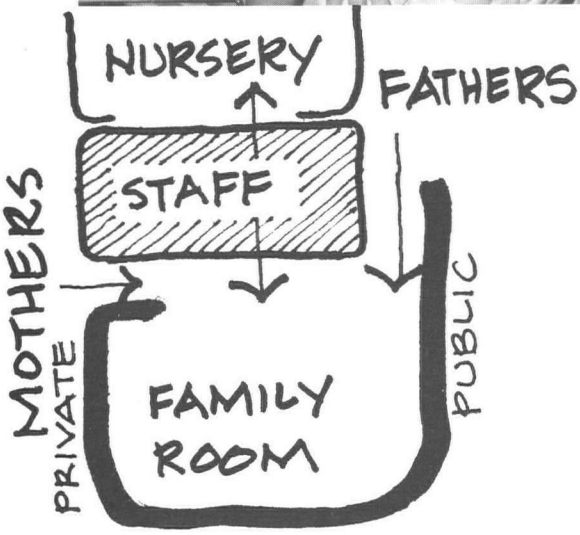
The room should be large enough to seat at least one half of the post-partum mothers at tables. There needs to be a kitchen space with cupboards and counter top so that a number of people can be using the space simultaneously. It is not necessary to provide a great deal of space in the kitchen but the counter should have a sink and be a permanent fixture. It should feel like a family kitchen.

The light in the room should not be even. It should be arranged so that lights be hung or focused over tables. Ensure that it is soft light and the general room illumination is lower. This will hold people together at the tables and focus on the tables as a place to go when entering the room.

Family Room

JUST AS A FAMILY ROOM AT HOME IS A PLACE WHERE THE FAMILY ARE TOGETHER DOING ACTIVITIES OF INTEREST AND LEARNING SO DOES THE HOSPITAL NEED A FAMILY SPACE.

Since a mother and her child are required to stay in hospital for some days, an opportunity exists to use the visit as a learning experience.



THEREFORE: IN ORDER TO ALLOW MOTHERS OR BOTH PARENTS THE CHOICE OF UTILIZING THE HOSPITAL STAY TO LEARN CHILD OR FAMILY CARE, A SPACE MUST BE PROVIDED IN CLOSE PROXIMITY TO THE STAFF ACTIVITY IN THE NURSERY WHICH HAS:

1. **OPPORTUNITY TO BE IN DIRECT CONTACT WITH STAFF WHO ARE WORKING IN THE NURSERY TO ASK ADVICE OR ASSISTANCE WITHOUT HAVING TO DISTURB ROUTINE NURSERY CARE.**

2. **PROVISION TO WORK IN A CLEAN ENVIRONMENT BY MAKING IT A PHYSICALLY SEPARATE SPACE AND YET STILL HAVING ACCESS TO STAFF BY ENSURING NORMAL BARRIER TECHNIQUES (E.G., HAND WASHING).**

3. **AN EASY TRAFFIC FLOW FOR MOTHERS AT ANY TIME FROM THE NON PUBLIC POST-PARTUM AREAS.**

4. **THE ABILITY TO BE FLEXIBLE AND DIVIDABLE THROUGH SCREENING AND BY ARRANGING FURNITURE TO ALLOW MOTHERS TO HAVE HELP WITH BREAST FEEDING AS WELL AS ALLOWING OTHERS TO HAVE GROUP EVENTS.**

5. **AN ATMOSPHERE OF FRIENDLY EXCHANGE.**

We know that the involvement of staff is important to ensure the education process occurs. With the general limits on the number of staff available this learning experience must occur where the presence of staff is required most of the time. If this access does not occur there will be insufficient staff to provide total mother and child care including education.

Nursing staff and medical staff traditionally find their mother and child care time concentrated in two areas; at the bedside and in the nursery. Since the information a mother receives at the bedside is usually personal, individually provided (one to one) and can be readily given with any hospital stay, it is more important to deal with the less available opportunity. This is to exchange information and draw upon limited staff resources while in the nursery areas; an opportunity that should be maximized. Regardless of whether mothers Room-In or not, a facility must be provided for mothers to stay near supervision. Here they get support to achieve their parent/baby interaction or learn from the nurses primarily occupied in the nursery.

Numerous babies have low resistance to infection, so infection becomes a special problem when considering mothers having access to the nursery. Because of the need to be with the nursing staff, special provision should be through a transition space either within the normal nursery or just outside the nursery. It could be argued that a mother's physical condition is known by staff therefore possible risk of infection can be minimized. However, access to the baby, in the presence of other babies with supervision by staff will also want to be available to the father (or supporting relative) whose infection risk is unknown. Provision must be made for hand washing or gowning or other barrier techniques for these known "others" to enter this zone. It should occur with ease and not intimidation.

This space becomes a meeting space. A space to share learning experiences. A place for multi-para mothers to share ideas with first time mothers. An opportunity for group demonstrations by the staff, of child care techniques with mothers having access to their babies to participate. It becomes the parents family room where there can be an exchange of information and enjoyment.

CONTEXT

This space is not the same as Mothers Exchange. This is a work area that has access for other members of the family. It is for individual families to be together not a group of mothers. Mothers Exchange is part of the bedroom, privacy zone, Family Room is part of the activity zone.

The Size of The Well Babies' Room

DETERMINING THE APPROPRIATE SIZE OF THE NURSERY IS CRITICAL TO ITS FUNCTION.

THEREFORE: WHEN PROVIDING SPACE FOR NEW-BORN WELL-BABY NURSERIES:

(i) PROVIDE BASSINETTES FOR 25% MORE THAN THERE ARE POST PARTUM BEDS.

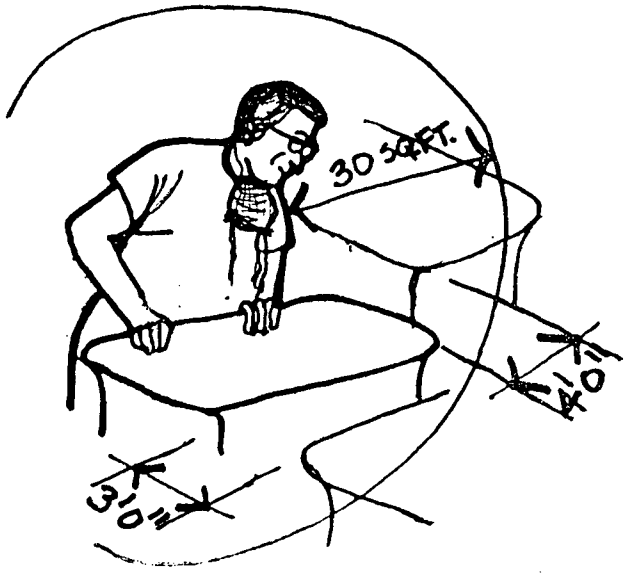
(ii) ALLOW 30 SQ.FT. OF DEPARTMENTAL GROSS AREA PER BASSINETTE IN THE NURSERY ITSELF EXCLUSIVE OF OTHER SUPPORT AREAS.

(iii) DESIGN THE SPACE SO THAT A BASSINETTE HAS AT LEAST THREE TO FOUR FEET CLEAR ON ALL SIDES.

(iv) PROVIDE SUB-GROUPINGS WITHIN THE NURSERY REFLECTING A NURSE/ INFANT RATIOS OF 1:6 PROVIDE MODULES OF MECHANICAL SERVICES (ELECTRICAL, OXYGEN VACUUM, AIR) MATERIAL SUPPLY AND WORK SPACES, ONE OF EACH FOR EACH SIX BASSINETTES.

(v) WHEN REDUCED OCCUPANCY OCCURS, DESIGN THE NURSERY TO CLUSTER UP TO TEN BASSINETTES WITH DIRECT VISUAL AND AUDIO SUPERVISION OF THE NURSES STATION.

There are many factors which affect the numbers of children in a nursery. Changing population causes the number of babies being born to fluctuate greatly from community to community. Once in hospital the desire for some mothers to be with their children at all times and other mothers desiring to be with them part of the time effects where babies will sleep. The possibility of shorter hospital stays with better prepared mothers reduces space need and yet, at the same time, longer hospital stays for any children who are not fully well will cause offsetting space needs.



The continued desire to have an integrated family orientation and involvement, in the birthing process, requires choice by parents. This choice includes either rooming in or nursery care or both. This causes staff numbers to fluctuate in different locations. It means that spaces in which baby care functions are carried out must be adaptable. Designers must provide for flexibility of space.

The key to providing this flexibility is firstly to provide space sufficient for that situation which would create the greatest demand upon space, then having done that, to consider the working problems when the space is not being fully utilized. The situation that causes the greatest space demand, is when the newborn nursery operates with all babies in occupancy. It becomes the well babies' bedroom.

Like the babies' bedroom at home, it is where the baby sleeps, is washed, observed and occasionally fed, given treatment and therapy. It is where the parents, doctor and staff visit. Within the hospital it is like the home, a continuum of where the mother lives -- the post-partum ward.

The space needed in any nursery area depends upon the kind of care needed to be given there.

In the normal nursery it must be remembered that we are considering the nursery to be of the lowest Level of Care; that is babies will be greater than 34 weeks gestation and not less than 2000 to 2500 grams at gestation. They will be of low risk from serious cardiorespiratory problems or in need of surgery. These conditions hold true whether it is the nursery of a community hospital or is a facility with other higher levels of care. This means infants will be in bassinettes (cribs) not in incubators and can have less space.

It is generally considered important to provide 25% more bassinette spaces than there are post-partum beds. This makes allowance for multiple births, extended hospitalization and any upward fluctuation of patient census at peak times during the year.

From recent studies carried out with a group of nursery experts in British Columbia and Alberta a space of 30 Department gross square feet for each bassinette exlusive

of Nurse station and support area was considered minimal. There must be no less than three feet between bassinettes in all directions or four feet if an aisle occurs.

Since methods of care vary from unit to unit and nursing staff will move the bassinettes to suit their own practices; some bassinettes will be in the centre and some around the edges of the unit. It is important that services required at the bassinette are not so inflexible as to restrict this capability. Various grouping possibilities must be explored by the design team once the shape of the space is known.

In the previously described survey of experts, while examining the optimal total numbers of bassinettes that should be in one location, the answer was inconclusive. Some felt that, a total of 16 to 20 bassinettes was maximal. Others felt that all the hospital's well newborns should be in one large space. It is clear that each hospital must decide whether all babies will be in one space or not and the answer would be partly determined by the constraints of the physical plan. It was noted that regardless of the total numbers in the overall group, there is a definite relationship between the sub-groups within the area.

The sub-grouping of bassinettes will be different for the different operating modes. Primarily of concern is that time when all the babies are occupying the nursery and routine activities require maximum staffing. Sub-groupings of bassinettes should be according to the staff/infant ratio of one nurse to between five and eight infants. A ratio of 1:6 is optimal for planning purposes and space for one hand washing sink, a work top, clean and soiled supply units, room for a rocking chair and some charting space, should be developed around this module.

Mechanical services should also be based upon this ratio of 1:6. There should be one oxygen outlet available, one compressed air and one suction (vacuum) outlet per six infants. There should be one duplex electrical outlet per infant station but careful consideration must be given to the size of plugs in use. As larger plugs on certain equipment may make the access for additional plugging impossible then use two single outlets.

There should be one grounded power outlet for a portable x-ray machine, located within the nursery in such a place that if x-rays are required, all other infants can be easily screened without disruption to routine care.

At times when infants are not all occupying the nursery, it must be possible to cluster infants where there can be good visual and audio supervision from a more central nurses' work station. There is to be at least one staff member present while there are any babies in the nursery and this will mean other duties are being carried out at the work station. The shape of the overall nursery space and number of infants visible from the station will limit the size of this special sub-grouping. When special physical constraints such as overall shape, column spacing etc. cause reduced visibility, to compensate staff numbers must be increased or the census reduced. The choosing of modules, the size and relationship of sub-group must relate to hospital policies of patterns of care. However remember these policies and patterns of care change, so to provide adaptation of spaces will make a nursery functional and efficient for staff numbers.

CONTEXT

This pattern deals with the space around the bassinettes. See the Pattern "Adults in the Nursery", for other space needs.

The Size of The Sick Babies' Room

AS THE NEED FOR SPACE AROUND SICKER BABIES INCREASES THE CAPACITY TO DEAL WITH INTERMEDIATE CARE SITUATIONS BECOMES CRITICAL.

THEREFORE: WHEN PROVIDING SPACE FOR INTERMEDIATE CARE NURSERY FACILITIES.

(i) **PROVIDE 3 BEDS PER 1,000 LIVE BIRTHS.**

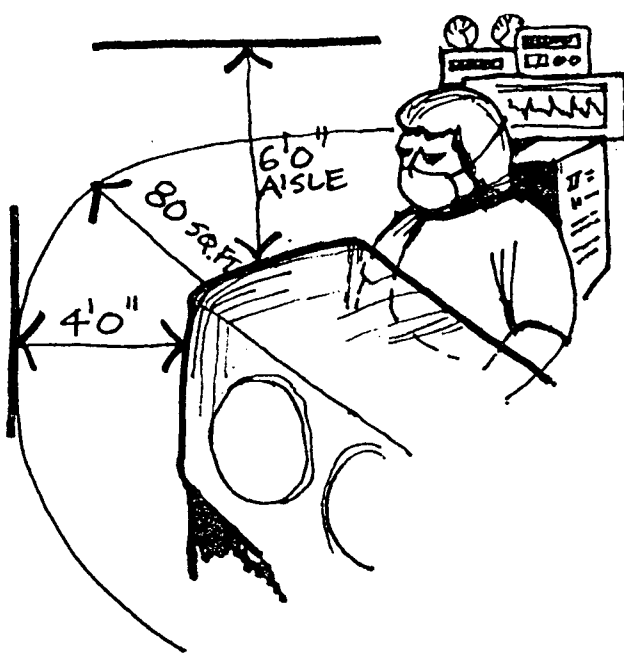
(ii) **ALLOW 80 SQ.FT. OF DEPARTMENTAL GROSS SPACE FOR EACH INCUBATOR EXCLUSIVE OF OTHER SUPPORT SPACES.**

(iii) **DESIGN THE SPACE AROUND THE INCUBATOR TO HAVE ACCESS ON ALL FOUR SIDES AND CIRCULATION SPACE BETWEEN INCUBATORS OF 4'-0" MIN. AND 6'-0" MAXIMUM WITH TRAFFIC AISLES OF 6'-0" MIN.**

(iv) **PROVIDE SUB-GROUPINGS BASED ON A MODULE-OF-CARE. THIS MODULE HAS NURSE/INFANT RATIOS OF 1:2.5, MECHANICAL SERVICES OUTLETS OF 8 ELECTRICAL, 2 OXYGEN, 2 VACUUM, 2 COMPRESSED AIR PER INFANT.**

(v) **MAKE PROVISION WITHIN THE MODULE FOR STAFF ADMINISTRATIVE TASKS RATHER THAN ALL AT A CENTRAL STATION.**

The Intermediate Care nursery is for those facilities who have a need to provide for sick infants. Depending upon available medical staff, this will be for all all sicknesses with the exception of those requiring prolonged assisted ventilation, neonatal surgery, extreme prematurity (less than 28 weeks gestation) and any neonates requiring maximal care. This maximal care would be provided in an I.C.U. Nursery with facilities for cardio-respiratory failure, congenital heart disease, renal failure and problems needing prolonged assistance.



As an indication of a hospital that would require such a facility, conventional wisdom states that under 500 births per annum would not require more than a normal nursery. The need for intermediate care would be effected by population size and distance to I.C.N. facilities. For each 1,000 annual births there would need to be approximately 3 patient stations of Intermediate Care assuming that in a normal distribution, 80 low birth weight infants occur per 1,000 deliveries.

With improved education about nutrition and antenatal care, this ratio could be expected to fall in future. Planners must continually assess these kinds of assumptions in terms of the distribution and number of services needed.

The babies in the Intermediate situation may need the same equipment required of an Intensive Care situation. Therefore, space is to be provided for monitoring, x-rays, and access for performing procedures in cases of acute deterioration.

