THE IMPACT OF HOSPITAL MEDICAL
DAY CARE ON INPATIENT USE

by

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ABSTRACT

The impact of the introduction of hospital medical day care programs on inpatient use was studied, to see if there was a reduction in average lengths of stay, cases or patient days, for those diagnostic categories in the programs.

The provincial government funded these programs to create an alternative to hospitalization. Studies on the issue of whether or not day care is an alternative or substitutes for inpatient use were examined. Interest in ambulatory care is growing because of the increasing age of the population, increasing duration of chronic illness and increasing costs of hospital services.

Three programs at Lions Gate Hospital in North Vancouver, B.C. were chosen: Chronic Obstructive Lung Disease (C.O.L.D.) program, Diabetic Day Care and the Neuro (Neurology) program. The population for study were divided into four groups: those from North and West Vancouver who used Lions Gate Hospital, patients from the rest of the Greater Vancouver Regional District (G.V.R.D.) who used other G.V.R.D. hospitals, and to allow for 'spill-out' cases, those from North and West Vancouver who used other hospitals in the province and those from the rest of the G.V.R.D. who used Lions Gate Hospital.

The methodology involved the use of a multiple time series design which would allow some comparison before and after the introduction of the C.O.L.D. program, as well as comparison between the North Shore and the rest of the G.V.R.D.

A regression analysis, using a dummy variable for the C.O.L.D.
program, on average length of stay, cases and patient days showed no statistically significant results. The data collection period, 1970 to 1979/80, does not provide conclusive answers for Diabetic Day Care, introduced at Lions Gate Hospital in 1966 and in some of the hospitals of the rest of the G.V.R.D. in 1972, or for the Neuro program, introduced at Lions Gate Hospital in 1979. However, population and age adjusted cases and patient days for all three programs are consistently higher in the rest of the G.V.R.D. when compared with North and West Vancouver and deserve further investigation.

The implications from this study, that there is no impact from medical day care programs on rates of inpatient use, is consistent with similar studies on Diabetic Day Care and Day Care Surgery. The health care system does not seem to be able to respond to innovations of this type and they are additions to existing services.
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It is a special characteristic of all modern societies that we consciously decide on and plan projects designed to improve our social systems. It is our universal predicament that our projects do not always have their intended effects.

(Campbell, 1975, p. 3)
CHAPTER I. INTRODUCTION

There is little evidence that the introduction of hospital ambulatory day care programs, such as those for Chronic Obstructive Lung Disease, Cerebrovascular Disease or Diabetes shorten the length of stay in hospital of patients with those diseases, reduce the number of cases of those diseases or prevent hospitalization (Elnicki, 1976; Evans, 1980, Chap. 10; Freiberg, 1979; Rennie, 1977). Yet they are acclaimed as cost containment devices (Newman, 1979; Somers, 1980; Timm, 1979).

Because there is a lack of research in this area this thesis will explore some of the questions surrounding the impact of medical day care. Specifically:

- Does hospital medical day care (as defined in this paper) reduce average length of stay, the number of cases or patient days?
- Can a methodology be developed which will answer this question?
- Is there a relationship between the use of these programs and cost savings?
- What do the answers imply for government policy on alternatives to institutionalization?

Some historical background is required to explain why interest in ambulatory care is growing. Interest in medical day care, as an alternative to hospitalization, began in the 1940s when day hospitals were started in Britain in an effort to diminish the length of hospital stay. It was felt that long periods in bed
were not desirable or necessary (Brocklehurst, 1976).

Interest in Canada and the United States did not follow until the late 1960s. Until then hospitals in the United States "regarded outpatient care as a teaching-related charitable endeavor rather than a basic component of their service mission" (Block, 1979, p. 105). In the late sixties in Canada experiments with day care surgery were being conducted (Shah, Robinson, Kinnis & Davenport, 1972). As well, geriatric day hospitals had been started (Farquhar & Earle, 1979; Fisher, 1974).

By 1970, the Task Force Reports on the Cost of Health Services in Canada saw ambulatory care as "a promising alternative to the full use of hospital impatient services" (Dept. of National Health & Welfare, 1970). During the seventies a series of economic studies conducted at Children's Hospital in Vancouver, B. C. identified savings that were possible with the substitution of day care surgery for inpatient care (Evans, 1980, Chapt. 10; Evans, Kinnis & Robinson, 1978; Evans & Robinson, 1973).

With the Lalonde report (1974) pointing to changes in the patterns of hospitalization, the prevalence of long-term chronic illness became more apparent and interest in alternatives to inpatient care increased. Similar pressures on the health system have been felt in the United States and in England and Europe (Friederich, 1973; Maxwell, 1975). However, this shift in emphasis did not change, to any great extent, the way hospitals were funded, based on potential patient days, so there was little incentive for hospitals to move to ambulatory care programs (Rennie, 1977). Incentives may not have been given because of the lack of evidence
that ambulatory programs provide better care or reduce hospitalization. Much of the literature on alternatives is controversial and many of the studies conducted on various programs have produced inconclusive results.