It is important to remember that sicker babies will be in incubators. Access to a closed incubator requires space available on all sides. There are many different kinds of equipment on the market. With additions such as monitors, respirators, ventilators, humidifiers, I.V. bottles, etc., the protrusions into space are difficult to predetermine. In addition it can be expected that like a maximal care infant, there will be a number of staff collected around the incubator.

Consequently a space of 80 sq.ft. per patient net of desks, counters, etc., must be provided. It has been observed that when moving a sick infant from one location to another with all the equipment attached and personnel in attendance, that 3'-6" doors are barely adequate. This indicates a size need, so provide at least 4'-0" and up to 6'-0" between incubators in an Intermediate Care Area. There must be 6'-0" in an aisle between incubators.

It should be remembered that the size of equipment and the personnel who support a patient in a nursery are the same as those who would support an adult. The only thing that is smaller is the bed. This is a crucial understanding needed if we are not to undersize nursery areas.

Just as in the Normal Nursery, the capability to adjust to different patterns of care and sub-groupings must be ensured. This can be done by making "modules-of-care".

Starting with a nurse/patient ratio of 1:2 or 1:3 (for area planning 1:2.5) this produces a module based upon staff availability. It is a module of work space needs which allows access to clean supplies for this grouping of two or three infants. This supply based module would have linen, equipment, medical supplies, special trays, diapers and formula, for one day and be topped up from a central bulk storage area on the unit. This will ensure that the unit has at least a 24 hour supply at all times. Storage sizes would vary depending upon central hospital supply service hours of operation.

There must be mechanical service supplies for each patient incubator. These are:

(i) 8 electrical outlets either as 4 duplex or 8 singles. If the sizes of plugs for equipment are so large as to interfere with the possible use of the second outlet on a duplex, then all single outlets should be provided.

(ii) 2 oxygen outlets, 2 compressed air and 2 vacuum (suction) outlets per bed.

These mechanical service supplies would be arranged on either walls, island benches, ceiling or floor mounted columns. In deciding which is the best method to use the overall space needs and functional sub-groupings of babies within the nursery will be the major factor.

Space will be restricted by the shape of the area involved. A more rectangular or at least regular shaped space was preferred in a recent survey of B.C. and Alberta users. Although some people surveyed felt large open areas did not provide good zoning of levels of care and still others felt that the shape of the space on its own was not a major factor, planners of units find that regular shaped spaces provide more options to solve a design layout problem than irregular shapes.

When considering the size of sub-groups, in the same survey, users felt it important that within the space two critical factors be considered. One is the visibility of as many patient modules as possible. This allows easy calling for assistance by staff and also the ability to supervise an adjacent nurses' babies if one has to take a break. The second issue was that in sicker baby areas more provision be provided at the bedside, or within the modules, for supervision than at a central nursing station.

This can be a matter of providing mobile chart and writing stations or if configuration permits a fixed work space shared between a

group of modules. There is no preference for the number of modules that might share a work space. This number would depend upon the ease of visible access to the work space from any module.

CONTEXT

These requirements are for the Intermediate Care babies only. When these patients are a continuum with Intensive Care and/or Continuing (convalescent) Care, issues such as portability between levels must be considered. Take the patterns for each level of care separately. Based upon the needs of the separate care modules, determine the needs in each level of care of adjacent modules, whether they be Intensive or Convalescent, allowng sub-groupings that will provide "swinging" between areas.

See the Pattern "The Size of the Sickest Babies Room" for a discussion of mix of levels of care.

See the Pattern "Adults in the Nursery" for other space needs in the nursery.

Locating The Intensive Care Nursery

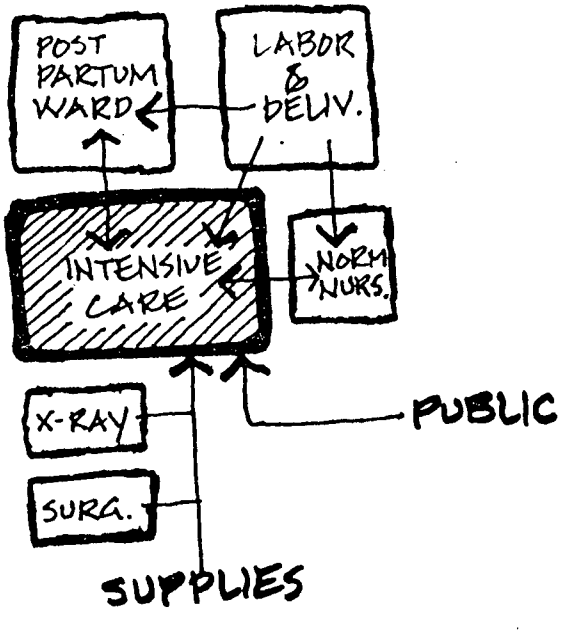
TO BE EFFECTIVE THE INTENSIVE CARE UNIT MUST BE ACCESSIBLE.

The Neonatal Intensive Care Unit is required to support personnel who deal with neonates in life threatening situations. It must be located so that both the neonates and the multi-disciplinary staff can reach the unit quickly.

Many sources feel that the most appropriate location for this unit is close to the labour and delivery area. This presumption is based upon the fact that the prime concern of the unit is to deal with the in-born babies. Where there is a Special Unit receiving out-born admissions by referral, access to an elevator or outside entrance is essential. It should be remembered, however, that out-born admissions have already travelled to the unit to be received, so the term "convenient" rather than "immediate" access is appropriate.

Ross Laboratories,an euthority on Nursery planning in the U.S.A. point out that Neonatal Intensive Care requires the vertical integration of the efforts of obstetricians, anaesthesiologists and pediatricians in addition to the unit staff. Therefore proximity to the Delivery Suite will improve availability of these specialists.

THEREFORE: LOCATE THE NEONATAL I.C.U. ADJACENT TO THE LABOUR AND DELIVERY AREA. DEPENDING UPON THE PHILOSOPHY OF CARE AND THE SPACE AVAILABLE, THE NEWBORN NURSERIES OR THE NEONATAL INTENSIVE CARE UNIT MAY BE CLOSER TO THE DELIVERY SUITE. ACCESS FOR OUT-BORN INFANTS AND ACCESS TO DIAGNOSTIC OR TREATMENT AREAS WITHIN THE HOSPITAL MUST BE READILY AVAILABLE AND CONVENIENT.



The size and degree of specialty in the Intensive Care Nursery will decide to what extent the unit should be self-contained. However, there should be easy access to x-ray facilities, central laboratory, central respiratory equipment, storage and cleaning plus availability of Surgery and Special Radiological Procedures. This means on another floor of the same building or by covered access at the same level.

Unless the unit can be located next to Radiology or Laboratory there will be need for some services within the unit. It is felt by most experts that there is need within the unit for at least an immediate x-ray source, facilities for blood gasses, hemoglobin, and blood sugars serum bilirubin or dextrostix. All other facilities can be provided elsewhere within the hospital.

Another factor of location which is effected by philosophy, is the routine observation of certain full term babies through the Neonatal I.C.U. If the number of high risk births require routine observation in the unit it must be located adjacent to the delivery area.

Infection Barriers in Intensive Care Nurseries

DESIGNING SPACES TO HELP THE REDUCTION OF INFECTION IS FUNDAMENTAL.

Intensive Care Nurseries have a dilemma in that to bring together all the special services that will save the life of a child, it is necessary to bring together all the sickest and potentially infectious children which threatens the lives of the group.

Since the early 1960's when it was recognized that the principal problem of premature infants was respiratory distress - failure of the lungs to function, and that the serious diseases of more mature infants were more often of either the heart or the lungs, it was required that the cardiac and respiratory equipment with specially trained staff to provide care required centralization. The result was the single Intensive Care (Therapy) Unit for infants.

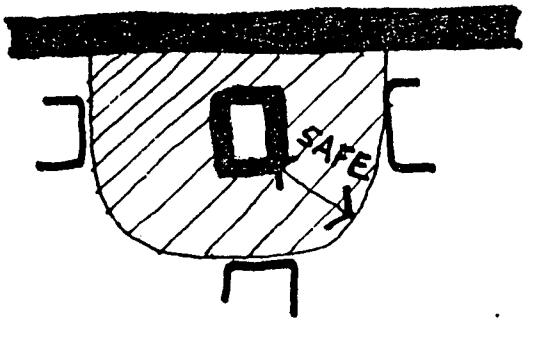
THEREFORE: WHEN PLANNING FOR INFECTION BARRIERS IN A NEONATAL INTENSIVE CARE UNIT THERE MUST BE:

(i) **SUFFICIENT SPACE TO ALLOW THE SEPARATING OF ONE OR MORE INFANTS WITH INFECTIONS FROM THE UNCOLONIZED GROUP.**

(ii) **NUMEROUS HAND WASHING FACILITIES LOCATED AROUND THE UNIT WITHIN A FEW PACES FROM EACH WORK STATION WHERE UNINTERRUPTED CLEANING CAN TAKE PLACE.**

(iii) **THE PROVISION OF PSYCHOLOGICAL BARRIERS WHICH HELP TO REINFORCE CLEANING TECHNIQUES BUT DO NOT RESTRICT THE ADAPTABILITY OF SPACES.**

(iv) **THE PROVISION OF MECHANICAL AIR SYSTEMS EITHER BY AIR-CONDITIONING THE WHOLE UNIT OR THROUGH INDIVIDUAL INCUBATORS TO CONTROL AIRBORNE INFECTION.**



With the concentration of these special neonatal services it was not long before units were being used to provide care for children with infectious diseases who required the facility for the other life threatening problems.

The problem statement is simple. Do you keep the infectious infants physically separated in an isolation area or do you put them in the same area as the others but take special precautions. If they are in a separate area the possibility of good continuous care is at risk. If they are in one area the risk of cross infection is high.

Bacterial infections are generally recognized as being primarily transmitted by staff on their hands or by dust and moisture particles in the air. In earlier Intensive Care Units where adequate space could not be found or poor plumbing and mechanical facilities could not be corrected, the need for physical separation of infectious children was obvious.

This was not to say that where simple barrier techniques were used that mixing was not a success. Dr. William H. Tooley who created an early Intensive Care Nursery in 1961 at the University of California, San Francisco Medical Centre, successfully mixed infectious infants in the one area. He states:

"So we installed more washing facilities, used short sleeve gowns to facilitate washing the arms as well as the hands, and began yelling at people when they did not wash."

Infections in general among infants decreased.

This kind of continued success lead the American Academy of Pediatrics in the mid 1970's to recommend that Isolation rooms were not necessary, when there was adequate staff, sufficient space between infants (reducing the temptation to move from one to the other without washing), additional basins and continued instruction of staff on barrier techniques.

At the time of producing those standards certain facts were apparent: That these were to be optimal standards and not always achievable; that in addition to reduction of hand borne nosocomial infection by increased hand washing, the airborne bacteria would be filtered through forced-draft incubations in which babies were presumed to be contained. It was also assumed that a gastroenteritis infant was likely to be sent to a pediatric gastro-ward. That these things can be achieved is apparent and the principle holds that mixing of most infectious infants is acceptable.

However, in a recent survey of experts in British Columbia and Alberta, concerns about the consequences of not achieving these objectives was clear. It was noted that the more resistant bacteria are not only the ones most threatening to the immature immunological mechanisms but their number and virulence will cause them to be the most likely to be passed on despite good technique. It was also noted that dealing with emergencies was a frequent occurrence and continuing the hand washing adequately was not always ensurable.

Finally it was noted that ensuring adequate staff in times of constant fiscal constraint was not always achievable.

It was noted that these problems are present whether there are isolation rooms or not. However the consensus was that lack of staff was the most serious threat to a child in an Isolation Area and this lack of staff is most likely to persist. It is also difficult to determine how many infants may be in need of isolation in advance so that a space large or small enough for adequate care is most unlikely to occur.

With respect to each of the problem areas the answer was to realize that if we are not to create hazards, optimal standards must be met. It must be that any new facility whether in renovated or new space, must meet high standards or it cannot be allowed (accredited)to continue.

There must be adequate staff available at all times or the census must be lowered. Similarly there must be sufficient space around the infants to create geographic and psychological barriers. If not the census must be lowered.

There must be non-hand operated scrub basins with Hexachlorophene cleansers, at such frequency around the unit, including the centres of open areas, to ensure easy access even during emergencies. The location and number of these facilities can only be determined in the actual design of the facility. As a guide to the location, nursing experts feel that it should be possible to stand without touching a non-clean object; be able to scrub vigorously for 20-30 seconds without disturbing normal routines going on around.

To avoid airborne and particulate infection there are a number of options that can be used in a unit. Most often the option is for the unit to have fully filtered air-conditioning providing a constant ambient temperature and humidity. This has other advantages, such as assisting incubators by maintaining reduced extremes in temperature ranges. Essential to infection control, it ensures a filtered air supply, to the whole area.

To optimize infection control this filtered air must be introduced vertically down into the space, in a linear direction (laminar), from the ceiling air diffusers. This ensures that the cleanest air hits the clean site on the infant or staff first, then carries airborne infection to the floor. The air must then be taken out of the room from low level exhaust air registers. Regardless of the fact that there exists different standards for the appropriate number of air changes per hour in a unit, it is important that a flow-through is maintained. This ensures that air directed at the floor does not float upwards again, causing contamination.

Principally it should be remembered that if the space is air-conditioned then open isolettes can be used. If not, enclosed incubators are required for most infants. This will effect a difference between building and equipment capital priorities.

Space must be provided in the ICN so that flexibility will allow different zones to be created for cohort groups of infectious infants. The expanding or contracting of the group space depends upon the number of infants involved at any one time and the mix of levels of care required. This can be achieved by having one dedicated zone which is recognized by psychological but moveable barriers. When there are no infectious children it is a part of the nursery. For larger units where there is separation between Maximal, Intermediate and Minimal care infants, a zone within each of these areas can be created as an isolation zone.

This isolation zone must have, in addition to the scrub facilities and normal gas and electrical outlets, capacity for a clean supply of non-shareable medical and surgical goods as well as bagged soiled holding space. This can be achieved with a moveable cart or fixed modular units which are dedicated to each infant.

Psychological barriers which

must not become physically restrictive can take different forms and might include an aisle; carts with supplies; provision for change of gown; work top of waist height with layout space and storage under; a row of ceiling mounted gas and electrical supply outlets set so that bassinettes or incubators will group differently; a pedestal with gas and electrical supply units that can have one to four incubators clusterd head to head forming a group.

Selection of the particular barrier will depend upon the particular design solution but it is important to look for natural barriers that must occur and use them to your advantage. By insisting on a barrier with gowning facilities as you enter the unit, although gowning has not proven clinically effective, can be an excellent technique reminder.

The Size of The Sickest Babies' Room

THE ABILITY TO FUNCTION EFFECTIVELY IN CRITICAL LIFE THREATENING SITUATIONS IN THE INTENSIVE CARE NURSERY CAN BE IMPROVED BY GOOD PLANNING OF SPACE.

THEREFORE: WHEN PROVIDING SPACE FOR MAXIMAL CARE NURSERIES

(i) REMEMBER TO PROVIDE SPACE FOR STAFF AND EQUIPMENT THAT WOULD BE PROVIDED FOR AN ADULT. ONLY THE SIZE OF THE BED IS SMALLER.

(ii) PROVIDE THE NUMBER OF SPACES ON THE BASIS OF 1.5 PER 1,000 LIVE BIRTHS AND 3 PER 1,000 LIVE BIRTHS WHEN HIGH LEVELS OF REFERRAL ARE EXPECTED.

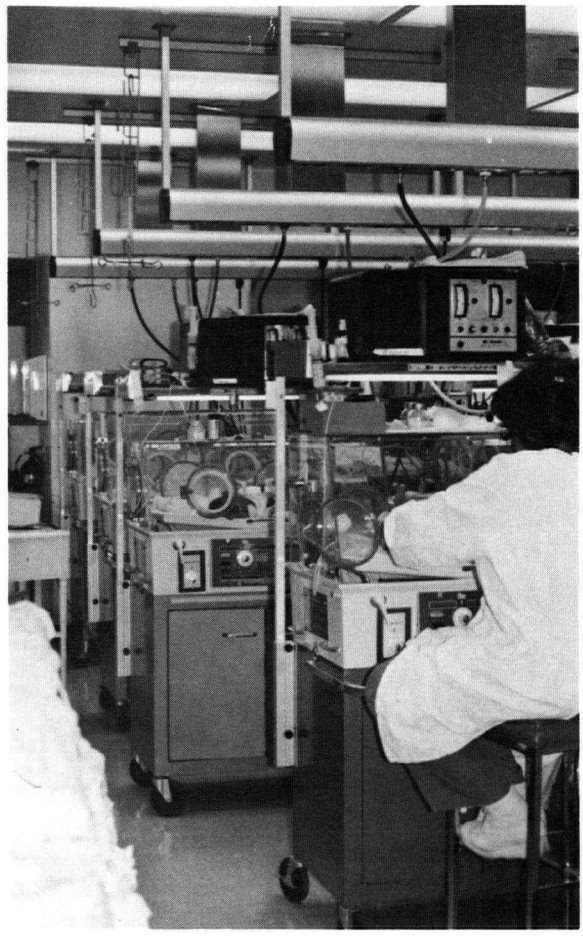
(iii) ALLOW 120 SQ.FT. OF DEPARTMENTAL GROSS AREA FOR EACH INCUBATOR EXCLUSIVE OF OTHER SUPPORT SPACES.

(iv) ALLOW 6'-0" CLEAR BETWEEN THE SIDES OF EACH INCUBATOR, AISLES OF 8'-0" CLEAR AND ACCESS TO ALL FOUR SIDES OF THE INCUBATOR.

(v) PROVIDE SUB-GROUPINGS BASED ON A MODULE-OF-CARE. THIS MODULE MUST BE BASED UPON NURSE/INFANT RATIO OF 1:1 AND IN INCREMENTS OF 2 INCUBATORS. GROUPINGS OF 4 OR 6 INCUBATORS PER MODULE ARE RECOMMENDED.

(vi) EACH MODULE MUST HAVE MECHANICAL SERVICES OF 10 TO 16 ELECTRICAL OUTLETS PER INFANT, OXYGEN AND AIR OF 2 TO 4 OUTLETS PER INFANT, VACUUM OF 2 OR 3 PER INFANT.

(vii) EACH PATIENT MODULE MUST BE A SUPPLY AND ADMINISTRATIVE WORK CENTRE AND NOT RELY UPON A CENTRAL STATION ONLY.



When we are dealing with children in a constant state of potential distress, it is the skills of the staff and their use of the available equipment which are important. Unfortunately it is often forgotten that although the layout of a unit will not of itself save lives it can be of enormous value in supporting those who do. By providing adequate space, and by consideration for the needs of the staff and equipment, the built environment can reduce staff stress and promote the ability to function optimally.

In addition to providing the correct spaces the design of the I.C.N. can be helped by such things as running service lines directly and unobtrusively around the unit; by providing proper storage so that there is reduced clutter, quick access to supplies and safe disposal of soiled goods; by ensuring that there is communication between staff and the outside without disruption to the care routines and through ensuring reduced noise by using absorbing materials where possible, particularly ceilings and screens; and finally by generally providing as much opportunity for staff to change the arrangement of their space to suit their perceived needs.

This flexibility is critical to being able to provide for changing categories of care from very Intensive to Intermediate and Convalescent care. The patterns of care in an I.C.N. are highly individual to the patient. If ease of adjustment is restricted by inappropriate location of fixed elements such as gasses and workspaces, choices are removed and so is the quality of care.

Firstly let us look at the infants who need this space. This type of unit is considered to provide the highest level of care to those who require: continuing ventilatory services; neonatal surgery; provision for cyanotic congenital heart disease; treatment for severe infections such as meningitis; renal impairment (requiring dialysis); severe gastrointestinal problems (requiring intravenous alimentation); all severely premature babies (less than 1200 grams) and any other conditions that need the equipment and trained staff of a Level III unit.

Provision of this type of unit should be only in Referral hospitals and needs at least 2,000 live births per annum to support such a unit. In the United States it has been stated both by the Department of Health, Education and Welfare in their National Guidelines for Health Planning and the American Academy of Pediatrics that no reduction to this standard be allowed by virtue of time travel between hospitals.

This is because it is recognized that high-risk pregnancies will be transferred to a hospital where an I.C.N. exists, before the birth is imminent.

The number of patients to be planned is at the ratio of 1.5 spaces per 1,000 births and up to 3 spaces per 1,000 births with a facility experiencing high referral rates. These ratios are based upon the assumption of 80 low birth weight infants per 1,000 births.

In a recent survey of medical and nursing users in British Columbia and Alberta sizes and spaces within the Intensive Care Nursery was explored in depth. They agreed the principal that must be applied to deciding the amount of space around an incubator was that the only difference between an Intensive Care Baby and an Intensive Care Adult is the size of the bed. The same support facilities and staff are required to support each human being, often with very similar basic problems.

The space required would be 120 sq.ft. Departmental Gross per incubator excluding any desks, workspaces or other spaces in the unit. There needs to be 6 feet clear between the sides of incubators to allow for apparatus such as phototherapy units, respirators, monitors on stands and other devices, while maintaining adequate separation between babies. Particular attention should be paid to layout space between incubators when overhead radiant warmers are utilized because they take up additional space and restrict easy access around an incubator for routine care.

When an aisle occurs it should be 8 feet clear. This allows for transport of bulky machinery, such as portable x-rays, and particularly for patient transfer with incubators having equipment attached and two or three people in attendance.

It was recognized in reviewing these spaces that the space may look excessive at times, say during a night shift, but it must be remembered that this is a critical care area. Stress and pressure upon staff during peak periods is high. Correct judgements must be made and communication within the team maintained for the safety of the infant. This can only occur if space is sufficient to allow order and fast access when needed.

With respect to sub-groupings in the Intensive Care Nursery it is virtually impossible to predetermine the mix of High Intermediate and Maximal Care Babies. In a number of I.C.N.s reviewed, both nurses and neonatologists stated that these babies are usually nursed side-by-side in the same geographic area. This is because it is difficult to predict the rapidity with

which one baby may move from one level to another. This means that groupings will include requirements for some Intermediate Care infants in clusters with Maximal Care infants.

Modules-of-Care for Maximal Care will relate to nursing responsibility. It is recommended that nurse/infant ratios be 1:1 and minimun of 1:1.2. There is a consensus that any infant receiving intensive respiratory care should be nursed 1:1 and during "breaks" a nurse should have no more than 2 such infants. At no time should a nurse have more than 3 infants to observe in the Maximal Care area.

For these reasons groupings of supplies and gasses will depend upon how many nurses share a module. There should however be a minimum of 2 incubators together and multiples of 2 possibly up to 6 would be reasonable. This 6 group module would allow the option of 6 nurses on 1:1, or 3 relief nurses with respirator maximal cares at 1:2 or 2 nurses with relief loads of 1:3. There is no one ideal size but these kinds of multiple ratios should be possible. Since a Registered Repiratory Technologist is recommended to be assigned to an Intensive Care Nursery at all times in the ratio of 1 to 4 infants, this might also be considered in sub-grouping modules.

As with Intermediate Care as the babies become sicker, the need for a administrative decentralization to the incubator modules is most important. It is the consensus of users that the bulk of work routines take place not in a central nurse station. Such a station could contain certain rest areas or bulk supply or some communication systems but with proper modular design most activities can occur within the infant clusters.

Work stations need to provide separate clean supplies including; linen, medical equipment, special trays, instrument sets, diapers, dressings and formula for each infant. Soiled holding must be separate, bagged easily and dividable into at least, sharp material, infected and other waste. This will reduce infection, the possibility of shortage of supplies and confusion in peak periods. Space for writing and charting must be a part of the module and can be portable or fixed depending upon the design solution.

At each module the mechanical services should be available on a per incubator basis as follows:

(i) 10 to 16 electrical outlets depending upon the ability to share some, the ability to place some at high level, at waist height or low down. Electrical

outlets should be in duplex and singles to allow the following:

(a) Equipment used high up on the incubator and infrequently changed at between 4'-0" and 6'-0" above the floor. Some in singles for large plugs, some in duplex.

(b) At waist height, or just below counter tops, at the front, not the wall behind the counter for most electrical needs. These will be the frequently changed leads, will be the majority of plugs and for maximum concentration should be duplexes. If a few singles can be provided at this height it would be desirable.

(c) For larger floor mounted equipment which is infrequently changed place some single plugs at about 2'-0" above the floor. X-ray plugs should be located around the nursery to ensure adequate availability for portable machines without causing leads to run long distances.

(ii) Between 2 and 4 oxygen and compressed air outlets per infant variations depending upon the ease of sharing through being located in a direct continuum between incubators. Similarly either 2 or 3 vacuum (suction) outlets are required per infant. These outlets must be mounted as follows:

(a) For outlets requiring gauges or blender settings at eye height, or 4' to 5'-0", above the floor.

(b) For other outlets requiring changing and direct connection, at a consistent height around 36" to 40" above the floor. Low outlets cause bending, high outlets cause stretching and inaccuracy.

CONTEXT

This pattern describes the space needs for the incubator areas in the maximal care nursery. When planning an I.C.N. you will need to consider other patterns related to other space, see "Adults in the Nursery", and adjoining nursery areas such as "The Size of the Sick Babies' Room". Also consideration for lighting and other functional needs will require looking at such patterns as "Babies in the Sun", "Warm Colors", "Locating the Intensive Care Nursery" and "Infection Barriers in Intensive Care Nurseries."

Babies in The Sun

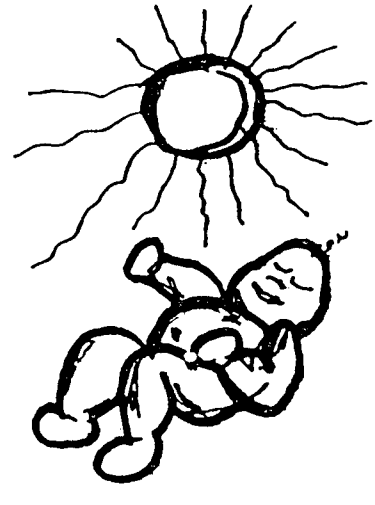
THERE IS CONSIDERABLE THERAPUTIC BENEFIT IN THE CONTROL OF HYPERBILIRUBINEMIA BY EXPOSING BABIES TO HIGH LEVELS OF NATURAL SOLAR ILLUMINATION. THE DIFFICULTY LIES IN MAINTAINING A COMFORTABLE ENVIRONMENT.

For centuries past and even today in less developed societies, the health giving value of exposure to the sun has been known intuitively. People feel good if they are exposed to the sun and in some African hospitals easy access to the outside, to lie in the sun, is considered theraputic.

In a report by Cremer, et al[1] in 1958 the use of Phototherapy in reducing hyperbilirubinemia was established and has been used effectively since. In reporting on a study done at the Montreal Childrens Hospital[2] MacLeod and Stern noted that the intensity and duration of illumination present in any nursery might play a significant role in explaining both the considerable variation in the incidence of hyperbilirubinemia from one nursery to another as well as the seasonal variation in neonatal bilirubin levels.

In their study MacLeod and Stern measured light level in different zones in the nursery and developed an index of variations in natural illumination. This variation probably occurs in any nursery irrespective of whatever artificial lighting is employed.

THEREFORE: NURSERIES MUST ALLOW BABIES MAXIMUM ACCESS TO DAYLIGHT ILLUMINATION AND HAVE THE CAPABILITY OF PROVIDING 100 FOOT CANDLES OF ILLUMINATION WITH WITH ARTIFICIAL LIGHTING. BABIES MUST BE CAPABLE OF BEING PLACED IN AREAS WITH HIGH LEVELS OF NATURAL LIGHT INTENSITY, WITH MINIMAL CLOTHING, YET STILL MAINTAINING COMFORTABLE BODY TEMPERATURES. EXTERNAL WINDOWS MUST BE LARGE ENOUGH TO MAXIMIZE DAYLIGHT UP TO 6 METERS AWAY AND DESIGNED TO REDUCE HEAT LOSS OR HEAT GAIN.



It was found that illumination received by any infant varied from 15 to 2,500 foot candles depending upon his or her location in the nursery, the time of day and the amount of sunlight present. The data presented suggests that exposure to natural sunlight easily yields far greater illumination levels than previous authors had already found (with artifical lighting) to be significant in lowering serum bilirubin levels.

It had been shown earlier that increases in illumination to 100-200 foot candles together with liberal policies of exposure of unclothed infants to this light, is a safe and effective method of preventing hyperbilirubinemia of prematurity. It had also been shown in a control study by Giunta and Roth[3] that infants exposed to only 90 foot candles had lower serum bilirubin levels than those exposed to 10 foot candles.

Increased exposure to natural illumination together with practices of nursing infants minimally clothed are important factors in controlling hyperbilirubinemia. The amount of window area, the orientation of the windows and the ability to place babies in sunlight is crucial to good nursery design.

If it is not possible to place babies in sunlight then be able to provide at least artificial illumination must be able to provide at least 100 foot candles of illumination to maintain the phototheraputic effect.

The problems associated with achieving high levels of sunlight is in the control of summer heat gain or heat loss in winter. What is required is high levels of illumination not necessarily direct sun. When large amounts of window area are exposed to the sun the heat gain creates problems for internal cooling. Similarly with larger amounts of glass the heat loss in cold climates can cause internal heating problems.

The solution to the problem must be resolved through screening, orientation and the R-value of windows. Currently many published sources do describe various methods of control of sun and heat loss. General principals include:

(i) A recommended minimum R-value of 0.3 m^2 deg C/W (double glazing) for all buildings.

(ii) South facing windows should have horizontal screening so that summer sun at a high angle is cut-off but winter sun at a low angle can penetrate.

(iii) Windows on west faces must have vertical screening, angled to

can penetrate.

(iii) Windows on west faces must have vertical screening, angled to cut-off low afternoon sun, but allowing maximum light penetration.

(iv) North windows may require triple glazing in cold climates since heat loss is the critical factor on this face.

(v) Optimal daylight conditions can be expected up to 6 meters from the window but can be increased by reflecting surfaces at the window and consideration given to the ceiling reflective characteristics at the perimeter.

The most important factor is that when designing the unit for comfort conditions they must be achieved with maximum natural daylight for babies.

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1. Cremer, R.J., Perryman, P.W. and Richards, D.H.: Influence of Light on the Hyperbilirubinemia of Infants. Lancet, 1:1094, 1958.

2. MacLeod, P. and Stern, L.: Natural Variations in Environmental Illumination in a Newborn Nursery. Pediatrics, Vol. 50, No 1;131. July 1972.

3. Giunta, F. and Roth, J.: Effect of Environmental Illumination in the Prevention of Hyperbilirubinemia of Prematurity. Pediatrics, 44:162, 1969 as reported in MacLeod P. and Stern L. op.cit. P133.

Heights of Service Outlets

TOO OFTEN GAS AND ELECTRICAL OUTLETS ARE LOCATED TO SUIT CABINETS OR CONVENIENT INSTALLATION STANDARDS TO THE DETRIMENT OF FUNCTION.

THEREFORE: PROVIDE GAS OUTLETS AND ELECTRICAL OUTLETS AT HEIGHTS RELATED TO THE FUNCTION NEEDED OF THE OUTLET AND FOR EASE OF USE BY STAFF. THEREFORE:

(i) GAS OUTLETS MUST BE CLOSE TOGETHER AND GENERALLY FROM WAIST HEIGHT (36") TO EYE HEIGHT (60").

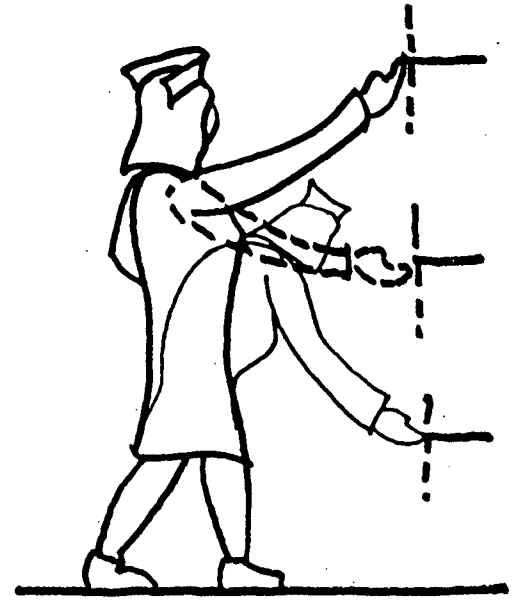
(ii) ELECTRICAL OUTLETS MUST BE AT DIFFERENT HEIGHTS ; AT 4'-0" TO 6'-0" (UPPER LEVEL) FOR INFREQUENTLY CHANGED LEADS ON HIGH MOUNTED EQUIPMENT; AT COUNTER HEIGHT, 36" TO 40" (MIDDLE LEVEL) FOR FREQUENTLY CHANGED LEADS; AND AT 2'-0" ABOVE THE FLOOR FOR INFREQUENTLY CHANGED LEADS OF MAJOR FLOOR MOUNTED EQUIPMENT OR WHEELED PORTABLES.

(iii) SUFFICIENT GAS AND ELECTRICAL OUTLETS MUST BE PROVIDED AT ANY ONE HEIGHT TO ENSURE AVAILABILITY WITHOUT REARRANGEMENT.

(iv) MAKE VISIBLE ELECTRICAL OUTLETS THAT ARE EITHER CONSTANTLY CONNECTED, IE. INCUBATORS, OR HAZARDOUS I.E. X-RAY, BY SLIGHT SEPARATION AND/OR COLOR CODING.

The correct height and location of outlets in a nursery can mean the difference between good function through ordered calm or of clutter, and possible hazzard or stress for staff.

In a recent survey of medical and nursing users in British Columbia and Alberta the height of gas outlet was examined. The conclusion was that to set one specific height was not useful. Consideration must be given to visual and physical accessibility. For example the space in front of an outlet is important to protect gauges, bottles, etc., from being jostled or damaged by equipment and personnel.



Because outlets can be on ceiling strips or consoles on island benches or pedestals or on walls, the space required will need to be assessed after considering the choice of configuration. In deciding height it is helpful to consider the use made of these outlets. Gas outlets which need to be altered frequently, or such as suction, oxygen blenders and oxygen flow meters must be at eye height.

Ideally the height should proclude bending or stretching to adjust controls. Suction bottles can be mounted lower so that lifting a full bottle is not done with the arm bent at an angle to the body. Outlets not used frequently such air and oxygen to equipment running constantly, could be less directly accessible. Concern is often expressed that where there is more than one outlet of a kind these outlets must be inter-changable and staff should not have to decide which outlet serves what unit each time they are used.

As a guide it is felt that all wall mounted gas outlets should be between 4'-0" and 5'-0". With freestanding cabinets, mounted as high as possible on the unit ie 36" to 40" and on pedestals either from the floor or from the ceiling they should be considered as for a wall unit but having no outlets higher than 5'-6" above the floor.

With ceiling strips there are some different concerns. They must be at a height low enough for short people to easily plug in gas and electrical connections and high enough for taller people not to bump their heads. The belief of planners and users is that it should not be assumed that ceiling strips can be routinely walked under. They must not be placed as across a traffic route, but must be located so that if in the course of care when it is necessary to move under them, it is a conscious action. The advantage of ceiling strip mounts is that they reduce the congestion of lines and leads coming across access space since they come down verticalyl. They cannot be treated as though they are totally flexible when planning, as if they did not exist. To mount them too high means they are not available at all.

Electrical outlet heights were examined in the same study and greater divergence of opinion was found. However, there are some clear guides which were evident. Electrical outlets should be at different levels to provide close proximity to different heights of the equipment.

(i) Where there are counters and equipment sits on counters electrical outlets should be provided at the back of the

counter at close to counter top height.

(ii) Where equipment is near or around the top of the incubator(such as constant infusion pumps) outlets must be provided with some high, eg between 4'-0" and 6'-0" and some lower eg waist height or 3'-0".

(iii) Where an incubator is placed near a counter or work space the outlets must be at the front of the counter as close to counter height as possible to avoid bending down and allow visibility of plugs. It is important not to put outlets on the wall at the back of the counter in this case as the leads running over the counter make it useless for work space.

For equipment such as incubators, phototherapy lights, ventilators, etc., which are not frequently changed, outlets should be provided closer to the floor to keep them from mixing with other frequently changed plugs. It is a good idea in situations where incubators are constantly used to have a plug slightly separated so that unplugging by mistake does not occur. These lower plugs should not be closer to the floor than about 2'-0" as they will require still considerable bending, may be hidden by equipment and are likely to get bumped or damaged if not visible.

It should be recognized that as with gas outlets interchange is important. Sufficient outlets at the various heights must be provided so that if additional needs occur it does not require a complete rearrangement of plugs and cords to make a unit function.

Where electrical outlets are provided from above with ceiling columns or strips, provide clusters of electrical outlets to avoid a "curtain" of electrical leads surrounding an incubator.

The location of monitors must be considered before an outlet is provided. The outlet must be close to the monitor. The access to and visibility of the monitor must be considered before a "standard" height of the outlet is provided.

Adults in The Nursery

IF THE STAFF AND PARENTS ARE TO ASSIST A NEWBORN MAKE THE TRANSITION FROM A PROTECTED TO AN UNPROTECTED ENVIRONMENT WHILE IN HOSPITAL, THE NURSERY DESIGN MUST BE SUCH THAT IT PROVIDES SUPPORT FOR THEIR EFFORTS.

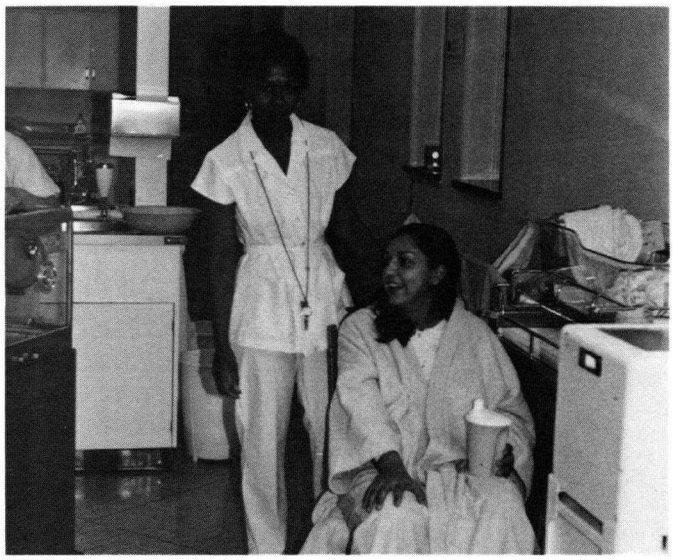
It has been said that any hospital nursery must provide a transition between the protective environment of the mother's womb and the pre environment of the outside world. The special newborn nursery must provide assistance to the premature or otherwise unprepared infant whose adaptive mechanisms are not yet sufficiently developed to enable unassisted survival. Before any child is thrust into a hostile, polluted and noisy world populated by larger, self-sufficient adults, those adults must be allowed to intervene to assist in that transition.

The adults involved are nursing staff, medical staff and parents. Each have roles to play and providing space in which their activities can be accommodated is essential. By examining what each group requires we can ensure the spaces are available.

The type of support spaces will vary with the level of care to be provided in a nursery. However, in all kinds of nurseries cross-infection is a concern. Even in a well baby nursery there must be a control of who enters the unit. This does not assume a no-entry policy, it just means planned entry. There must be a transition space so that direct entry from a public corridor does not occur. This transition can be through a parent/staff area or a scrub and gowning area. This latter kind of space helps reinforce barrier techniques which become more important as isolation nurseries are not being provided.

THEREFORE:

WHEN MAKING PROVISION FOR STAFF AND PARENTS IN THE NURSERY, ENSURE THAT THERE ARE BASIC SUPPORT SERVICES FOR ALL TYPES OF NURSERY UNITS WHICH INCLUDE: ENTRANCE TRANSITION SPACE; ADMINISTRATIVE CENTER; STAFF REST AREA; CENTRAL CLEAN UTILITY; CENTRAL SOILED HOLDING; AND EQUIPMENT STORAGE. PROVIDE IN ENERGY UNIT CAPACITY FOR: PROCEDURE ROOMS; CONFERENCE-CLASSROOMS; PARENT-STAFF AREAS AND OFFICE SPACES.



In Intensive and Intermediate Care nurseries a full scrub facility transition space with foot or knee operated controls, clean gowns, caps and soiled hampers are required. This is the type of care where infection control is important. No persons should enter this facility without these barrier controls.

In well baby nurseries mothers can have adjoining spaces into which the baby can be brought. If a hospital does not encourage an open-nursery-to-parents policy, other spaces must be provided so that the constant interaction with parents can occur. In Intensive Care situations bonding and parent involvement is just as important as in well baby nurseries but more difficult to achieve. The baby cannot be brought away from life support in most cases. Mothers particularly must be able to assist in the baby's transition to the outside world. They can choose to breastfeed or at least provide milk. They can start learning techniques to assist at home, and be involved on the unit by being taught infection control techniques followed by staff. Appropriate access is essential for at least the mother onto the unit.

Additional space for both parents is needed with intensive level nurseries. A space where other family members can observe, come and be informed of changes in the baby's condition or the therapy being used. This same space can be a quiet room where parents can have privacy to grieve and hold their dead or dying child. This space needs to be directly adjacent to the nursery space. It needs to be accessible from outside the nursery and close to the staff control centre. It needs to be large enough for a group of four or five adults in comfortable chairs.

Nursing and Medical staff need certain central points in a nursery where informational and service routines take place. Even though sicker babies require most tasks performed at infant care modules, there is always a need for some central facilities. Common to all nurseries are:

(i) Administrative Control Area: where incoming telephone calls can be handled, clerical duties by a ward clerk can occur, bulk clerical supplies can be left and charts can be accumulated.

(ii) Staff Rest Area: where staff can go to get away from the unit for breaks.

(iii) Central Clean Utility Area: where clean

medical, surgical, pharmacy and linen supplies can be kept. It will be sized to supply directly to bassinettes or to sub-group care modules. This sub-distribution will apply to all sick baby areas. All incoming supplies should go to this utility area to ensure inventory control, particularly pharmacuticals. It should have shelves above cart height for back up supplies, a counter top workspace for setting up trays, etc. and a stainless steel sink with wrist-action taps. This would be the place for a refrigerator and a secure drug cabinet. It should be accessible from the outside for incoming supplies and from the nursery for staff.

(iv) Central Soiled Holding Area: for the holding of soiled supplies, linen and waste. It can be the place where soiled material from bassinettes or sub-group modules are collected. It must have an outside access so that material can be removed by non-nursery personnel without them having to come further into the unit. This is of particular importance when infectious waste is involved.

As a central holding area, the amount of space needed will depend upon the number of pickups that building services can provide. Even so, soiled hold should be large. Nurseries produce abnormally large quantities of dirty supplies compared to other nursing areas. Linen must be bagged and takes up floor space. Large quantities come from gowns, cot linen, diapers, formula bottle waste, and disposable wrappings. Needles and sharp objects must be separated. Returnables such as tray sets, distilled water flasks, I.V. bottles take up counter or rack space. Planners must add up the number of carts, bags and racks required and assign the space accordingly.

Another basic item required in the Soiled Holding is a counter space integral with a stainless steel (deep) double bowl sink with knee or wrist action taps. (The size of the bowls should be 23" square and about 15"-18" deep. The sink

should have a hand held spray mechanism and very hot water available. The drain outlet of one bowl should be large (4") and a flushing rim proves useful for quick cleaning. The sink is used for washing soiled major and minor equipment either for reuse or sending out for sterilizing. This means small items such as surgical trays, bottles, stethoscopes, leads and also large items such as oxygen tents, soiled mattresses, and nebulizers are capable of being washed. Wall mounted drip racks help keep counters clear and assist in handling bulky items at the same time as smaller items. Space to use the sinks and reasonable counter space for the largest equipment on both sides must also be allocated to the Soiled Holding Area.

(v) Equipment Storage Rooms: where both shelf stored back up equipment such as monitors and floor mounted equipment such as cribs, incubators, phototherapy lights and I.V. poles can be held ready and accessible. The size and location of these rooms will vary with policies in respect of how much on-unit storage is needed to meet census fluctuations or in I.C.N. emergencies. Space will be effected by general hospital supply system policies.

There are a series of other spaces that should be provide but size and number will depend upon the size and level of care in a nursery:

(vi) Procedure Rooms: for diagnostic and treatment procedures on individual babies that cannot be performed at the bedside. When provided these should be immediately adjacent to the nursery space and be equipped with a ceiling mounted examination light and have as square a shape as possile.

(vii) Conference-Classrooms: where nursing and medical staff can meet for discussion, particularly at shift change. They can be used for inservice education sessions and should be equipped with AV/TV facilities. It must not be assumed that this can be shared as the staff rest or retreat area since that space must be available for use at all times.

(viii) Parent-Staff Areas: where parents can share learning experiences under the supervision of staff working in the nursery or where demonstrations to mothers can occur. These could also be areas where the public or family may view the baby. These spaces will vary in number in direct relationship with the size and complexity of the nursery being designed.

(ix) Office Space: for staff including atleast the Head Nurse and Medical Staff. This must be provided to allow interviews and to ensure staff availability to the unit. Intensive Care situations will require more offices for involved specialists than will well-baby areas.

CONTEXT

This pattern identifies the types of spaces that will be required to support activities other than the actual baby holding (nursery) area. This pattern must be read in conjunction with some other patterns to provide a complete picture. See Entrance Transition, Staff Retreat, Visitors Place, Mothers' Exchange, Family Room and Workspace Enclosure.

Staff Retreat

GETTING AWAY FOR BRIEF PERIODS IS ESSENTIAL FOR ALL STAFF.

In all areas of the Nursery Complex, whether it be Normal, low risk nurseries or high risk Maximal level nurseries, staff are subject to stress from their environment.

THEREFORE: WHEN PLANNING NEWBORN NURSERIES OR NEONATAL INTENSIVE CARE UNITS

(i) PROVIDE A SPACE CLOSE TO THE CORE OF THE UNIT WHERE STAFF CAN BE SEPARATED FROM THE ACTIVITIES OF THE UNIT.

(ii) MAKE THE WALLS SEALED, PART GLASS TO ALLOW ACOUSTICAL SEPARATION BUT HAVE VISUAL CONTACT.

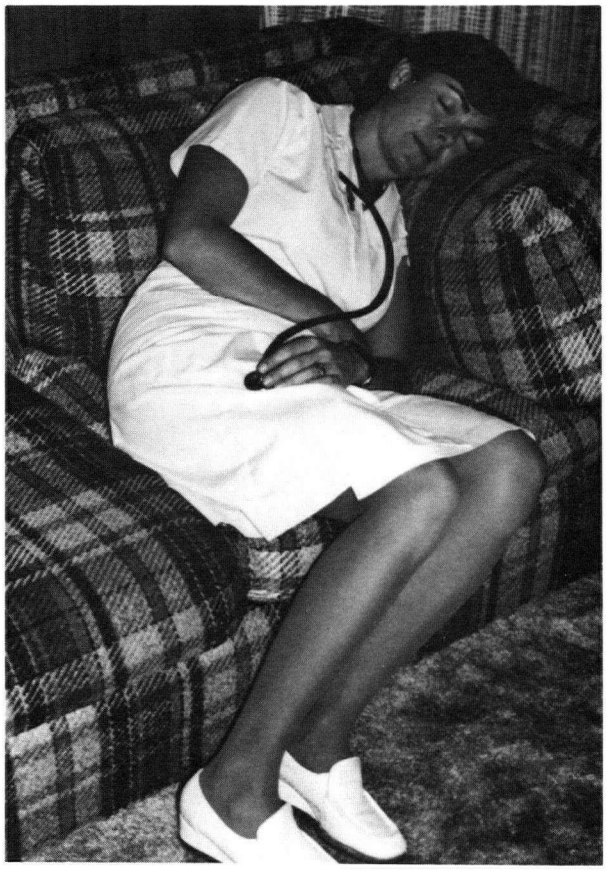
(iii) PROVIDE EMERGENCY COMMUNICATION BY INTERCOM OR BY AUDIO-VISUAL SIGNAL.

(iv) MAKE SURE THAT COMFORTABLE SEATING IS PROVIDED PLUS FACILITIES FOR REFRESHMENTS AND AT LEAST ONE LOUNGE/DIVAN THAT IS LARGE ENOUGH TO LIE DOWN. ARRANGE THE SEATING SO THAT IT IS POSSIBLE TO HAVE MORE THAN ONE GROUP IN DISCUSSION AT THE SAME TIME.

(v) MAKE ACCESS TO THIS RETREAT ONLY FROM THE NURSERY AREA.

In Maximal Care, Neonatal Intensive Units, stress comes from dealing with constant life threatening situations which must be dealt with quickly and skillfully. This requires continued concentration plus the need to deal with strained emotions resulting from working with or losing lives of very sick children.

While management practices such as the rotation of staff through various levels of care will reduce the constant exposure to stress, a place of retreat for staff is needed.



While it has been suggested that the level of stress is not as high in the well-baby nurseries, a recently surveyed group of medical experts feel that this is not so. They felt that stress is associated with the increased public role which comes from continued involvement with family centred care. With increased access by mothers, visitors and their greater group participation as health care consumers, the public makes continued demands upon staff. It has been suggested that pressure to represent hospital policy and deal with problems of a social and emotional nature beyond the normal range of responsibilities, causes this stress to occur.

A place for staff to retreat and be temporarily detached is essential. This retreat will serve different functions in different facilities depending upon the kind of stress that is to be relieved.

For example, when associated with the N.I.C.U. the most important need is to be removed from the sound of equipment, alarms and the constant reminders of concern. There must be capacity for groups to talk, or to be quietly alone, or find a forum for expressing concerns, or gaining counselling through access to persons of other disciplines.

In normal nurseries it must provide escape from public access and allow expressions of frustration, be able to ask advice or just unwind in the presence of colleagues without being overheard.

Regardless of the level of care of the nursery associated with the retreat, it must have direct visibility to the nursery area. It must be accessible for a quick return should the need arise. It must be linked by emergency communication systems so that all personnel can be reached quickly.

The retreat area must not become the nursing station or be presumed to be where administrative or charting functions take place. To have the retreat adjacent to the station would allow ease of access, but staff need to be removed from the normal functional centre of a nursery.

This retreat is not a conference space for education purposes. It is important to ensure that when staff need a place to retreat, perhaps to cry or lie down, that other staff can respect this without disrupting another purposeful gathering. To this end there should not be the capability of showing audio-visual material in the retreat. Access to conference or inservice education facilities must be provided for the unit so that this retreat does not become the only available space.

To ensure that it is only accessible to staff, the entrance must be placed so that it is accessible only from a staff space.

questions

3. THE LANGUAGE

Since each of the Patterns is concerned with an event that may or may not exist to be resolved in a plan, only when one has selected all the patterns that need to be considered can the whole be considered.

The patterns become a vocabulary of statements which when linked together form a "Language" of design for a particular facility. You select the words in a sentence of speech but they only make sense when they are linked. This is the same for design. We have on the previous pages shown two languages made up from the patterns; one for Newborn Nurseries and one for Intensive Care Nurseries.

When developing a language one selects from a collection, those patterns needed, until they complete a picture of the major issues to be included. Taken together they describe what needs to be done but not the solution. It is still the task of the designers to co-ordinate all the elements together to solve the physical solution. To make a good design, however, the language needs to have included sufficient patterns to cover the design issues present.

You should look at the language as presented here and answer the following questions.

3.1 DO YOU THINK THERE ARE SUFFICIENT PATTERNS IN THE LANGUAGE TO DESCRIBE:

(i) THE NEWBORN NURSERY ( ) YES ( ) NO

IF NO ADD A LIST OF PATTERNS YOU FEEL ARE NEEDED: (Do this by brief topic list)

_____

_____

_____

(ii) THE INTENSIVE CARE NURSERY ( ) YES ( ) NO

IF NO ADD A LIST OF PATTERNS YOU FEEL ARE NEEDED: (Do this by brief topic list)

_____

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questions

3.2 DO YOU FEEL THAT THOSE PATTERNS WHICH ARE LINKED TO FORM THE LANGUAGES PROVIDE A CLEAR UNDERSTANDING OF HOW THE PATTERN CAN BE USED IN THE DESIGN. ( ) YES ( ) NO

COMMENT

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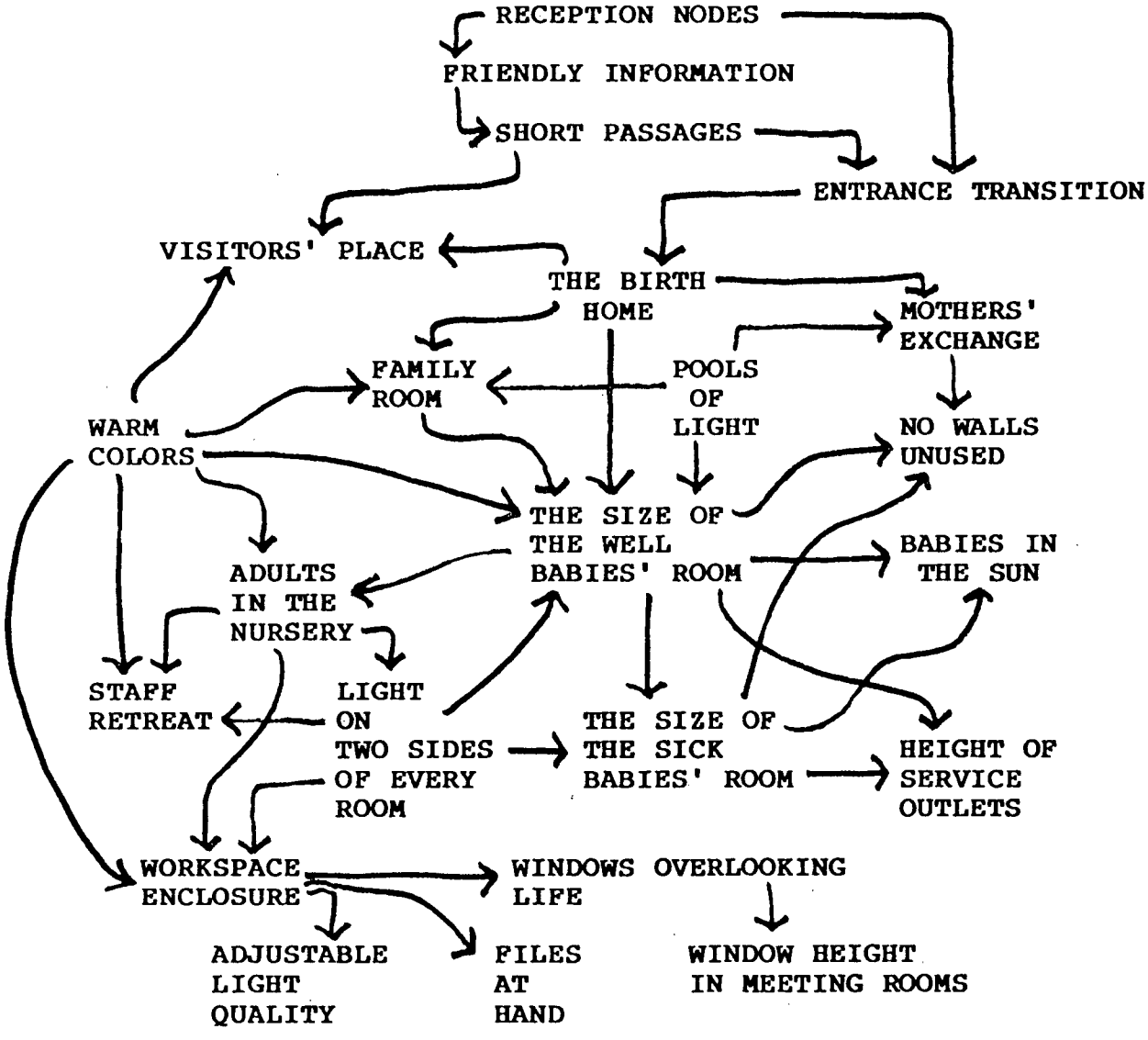
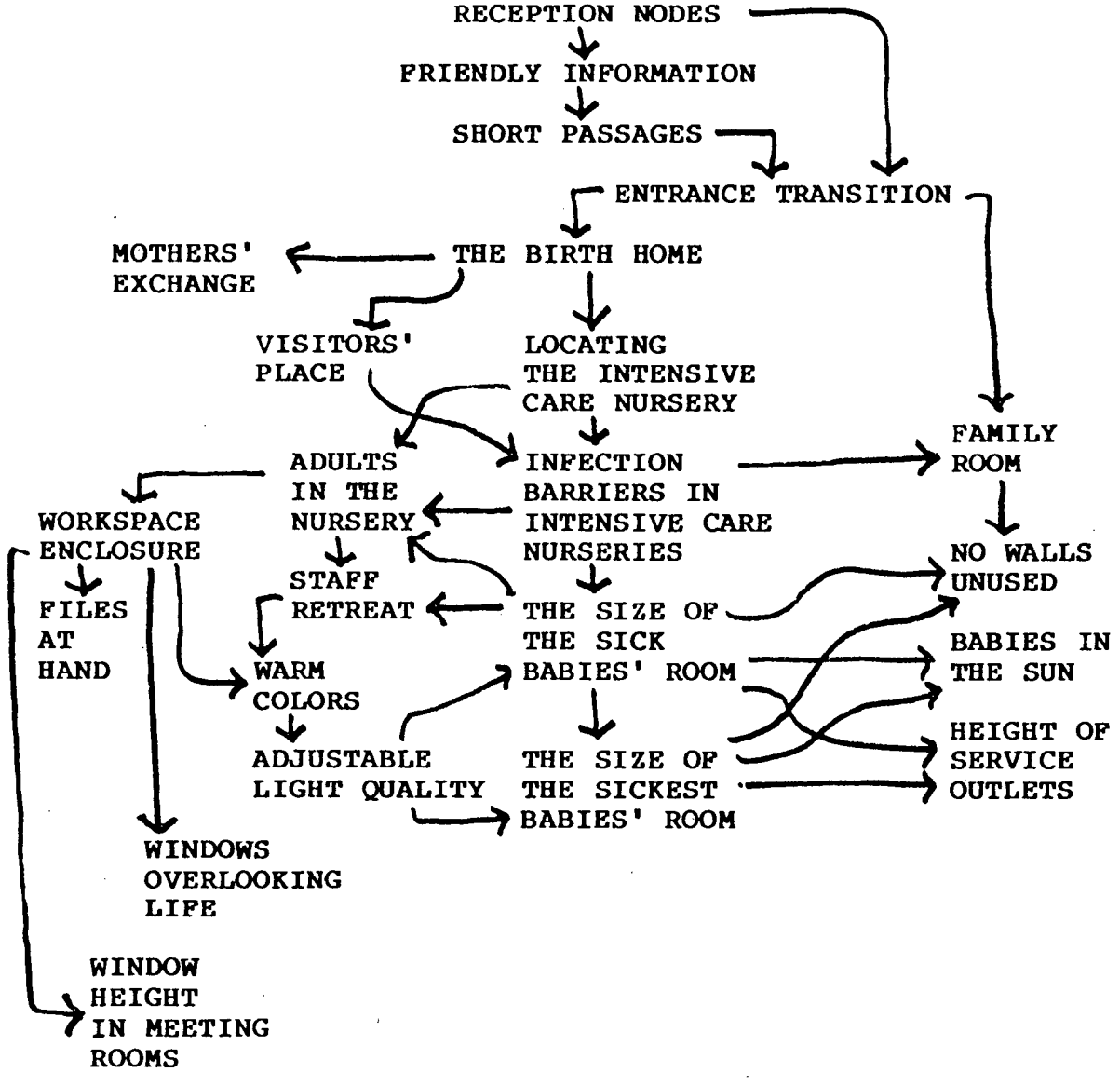
LANGUAGE FOR

NEWBORN NURSERY



LANGUAGE FOR

NEONATAL INTENSIVE CARE NURSERY



4. UNIVERSAL PATTERNS

The following Patterns are a group taken from those developed by The Center for Environmental Structure at Berkeley, California. We have used them to complete the "Languages" provided at the beginning of this section. We have not modified them and have selected those that we feel are directly applicable.

Would you read through them, look at the linkages in the Pattern Language, then respond to the following questions.

4.1 DO YOU FEEL IT IS APPROPRIATE THAT ALL THE PATTERNS CAN BE USED TO COMPLETE THE LANGUAGE, (Tick One)

( ) COMPLETELY UNCHANGED OR
( ) SOME MODIFIED IN SOME WAY OR
( ) ALL MODIFIED IN SOME WAY

4.2 IF MODIFIED STATE ALL OR LIST PATTERNS NEEDING CHANGE AND VERY BRIEFLY SAY WHAT IS NEEDED.

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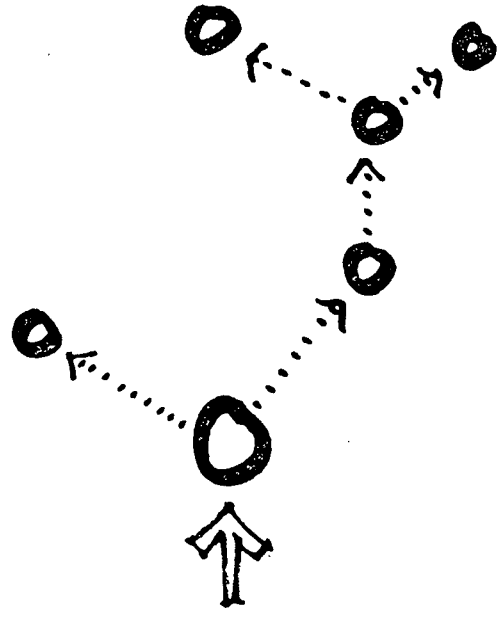
Reception Nodes

IT IS EMBARRASSING AND CONFUSING TO
HAVE TO ASK FOR DIRECTIONS CONTINUALLY,
OR TO BE LED BY THE HAND AROUND A BUILDING.

Everyone who has had to find his way around in a large building or complex has experienced this problem. Usually the results are anger and frustration. Confusing environments are unfriendly when an individual has difficulty in mastering their parts.

The pattern Circulation Realms deals with this problem at the large scale of basic orientation. But in a large public building or complex this may not be enough. In these situations, it is essential that entrances to reach 'realm' of a building or its reception be clearly visible on approach, so that the individual can, by himself, find his way around. Clearly the main reception/entrance area must be prominently located. But from this point it is important that one be able to see to the next. There must be, in effect, a system of reception nodes, organized so that one 'reception' always leads to another. (1)



MAKE ALL 'RECEPTION' POINTS FORM
A SYSTEM OF MUTUALLY VISIBLE
NODES - SO THAT A PERSON CAN
GO FROM ONE TO THE OTHER, ALWAYS
SEEING FROM ONE POINT TO THE
NEXT POINT.

---

(1) This pattern was rewritten from the pattern Reception Nodes by Dorsett and Alexander, originally written with reference to reception points in a community mental health center.

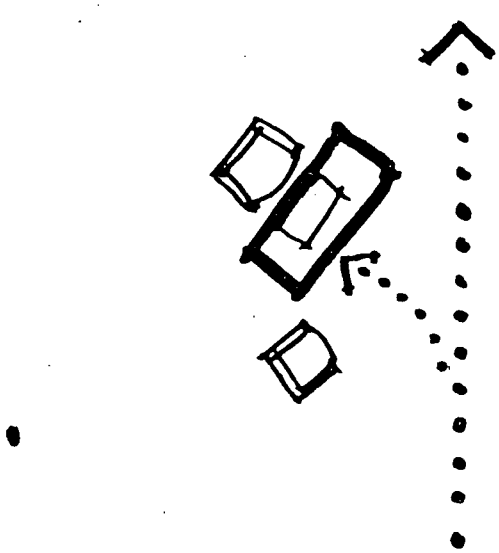
Friendly Information

RECEPTION AND INFORMATION DESKS ARE OFTEN DESIGNED AS SENTRY POSTS. NO ONE FEELS WELCOME TO ASK A QUESTION.

The problem seems to lie in the configuration of the desk or counter. Both of these have a definite front and back -- the front public, and the back private. In a subtle way this imposes a public and a private boundary between the service and the served.

Counters are perhaps the most impersonal. Standing for a long period or waiting to be served is tedious and tiring. And when you are asking a question there is only one direction to face -- right across the counter. Desks offer a bit more flexibility in that you can approach from the side and sit down if necessary with much more informality. Yet the desk has a similar feature to the counter -- a public front and a private back.

An ideal situation would orient the desk front -- the front that says public -- away from the approach direction. Avoid the worst case where a desk facing down a corridor seems like a sentry, you feel observed and on view from the minute you see it.



USE DESKS FOR THE INFORMATION SERVICE, BUT PLACE THEM SO THAT THEY ARE NOT FACING THE APPROACH DIRECTION. DO THIS BY PLACING THEM TO THE SIDE OF THE APPROACH, OR FACING SO THAT ONE APPROACHES THEM FROM THE SIDE.

Entrance Transition

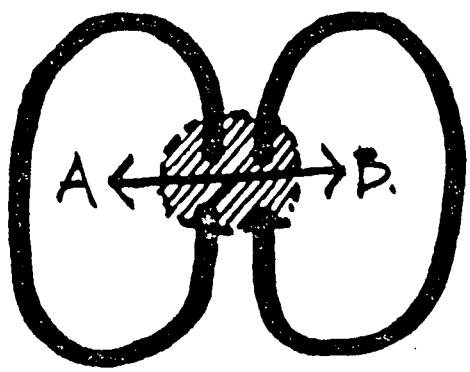
ENTRANCES ARE THE MOST IMPORTANT CLUES TO THE ACTIVITY AND FACILITY INSIDE. WHEN THEY ARE ABRUPT AND NEUTRAL, THE IDENTITY OF FUNCTION AHEAD IS BLURRED, AND THE DIFFERENCE BETWEEN WHERE YOU ARE AND WHERE YOU ARE GOING IS BLUNTED.

Perhaps one of the most serious failings of modern architecture is the disrespect for the function of an entrance. Openings in walls which separate different functions and activities are treated merely as means of access, irrespective of the difference in mood or activities between them. The doorway from a lobby into a church, or from living room to a street is treated the same as from a corridor to a storeroom.

About the only place where the need for transition is recognized today is in washrooms off public corridors.

Traditional buildings seldom ignored important transitions. Appropriate portals defined important entrances, foyers and lobbies separated usable areas from the corridor or from the outside. In traditional houses there is often a hallway to pass through before the living areas are reached.

.....2



GIVE EACH DOORWAY AND ENTRANCE AN APPROPRIATE ENTRANCE TRANSITION FOR ACTIVITIES WITH DISTINCT DIFFERENCES IN MOOD AND ACTIVITY LEVEL. CREATE A STRONG TRANSITION BY INTRODUCING ALCOVES, SEATS, LEVEL CHANGE, DIRECTION CHANGE, ETC.

ENTRANCE TRANSITION

This element of design might be best discussed in terms of houses where the current practice of entering from the street directly into the living room is perhaps the most blatant disregard for an entrance transition.

"The experience of entering a house influences the way you feel inside. If the transition is too abrupt there is no feeling of arrival, and the house fails to be an inner sanctum.

The following argument may help to explain it. While people are on the street, they adopt a mask of 'street behaviour'. When they come into a house they naturally want to get rid of this street behaviour and settle down completely into the more intimate spirit appropriate to a house. But it seems likely that they cannot do this, unless there is a transition from one to the other which helps them to lose the street behaviour. The transition must, in effect, destroy the momentum of the closedness, tension and 'distance' which are appropriate to street behaviour, before they can relax completely." (1)

Is this sort of transition desired or is it just an architectural whim? An experiment invented by Michael Christiano tried to test the 'houseness' of residences with respect to the extent of the entrance transition. He found that the more changes and transitions a house entrance has, the more it seems 'houselike'. Those which opened directly off the street or public realm, were judged the least 'houselike'. He found the preferred choice to be those houses which were approached by a long opened sheltered gallery, from which there is a view into the distance. It seems that people strongly prefer a transition at the entrance of their home which separates the public from the private realm.

Evidence for the necessity of a transition between other functions comes from the report by Robert S. Weiss and Serge Bouterline, Jr., "Fairs, Exhibits, Pavilions and Their Audiences", Cambridge, Mass., 1962.

"The authors noticed that many exhibits failed to 'hold' people; people drifted in and then drifted out again within a very short time. However, in one exhibit people had to cross a huge, deep-pile, bright orange carpet on the way in: in this case, though the exhibit was no better than other exhibits, people stayed. The authors concluded that people were, in general, under the influence of their own 'street and crowd behaviour' and that while under this influence could not relax enough to make contact with the exhibits; but that the bright carpet presented them with such a strong contrast as they walked in that it broke the effect of their outside

.....3

ENTRANCE TRANSITION

behaviour, in effect 'wiped them clean', with the result that they could then get absorbed in the exhibit." (2)

We believe that the concept of an entrance transition applies to all doorways and passages between activities. Between spaces where the mood and the function are different, for example between a senior citizens' drop-in and a public corridor, a definite transition zone must be created. Between areas of similar mood and function, for example between two craft rooms, the transition need only be minimal.

There are many ways to create a transition. For a house it may be a change of direction, of level, or material. For the drop-in center mentioned above, an alcove with chairs and a bulletin board may suffice. Some facilities might require a small ante-room for introductions and removing coats. Between areas of similar nature or for entrances off the street perhaps a very public transition should be created with extensive use of glass or openness.

The important element is that the entrances between spaces be considered as a transition zone, and depending on the nature of the facilities on either side, an appropriate entrance transition be described.

Clues to the appropriateness of a transition may be gained by considering the activities in terms of:

public vs. private
active vs. passive
small scale vs. large scale
formal vs. informal
structured activity vs. 'free' activity
territorial aspects vs. open use.

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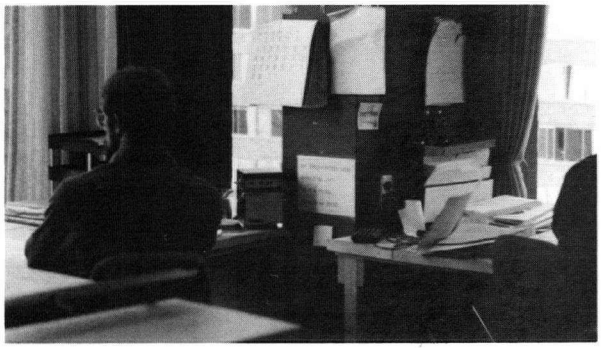
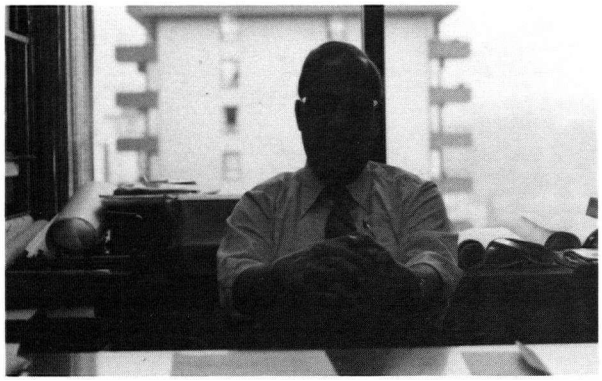
(1) Center for Environmental Structure, pattern Entrance Transition, Berkeley, 1970.

(2) loc. cit.

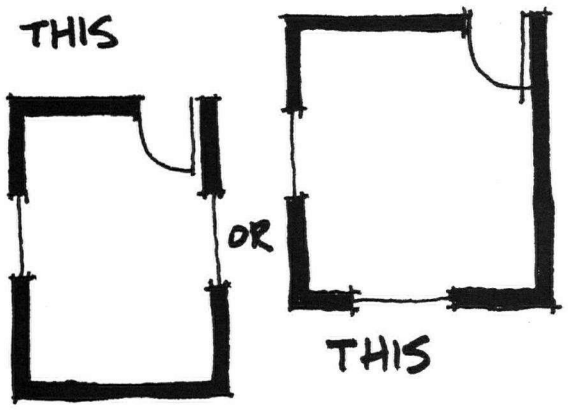
Light on Two Sides of Every Room

A ROOM LIT FROM ONE SIDE ONLY IS ALMOST ALWAYS UNCOMFORTABLE.





THEREFORE: GIVE EVERY ROOM USED DURING THE DAYTIME NATURAL LIGHT BY WINDOWS OR SKYLIGHTS FROM AT LEAST TWO DIRECTIONS.



When they have a choice, people will always gravitate to those rooms which have light on two sides, and leave the rooms which are lit only from one side unused and empty.

This pattern, perhaps more than any other single pattern, determines the success or failure of a room. The arrangement of daylight in a room, and the presence of windows on two sides, is fundamental. If you build a room with light on one side only, you can be almost certain that you are wasting your money. People will stay out of that room if they can possibly avoid it. Of course, if all the rooms are lit from one side only, people will have to use them. But we can be fairly sure that they are subtly uncomfortable there, always wishing they weren't there, wanting to leave--just because we are so sure of what people do when they do have the choice.

The experiments on this matter have been rather informal and drawn out over several years. The work was done by Alexander, Hishen Ishikawa, Coffin and Angel at

the Centre for Environmental Structure at Berkeley, California in 1970. They were aware of the idea for some time-so over and over and over again, in one building after another, wherever they happened to find themselves, they would check to see if the pattern held. Were people in fact avoiding rooms lit only on one side, preferring the two-sided rooms--what did they think about it?

They discovered that people were aware of the feeling that the two-sided pattern was significant. They realized that those rooms you intuitively recognize as pleasant, friendly rooms have the pattern; and those you intuitively reject as unfriendly, unpleasant, are the ones which do not have the pattern. In short, this one pattern alone, is able to distinguish good rooms from unpleasant ones.

The importance of this pattern lies partly in the social atmosphere it creates in the room. Rooms lit on two sides, with natural light, create less glare around people and objects; this lets us see things more intricately; and most important, it allows us to read in detail the minute expressions that flash across people's faces, the motion of their hands . . . and thereby understand, more clearly, the meaning they are after. The light on two sides allows people to understand each other.

In a room lit on only one side, the light gradient on the walls and floors inside the room is very steep, so that the part furthest from the window is uncomfortably dark, compared with the part near the window. Even worse, since there is little reflected light on the room's inner surfaces, the interior wall immediately next to the window is usually dark, creating discomfort and glare against this light. In rooms lit on one side, the glare which surrounds people's faces prevents people from understanding one another.

Although this glare may be somewhat reduced by supplementary artifical lighting, and by well-designed window reveals, the most simple and most basic way of overcoming glare, is to give every room two windows.

The light from each window illuminates the wall surfaces just inside the other window, thus reducing the contrast between those walls and the sky outside. For details and illustrations, see R.G. Hopkinson, Architectural Physics: Lighting, London: Building Research Station,

1963, pp. 29, 103.

A supreme example of the complete neglect of this pattern is Le Corbusier's Marseilles Block apartments. Each apartment unit is very long and relatively narrow, and gets all its light from one end, the narrow end. The rooms are very bright just at the windows and dark everywhere else. And, as a result, the glare created by the light-dark contrast around the windows is very disturbing.

In a small building, it is easy to give every room light on two sides: one room in each of the four corners of a house does it automatically.

In a slightly larger building, it is necessary to wrinkle the edge, turn corners, to get the same effect. Juxtaposition of large rooms and small, helps also.

In an even larger building, it may be necessary to build in some sort of systematic widening in the plan or to convolute the edge still further, to get light on two sides of every room.

But of course, no matter how clever we are with the plan, no matter how carefully we convolute the bulding edge, sometimes it is just impossible. In these cases, the rooms can get the effect of light on two sides under two conditions. They can get it, if the room is very shallow--not more than about eight feet deep--with at least two windows side by side. The light bounces off the back wall, and bounces sideways between the two windows, so that the light still has the glare-free character of light on two sides.

And finally, if a room simply has to be more than eight feet deep, but cannot have light from two sides--then the problem can be solved by making the ceiling very high, by painting the walls very white, and by putting great high windows in the wall, set into very deep reveals, deep enough to offset the glare. Elizabethan dining halls and living rooms in Georgian mansions were often built like this. Remember, though, that it is very hard to make it work.

CONTEXT

This pattern does not go into details about window area to wall area ratio, or the exact optimum placing of the windows with respect to the proportions of the room. The point of the pattern still stands--that windows in any room should be placed to satisfy two requirements:

1. reduce the light gradient in the room.

2. directly or indirectly illuminate walls immediately adjacent to windows.

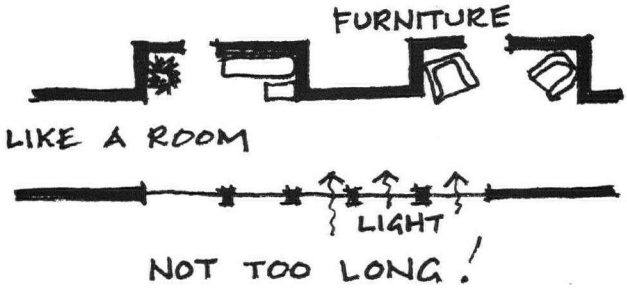
This pattern, of course, applies only to rooms with windows. In fact we do believe that all rooms used during the day need windows, not only for natural light, but also because people need some relationship to the outdoors. See Windows Overlooking Life.

This pattern was developed from the pattern Light on Two Sides of Every Room by Christopher Alexander, Sanford Hirshen, Sara Ishikawa, Christie Coffin, Shlomo Angel at the Centre for Environmental Structure, Berkeley, California.

Short Passages

"...LONG, STERILE CORRIDORS SET THE SCENE FOR EVERYTHING BAD ABOUT MODERN ARCHITECTURE."

NOT THIS!



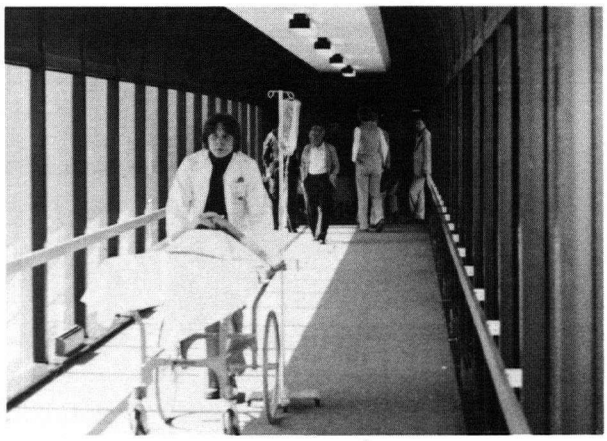
NOT TOO LONG!

THEREFORE: MAKE EACH STRETCH OF CORRIDOR LESS THAN 50 FEET; IN EFFECT, THIS MEANS NO MORE THAN 5 OR 6 UNITS OPENING OFF THE SIDE OF ANY SINGLE STRETCH OF CORRIDOR. BREAK LONGER CORRIDORS INTO LESS-THAN-50-FOOT UNITS BY JOGGING THEM, OPENING ONE SIDE TO A COURT, WIDENING THEM INTO LOBBIES, ETC.

In fact, the ugly long repetitive corridors of the machine age have so far infected the word "corridor" that it is hard to imagine that a corridor could ever be a place of beauty, a moment in your passage from room to room, which means as much as all the moments you spend in the rooms themselves.

Where a number of rooms are to share a circulation path, it is common practice to string them along a straight corridor. However, the intuition persists that, from a human point of view, long corridors with many rooms off them are dysfunctional: People dislike them; they represent bureaucracy and monotony.

Let us try to make this intuition more specific. What evidence is there that long corridors contribute to human uneasiness?



THIS!

We refer first to a study by Mayer Spivack on non-conscious effects of long hospital corridors on perception, communication and behaviour:

"Four examples of long mental hospital corridors are examined...It is concluded that such spaces interfere with normal verbal communication due to their characteristic acoustical properties. Optical phenomena common to these passageways obscure the perception of the human figure and face, and distort distance perception. Paradoxical visual cues produced by one tunnel created interrelated, cross sensory illusions involving room size, distance, walking speed and time. Observations of patient behavior suggest the effect of narrow corridors upon anxiety is via the penetration of the personal space envelope." (M. Spivack, "Sensory Distortion", Hospital and Community Psychiatry, 18, No. 1, January 1967.)

An experiment, done by Alexander at Berkeley, is relevant. It was found that, in the perception of rectangles, there is a definite cognitive break between that class of rectangles with ration 5:1 or less, and that class of rectangles with ratio greater than 5:1. Rectangles from the first class are seen as rectangles with a specific proportion. Rectangles from the second class are seen merely as "long thin things".

This result suggests that there may be a clear cognitive distinction between rectangles (and hence, perhaps, corridors) which have a ratio of less than 5:1, and those which have a ratio greater than 5:1. According to this distinction, a corridor 10 feet wide would have an upper limit on its length of 50 feet.

Another suggestive piece of evidence is the following: It is known that when a person sees 4 or 5 regularly spaced objects of the same kind, he perceives them as a unit. He can judge their number without counting them. When the number of objects goes above 5 or 6, he no longer sees them as forming a unit. He now sees them as a collection. If he wants to estimate their number, he has to count them, one by one, in sequence. At this stage, it seems likely that the feeling of monotony and repetition sets in. In its most extreme form, we may say that the perceiver, faced with a "collection," sees the objects as digits. If the objects were offices along a corridor, then the perceiver would begin to see the offices, and their inhabitants, as digits. (G. Miller, "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information", in D. Beardslee, and M.

Wertheimer (eds.), Readings in Perception, New York: Van Nostrand, 1958, esp. p. 104; also E.L. Kaufman, M.W. Lord, T.W. Reese and J. Volkmann, "The Discrimination of Visual Number", American Journal of Psychology, 62, 1949, pp. 498-525.)

This result suggests that there may be a cognitive distinction between corridors which have five or less equally spaced doors, and those which have more than five.

(As it happens, both of these breakpoints coincide approximately. Given standard corridor widths, and standard office sizes, they both make a distinction between corridors less than 40-50 feet long and those more than 40-50 feet long.) Since common sense indicates that a corridor becomes unpleasant when it has five or more equally spaced doors down one side, and when it is more than five times as long as its width, it is very likely that this breakpoint is the one we are looking for.

What do we know about corridors that make some deadening places and others alive?

The most profound issues, to our minds, is natural light. A hall or passage that is generously lit by the sun is almost always pleasant. The archetype is the one-sided hall, lined with windows and doors on its open side. (Notice that this is one of the few places where it is a good idea to light a space from one side).

The second issue is the relation of the passage to the rooms which open off it. Interior windows, opening from these rooms into the hall, help animate the hall. They establish a flow between the rooms and the passage; they support a more informal style of communication; they give the person moving through the hall a taste of life inside the rooms. Even in an office, this contact is fine so long as it is not extreme; so long as the workplaces are protected individually by distance or by a partial wall.

The third issue which makes the difference between a lively passage and a dead one is the presence of furnishings. If the passage is made in a way which invites people to furnish it with book cases, small tables, places to lean; even seats, then it becomes very much a part of the living space of the building, not something entirely separate.

While in health facilities there is a concern about the combustibility of furnishing materials in fire rated corridors it is possible to design these passages by grouping fire zones, so that a passage can live. It is possible so that outside of the specified Building Code

width, small spaces where seats can be placed will occur. Designers must work with Codes in health facilities to strive to create alive corridors so that passing through a building is meaningful.

CONTEXT

This applies to any building with rooms opening off corridors; especially double loaded corridors. (Ron Walkey has pointed out that corridors can be longer than fifty feet provided there is changing visual stimulus on at least one side; for example a single loaded corridor where the unloaded side is full of windows looking onto something interesting.)

Adjustable Light Quality

LIGHTING IS PERHAPS THE SINGULAR MOST CRITICAL ELEMENT IN CREATING COMFORTABLE SPACES. IF THE LIGHTING CANNOT BE ADJUSTED TO SUIT THE ACTIVITY, THE SPACE MAY NEVER SEEM QUITE RIGHT.

In the pattern Pools of Light it is suggested that lighting be organized in a space so as to 'define' the social groups within.

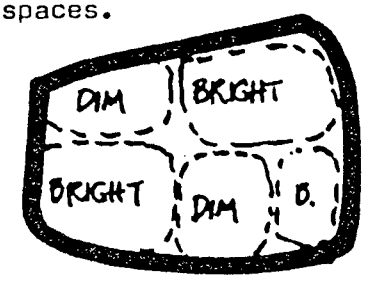
"Pools of light define social space; when light is evenly distributed throughout a special space its social character is lost".

Too frequently overhead fluorescent lights are employed to raise the level of lighting to a point where any activity can be carried on within. Although this is a case of the highest common denominator, many intimate social activities cannot survive under this level of intensity.

In a multi-purpose room where meetings, small group games, discussions, etc. will occur, the problem is that no one light level or quality will satisfy all of these social groups. To use only the highest common denominator will satisfy only a few of these activities.

In all but those activities requiring detailed visual concentration, it is the quality of the light which will make or break the space, not merely the quantity of it.

We suggest therefore that in these kinds of rooms the lighting be made 'adjustable', so that both its quality and quantity can be altered to suit a particular situation. In practical terms this means having several circuits of lights which can be turned on or off, or better yet, moveable lights which can be used to define various social spaces.



PROVIDE EVERY MULTI-PURPOSE SPACE WITH LIGHTING WHICH CAN BE ADJUSTED IN QUANTITY AND QUALITY TO SUIT THE VARIETY OF ACTIVITIES WITHIN.

5. UNIVERSAL PATTERNS MODIFIED

These Patterns, like those in Section 4, have been taken from the work of Christopher Alexander et al, at Berkeley. We have, in minor ways, made them Hospital or Nursery specific. Please read them and answer the following questions.

5.1 ARE THE MODIFICATIONS OBVIOUS IN THAT THEY DISTRUB YOU WHEN YOU READ THEM?

( ) YES ( ) NO

5.2 DO YOU FEEL THEY SHOULD BE FURTHER MODIFIED?

( ) YES ( ) NO

5.3 IF THEY NEED MODIFICATION IN ANY WAY PLEASE EXPLAIN VERY BRIEFLY: (comment)

_____

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No Wall Unused

WALLS WHICH ONLY DIVIDE SPACES SEEM LIFELESS AND DULL. THOSE WHICH SUPPORT THE ACTIVITY WITHIN SEEM TO BRING EVERYTHING IN THE SPACE TO LIFE.

Walls identify and define space. They contain the structural and acoustic properties to support the functions within. In modern buildings the kinds of walls are very limited. It is either a solid divider, or a transparent sheet of glass. There is little variation other than surface color and texture.

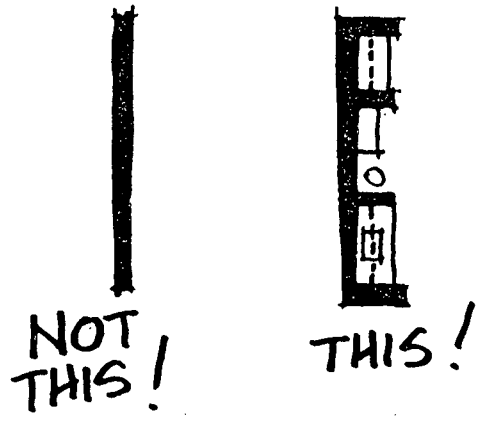
Traditional buildings seldom had walls with such limited functions. The walls of a Greek house holds a niche in wich to put a carrage of cool water. The wall in a Japanese house hides all the bedding. The walls of an ancient chapel are covered in bas relief carrying a traditional message. These examples may be dramatic but they are not isolated. In most traditional buildings the walls serve a higher purpose than just defining space -- they become part of the activity in that space by being useable in an immediate sense.

In hospitals the solid walls of masonry have given way to Steel Stud and Plasterboard. In addition to considerable reduction in cost they are more flexible. They can contain many different

THINK OF EVERY PART OF EVERY WALL AS A PART OF THE LIVING SYSTEM IT SURROUNDS.

SHAPE IT TO SUSTAIN THE ACTIVITY IN THE ROOM BY:

- **MAKING IT A STORAGE WALL IF IT SURROUNDS A WORK AREA.**
- **MAKING IT A TACKBOARD IF IT ENCLOSES A DISPLAY OR TEACHING AREA.**
- **MAKING IT A DISPLAY WALL IF IT IS IN A PUBLIC LOBBY.**
- **MAKING IT HOLD SEATING AND ALCOVES IF THE ROOM IS A LOUNGE.**
- **MAKING IT HOLD SHELVES IF IT IS PART OF A FOOD SERVING AREA.**



service supply lines and can be cut open, repaired and relocated easily. In the interest of maintaining the idea of flexibility planners have avoided putting fixtures on Drywall partitions as if they were demountable.

This is an incorrect attitude since the Drywall system can hold very heavy storage units. In order to change a wall during replanning, it would need to be demolished, so a shelf unit could be removed just as easily. Hospital Drywall systems lend themselves well to being built up as thick walls.

Unlike hospitals, with dwellings, we easily recognize the necessity for interaction with the walls. The pattern developed at the Center for Environmental Structure at Berkeley called Thick Walls develops this notion in great length:

"Most of the identity of a dwelling lies in or near its surface -- in the three or four feet near the walls, floors and ceilings. This is where people keep most of their belongings, this is where the special lighting fixtures are, this is where the special built-in furniture is placed, this is where the special cozy nooks and corners are, that individual families make their own, this is where the identifiable small scale variation is, this is the place where people can most easily make changes, and see the product of their own craftsmanship."

The same is true of spaces in hospitals. You can use the walls to serve and enrich the space it surrounds.

Pools of Light

POOLS OF LIGHT DEFINE SOCIAL AND WORK SPACE WHEN LIGHT IS EVENLY DISTRIBUTED THROUGHOUT A SPACE ITS SOCIAL CHARACTER IS LOST.

People working in a hospital are rarely alone. They interact as social groups.

In any given space, at a given moment, there are social groups of well established dimension. These groups may involve, 1, 2, 3, 5, 10, or 100 persons - according to the occasionand the activity being undertaken.

The conjecture is:

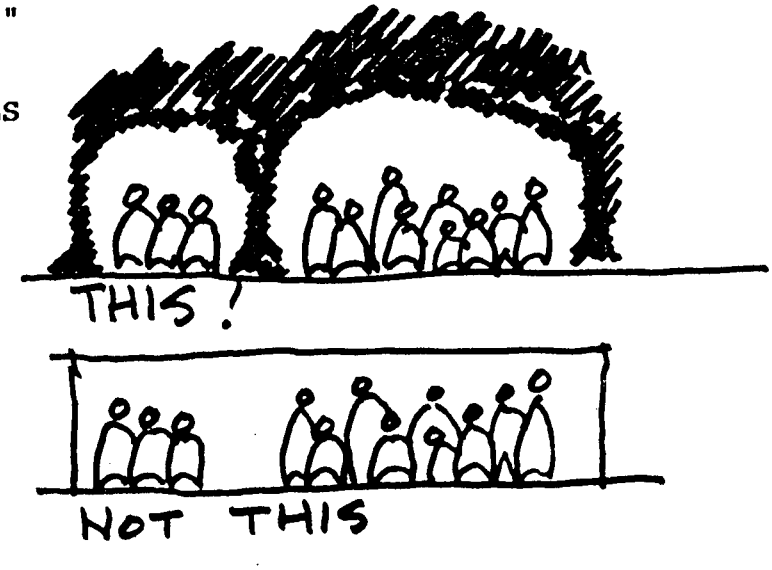
1. If such a group is within a "pool" of light, whose size and boundaries correspond to those of the group, this will enhance the definition, cohesiveness, and even the phenomenological existence of the group.

2. If such a group is in an area of uniform illumination, so that there are no light gradients corresponding to the boundary of the group, then the definition, cohesiveness, and "existence" of the group will be weakened.

We know of no experimental evidence which supports this conjecture directly. However, everyday experience bears it out in hundreds of ways.

One possible explanation is suggested by the experiments of Hopkinson and Longmore, who showed that small bright light sources distract the attention less than large areas which are less bright. These authors conclude that local lighting over a work table, allows the worker to pay more attention to his work than uniform background lighting does. It seems reasonable to infer that the high degree of person to person attention required to maintain the cohesiveness of a social group, is more likely to be sustained if the

THEREFORE: VARY LIGHT LEVELS TO CREATE DISCERNIBLE POOLS; MAKE THE PERCEIVED DIAMETER OF ANY GIVEN POOL ABOUT THE SAME AS THE DIAMETER OF THE SOCIAL GROUP IT IS GOING TO "COVER"; DON'T LET THE BRIGHTNESS RATIO OF POOLS/ BACKGROUND EXCEED 40:1; IF POSSIBLE PLACE A DIMMER CONTROL FOR THE LIGHT POOL WITHIN THE AREA COVERED.



group has local lighting, than if it has uniform background lighting. This means that in hospital settings where a great deal of activity is going on around a work space, pools of task light will improve concentration and work environment for those involved. (See R.G. Hopkinson and J. Longmore, "Attention and Distraction in the Lighting of Workplaces", Ergonomics, 2, 1959, p. 321 ff. Also reprinted in R.G. Hopkinson, Lighting, London HMSO, 1963, pp. 261-268.)

This phenomenon can be seen in many familiar settings.

Every good restaurant keeps each table as a separate pool of light, knowing that this contributes to its private and intimate ambience. In a house where family members live, a truly comfortable old chair, "yours", has its own light, in dimmer surroundings-so that you retreat from the bustle of the family to read the paper in peace. Again, house dining tables often have a single lamp, suspended over the table-the light seems almost to act like glue for all the peple sitting round the table. In larger situations the same thing seems to be true. Think of the park bench, under a solitary light, and the privacy of the world which it creates for a pair of lovers. Or, in a trucking depot, the solidarity of the group of men sipping coffee around a brightly lit coffee stand.

One component of this phenomenon is probably that uniform lighting tends to obscure texture gradients and other visual cues, and may in this way also act against group members efforts to communicate with one another. (See for instance, Elektisk Lys I Klasserum, Kommission Hos Teknisk Forlag, Copenhagen, 1958; H.L. Logan, Lighting and Wellbeing, Holophane Company, 342 Madison Avenue, New York, 1961; H.L. Logan and E. Berger, "Measurement of Visual Information Cues", Illuminating Engineering, 56, 1961, pp. 393-403.)

One word of caution. It might be possible to object to this pattern, on the ground that pools of light, and the consequent brightness gradients, will create glare. The subject of glare is complex; since glare depends on many factors, including not only the ratio of source brightness to background brightness, but also on their absolute brightnesses, the size of the source, the angle subtended at the perceivers eye, and the angle of viewing.

Detailed treatment of these subjects may be found in the series of papers by Hopkinson and others in Hopkinson, op. cit., pp. 201-290, especially the first paper, R.G. Hopkinson and P. Petherbridge, "Discomfort Glare and the Lighting of Buildings", Transactions of the Illuminating Engineering Society, 15, London, 1950, pp. 39 ff.

For the time being, it is enough to note that brightness ratios as high as 40:1 or even 80:1 are perfectly acceptable. (W.H. Kahler, "Visual Comfort in the Plant", Industrial Medicine and Surgery, 17, 1958, pp. 556-557.) There is no reasonable basis for insistence on perfectly uniform lighting.

With recent concern for Energy Conservation, in areas where there is all artificial light, general reduction of background light levels is preferable. This means that "task" lighting is required and the location of these lights can be considered with reference to this pattern.

CONTEXT

Pools of Light applies to any area which requires artificial illumination, and in which people are to be fairly stationary - like sitting, working, talking, resting...

This pattern was developed from the pattern of the same name created by Christopher Alexander, Sara Ishikawa, Murray Silverstein, from the Centre for Environmental Structures, Berkeley, California in 1970.

Workspace Enclosure

PEOPLE CANNOT WORK EFFECTIVELY IF THEIR WORKSPACE IS TOO ENCLOSED OR TOO EXPOSED. A GOOD WORKSPACE STRIKES THE BALANCE.

In many office environments, people are either completely enclosed and feel too isolated or they are in a completely open area as in the office landscape and feel too exposed. It is hard for a person to work well at either of these two extremes - the problem is to find the right balance between the two.

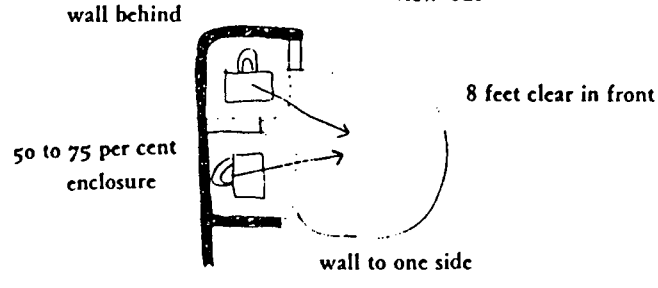
THEREFORE:

GIVE EACH WORKSPACE AN AREA OF AT LEAST 60 SQUARE FEET. BUILD WALLS AND WINDOWS ROUND EACH WORKSPACE TO SUCH AN EXTENT THAT THEIR TOTAL AREA (COUNTING WINDOWS AT ONE-HALF) IS 50 TO 75 PERCENT OF THE FULL ENCLOSURE THAT WOULD BE THERE IF ALL FOUR WALLS AROUND THE 60 SQUARE FEET WERE SOLID. LET THE FRONT OF THE WORKSPACE BE OPEN FOR AT LEAST 8 FEET IN FRONT, ALWAYS INTO A LARGER SPACE. PLACE THE DESK SO THAT THE PERSON WORKING AT IT HAS A VIEW OUT, EITHER TO THE FRONT OR TO THE SIDE. IF THERE ARE OTHER PEOPLE WORKING NEARBY, ARRANGE THE ENCLOSURE SO THAT THE PERSON HAS A SENSE OF CONNECTION TO TWO OR THREE OTHERS; BUT NEVER PUT MORE THAN EIGHT WORKSPACES WITHIN VIEW OR EARSHOT OF ONE ANOTHER.

To find this balance an experiment was conducted at the Centre for Environmental Structure at Berkeley in California. In this experiment 13 variables which it was thought might influence a person's sense of enclosure in his workspace were determined. The experiment was as follows:

"These 13 variables are:

1. Presence or absence of a wall immediately behind you.
2. Presence or absence of a wall immediately beside you.
3. Amount of open space in front of you.
4. Area of workspace.
5. Total amount of enclosure around the immediate workspace.
6. View to the outside.
7. Distance to nearest person.
8. Number of people you are aware of from your workplace.



9. Noise: level and type.

10. Presence or absence of a person facing you directly.

11. Number of different positions you can sit in.

12. Number of people you can see from your workspace.

13. The number of people you can talk to without raising your voice.

We then formulated thirteen hypotheses which connect these variables with the comfort of the work space. The hypotheses are listed below. We interviewed 17 men and women who had all worked in several different offices. In the interview, we first asked each person to think of the very best workspace he (or she) had ever worked in and the very worst; and then asked him (or her) to make a sketch plan of both spaces. Then we asked questions to identify the value of each of these 13 variables in the "best" and "worst" workspaces. Thus, for instance, we might point to one of the sketches a person had drawn, and say "How far away was that wall" to establish the value of the third variable. The values of the variables for the 17 best and worst workspaces are given in the following table.

On the basis of this table, we then calculated the probable significance of our hypotheses, according to the chi-squared test. Nine of the hypotheses appear to be significant according to the chi-squared test, and four are not. We now list the nine "significant" hypotheses, and with each one, in parentheses, we venture an explanation for its success.

1. You feel more comfortable in a workspace if there is a wall behind you. (If your back is exposed you feel vulnerable - you can never tell if someone is looking at you, or if someone is coming toward you from behind.) The data support this hypothesis at the 1 percent level of significance.

2. You feel more comfortable in a workspace if there is a wall to one side. (If your workspace is open in front and on both sides, you feel too exposed. This is probably due to the fact that though it is possible to be vaguely aware of everything that goes on 180 degrees around you, you cannot feel in real control of such a wide angle without moving your head all the time. If you have a wall on one side, you only have to manage an angle of 90 degrees, which is

much easier, so you feel more secure.) The data support this hypothesis at the 5 percent level of significance.

3. There sould be no blank wall closer than 8 feet in front of you. (As you work you want to occasionally look up and rest your eyes by focusing them on something farther away than the desk. If there is a blank wall closer than 8 feet your eyes will not change focus, and they get no relief. In this case you feel too enclosed. The data support this hypotheses at the 5 percent level of significance.

4. Workspaces where you spend most of the day should be at least 60 square feet in area. (If your workspace is any smaller than 60 square feet you feel cramped and claustrophobic.) The data support this hypothesis at the 5 percent level of significance.

5. Each workspace should be 50 to 75 percent enclosed by walls or windows. (We guess that enclosure by windows create about half the feeling of enclosure that solid walls have, but that a workspace which is surrounded half by wall and half by window is considered to have 75 percent enclosure, while a workspace completely surrounded by a half-height wall and otherwise open, is considered to have 50 percent enclosure.) The data support this hypothesis at the 1 percent level of significance.

6. Every workspace should have a view to the outside. (If you do not have a view to the outside, you feel too enclosed and oppressed by the building, even if you are working in a large open office. See WINDOWS OVERLOOKING LIFE. The data support this hypothesis at the 0.1 percent level of significance.

7. No other person should work closer than 8 feet to your workspace. (You should be able to hold conversations either on the phone or in person with someone, without feeling as though someone else can hear every work you are saying. The noise level in an average office is 45 db. At 45 db people closer than 8 feet to you are virtually forced to overhear your conversations. From the Handbook of Noise Measurement by Peterson and Gross, Sixth Edition, West Concord, Mass.: General Radio Company, 1967.) The data support this hypothesis at the 5 percent level of significance.

8. It is uncomfortable if you are not aware of at least two other persons while you work. On the other hand, you do not want to be aware of

more than eight people. (If you are aware of more than eight people, you lose a sense of where you are in the whole organization. You feel like a cog in a huge machine. You are exposed to too many people. On the other hand, if you are not aware of anyone else around you, you feel isolated and as though no one cares about you, or your work. In this case, you are too enclosed.) The data support this hypothesis at the 5 percent level of significance.

9. You should not be able to hear noises very different from the kind of noise you make, from your workplace. (Your workplace should be sufficiently enclosed to cut out noises which are of a different kind from the ones you make. There is some evidence that one can concentrate on a task better if people around him are doing the same thing, not something else.) The data support this hypothesis at the 5 percent level of significance.

Four of the hypotheses we tested were not supported to a statistically significant extent by the data. They are the following:

10. No one should be sitting directly opposite you and facing you.

11. Workspaces should allow you to face in different directions.

12. From your workspace, you should be able to see at least two other persons; but no more than four.

13. There should be least one other person close enough to talk to.

Although this is a simple test we know of no other attempts to find such a balance. From various discussions with planners the "sense-of-place" which gives a feeling of comfort in the workplace supports the findings of this experiment. Further observation will prove whether the hypothesis provided here is correct.

CONTEXT

This pattern applies to spaces in hospitals where clerical activities take place (reading, charting, report writing, etc.) and normal nursing or medical activities which require they take place in a fixed location (preparing, testing, treating, observing, etc.)

Warm Colors

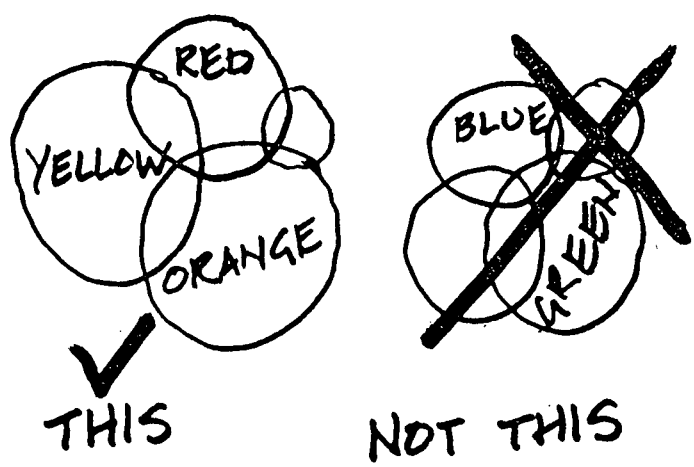
THE GREENS AND GREYS OF HOSPITALS AND OFFICE CORRIDORS ARE DEPRESSING AND COLD. NATURAL WOOD, SUNLIGHT, BRIGHT COLORS ARE WARM. IN SOME WAY, THE WARMTH OF THE COLORS IN A ROOM MAKES A GREAT DEAL OF DIFFERENCE BETWEEN COMFORT AND DISCOMFORT.

But just what are warm colors and cold colors? In a very simple minded sense, red and yellow and orange and brown are warm; blue and green and grey are cold. But, obviously, it is not true that rooms with red and yellow feel good; while rooms with blue and grey feel cold. There is some superficial truth to this simple statement: it is true that reds and browns and yellow help to make rooms comfortable; but it is also true that white and blue and green can all make people comfortable too. After all, the sky is blue, and grass is green. Obviously, we feel comfortable out in the green grass of a meadow, under the blue sky.

The explanation is simple and fascinating. It is not the color of the things, the surfaces, which makes a place warm or cold, but the color of the light. What exactly does this mean? We can estimate the color of the light at a particular point in space by holding a perfectly white surface there. If the light is warm, this surface will be slightly tinted toward the yellow-red. If the light is cold, this surface will be slightly tinted toward the blue-green. This tinting will be very slight: indeed, on a small white surface it may be so hard to see that you need a spectrometer to do it.

But when you realize that everything in that space is lightly tinted--people's faces, hands, shirts, dresses, food, paper, everything--it is not so hard to see that this can have a huge effect on the emotional quality that people experience there.

THEREFORE: CHOOSE SURFACE COLORS WHICH TOGETHER WITH THE COLOR OF NATURAL LIGHT, REFLECTED LIGHT, AND ARTIFICIAL LIGHTS, CREATE A WARM LIGHT IN THE ROOMS. ESSENTIALLY THIS MEANS THAT THE COLORS SHOULD BE IN THE RED-BROWN RANGE.



Now, the color of the light in a space does not depend in any simple way on the color of the surface. It depends on a complex interaction between the color of the light sources and the way this light then bounces on and off the many surfaces. In a meadow, on a spring day, the sunlight bouncing off the green grass is still warm light--that is, in the yellowish reddish range. The light in a hospital corridor, lit by fluorescent tubes, bouncing off green walls is cold light--in the green-blue range. In a room with lots of natural light, the overall light is warm. In a room whose windows face onto a grey building across the street, the light may be cold, unless there is a very strong concentration of yellow and red fabrics.

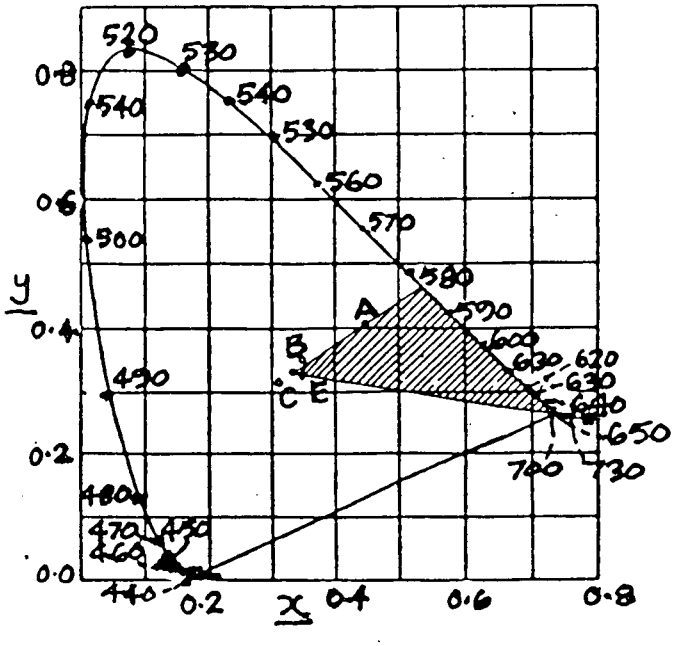
If you are in any doubt about the objective character of the light in the room and you don't have a spectrometer, all you need to do is try to use color film. If the light is warm and the film is properly exposed, white walls will come out slightly pink. If the light is cold, white walls will come out slightly blue.

So, in order to make a room comfortable, you must use a collection of colors which together with the sources of light and the reflecting surfaces outside the room, combine to make the reflected light which exists in the middle of the room warm, that is, toward the yellow-red. Yellow and red colors will always do it. Blues and greens and whites will only do it in the proper places, balanced with other colors, and when the light sources are helping.

To complete the discussion we now make the concept of warm light precise in terms of chromaticity. Consider the light falling on any given surface in the middle of the room. This light contains a variety of different wavelengths. Its character is specified, exactly, by some distribution of spectral energies p( ), which gives the relative proportions of different wavelengths present in this light.

We know that any light whatsoever--in short, any p( )--can be plotted as a single point on the color triangle --more formally known as the two-dimensional chromaticity diagram--by means of the standard color matching functions given in Gunter Wyszecki and W.S. Seiles, Color Science, New York, 1967, pp. 228-317. The coordinates of a plot in this color triangle define the chromaticity of any given energy distribution.

We may now identify a region on the wall chromaticity diagram, which we shall call the warm region. It is shown hatched on the drawing.



CHROMATICITY DIAG.

This hatched area is based on a number of empirical results. For example, we know that people have a clear subjective impression of the relative warmth, or coldness, of different spaces. See, for instance, Committee on Colorimetry of the Optical Society of America, The Science of Color, New York, 1953, p. 168. One study which attempts to identify the objective correlates of perceived "warmth" is S.M. Newhall, "Warmth and Coolness of Colors," Psychological Record, 4, 1941, pp. 198-212.

This study revealed a maximum for "warmest" judgments at dominant wavelength 610 millimicrons, which is in the middle of the orange range. And individual observer stability in such judgments is high. Thus, one study gives reliability co-efficients of 0.95 for warmth and 0.82 for coolness--N. Collins, "The Appropriateness of Certain Color Combinations in Advertising," M.A. thesis, Columbia University, New York, 1924.

We require that the light incident on any plane surface, at any point within 5 feet of the floor, in the space defined, have chromaticity within the warm region.

In order to meet this requirement, it will be necessary for the floor, and most of the walls, to be in the red-brown range. Detailed computations on any given surface to estimate the chromaticity of the light in the room, as a function of the spectral distribution of the primary sources, and the reflection characteristics of floor, walls, and ceiling, may be made according to the methods described in P. Moon and D.E. spencer, Lighting Design, Cambridge, 1948, and summarised in Warren B. Boast, Illumination Engineering, New York, 1953 pp 197-221.

Finally, it is vital to remember that this pattern requires only that the light--the total light in the middle of a room, coming from sunlight, artifical lights, reflections from walls, reflections from outside, from carpets--the total light, lies in that part of the color triangle we call "warm." It does not require that any individual color surfaces in the room should be red or orange or yellow--only that the combined effect of all the surfaces and lights together, creates light in the middle of the room which lies in the warm part of the color triangle.

CONTEXT

This pattern can be used for areas of the hospital that do not need special color correction for assessing skin tone. In the Nursery Holding Area most finishes and light must be calculated for critical color observation. This is achieved with daylight or artificial light sources in the higher Kelvin ranges with a relatively flat spectral power distribution (fluorescent 5000° K/daylight).