Problems in measuring the impact of ambulatory programs and generalizing to other populations occur because ambulatory care has several definitions and because programs provide different services. Christoffel and Loewenthal (1978) point to several problems which make ambulatory care difficult to evaluate: episodes of illness, particularly chronic illness, which cannot be defined easily, no specific diagnosis for ambulatory patients, incomplete ambulatory medical records and records which are not uniform, providers having little control over the patient's adherence to prescribed regimens and over outside influences.

Ideally, evaluation of any health care program should be sought by relating its objectives to its outcomes or results (Starfield, 1973). The outcome of a health program can be measured by assessing the health status of the users of that program. Here, the assumption is that the impact on health status will be relatively similar for both ambulatory and inpatient care. As one objective of introducing the ambulatory programs is a reduction in the length of stay in hospital the impact of these medical day care programs on average length of stay, number of cases and patient days will be measured.

A survey of the literature on studies which assess the impact, or outcome, of various kinds of alternatives to hospitalization provides contradictory answers to questions of whether or not day
care programs substitute for hospitalization. Nor is the relationship between cost savings and substitution always clear.

This thesis, as detailed in Chapter IV, will attempt to measure the impact of medical day care programs on inpatient utilization by trying to identify what happened prior to the programs to those specific disease groups now using ambulatory care, what would have happened without medical day care, and what is happening currently. The trends will be examined using data modified by population information, other information on changes in medical practice, prevalence of the conditions, etc. The data obtained from ten years of hospital discharge tapes, provided by the Ministry of Health, Hospital Programs Division, is presented and analyzed in Chapter V. Implications of the analysis for government policy on alternatives to institutionalization are explored in Chapter VI.
CHAPTER II. AMBULATORY CARE

WHAT IS AMBULATORY CARE?

The broadest definition of "ambulatory" comes from Webster's New World Dictionary, "able to walk," the word coming from "ambulare" or to walk about. The Oxford Dictionary adds: "place for walking, or arcade or cloister." However, when it is used in relation to health care it covers hospital outpatient care, emergency care, day care surgery, day hospitals, and even primary care. The definition is often broad, including a variety of organizational arrangements and locations, where people obtain medical services of various kinds without admission to an overnight hospital bed (Bodenheimer, 1970; Burns, 1980; Friederich, 1973; Loebs, 1978; Rennie, 1977). Friederich adds that these are "freestanding arrangements of medical practice to accommodate social, governmental and financial pressures" (p. 379). In other words, it is "any kind of health care offered on an outpatient basis" (Gebbie, 1976, p. 72). The definition is narrow when it applies to a type of service such as primary care in a Neighborhood Health Centre (Bellin, Geiger & Gibson, 1969). Home Care services are included by some authors (Goldsmith, 1977), but definitely excluded by others (Burns, 1980).

Outpatient care is defined as a "spectrum of services including health education and maintenance, prevention of diseases, early diagnosis, treatment, and rehabilitation" (American Hospital Association, 1968, p. 10). Like outpatient care, day hospitals
are said to provide the same spectrum of services, usually involving multidisciplinary health teams in a setting like "a hospital ward from which patients go home at night . . ." (Brocklehurst, 1976, p. 149). Generally day hospitals have been for psychiatric, geriatric or paediatric specialties but Fisher (1974) describes the first day hospital in Ontario, in 1972, as having 31 per cent of its patients under age 60 with an age range of 40 to 99, and as providing programs of rehabilitation to patients who often have more than one diagnosis, such as cerebrovascular disease and chronic obstructive lung disease.

This description comes closest to the kind of ambulatory care provided at Lions Gate Hospital's Medical Day Care Centre, formerly called "Ambulatory Care and Treatment Services." It is, like Loebs' (1978) definition: "the integrative and centralized arrangement for the services in which a multidisciplinary health care team . . . work together for diagnosis and treatment" (p. 2); it is like Roemer's (1975) definition of organized ambulatory care services, "a setting in which several health personnel collaborate and make decisions through some team process or as part of an organizational framework . . ." (p. 49). To use Rathbone-McCuan's and Elliot's (1976-77) approach: Medical defines the problems served; day defines the temporal limits of the services; care places the service in the broad field of health and social welfare; and center denotes a single location where a variety of specific services are clustered" (p. 154). What is different at Lions Gate Hospital is that the care is mainly provided in group programs, with physicians' diagnostic services generally having been
completed before referral to the programs. The hospital medical day care upon which this thesis is based is limited to programs for groups of patients with similar diagnoses. Supported by a Coordinator, teams of allied health professionals, with Clinical Directors (physicians), provide education, rehabilitation and treatment services (Young & Romilly, 1981).

WHY THE INTEREST IN AMBULATORY CARE?

Ambulatory care programs are of interest because of several trends in health care: the increasing age of the population, more chronic illness and increasing costs of hospital care. As Regenstreif (1977) says: "Alterations in any area of a complex social system are rarely traceable to a single stimulus" (p. 43), and the threads of interest which make up the tapestry of ambulatory care are tightly interwoven. This interest has come from several levels of government, both federal and provincial, from politicians and Ministry officials, from health care providers like hospitals and physicians and from patients concerned with the care provided. As well, a change in care emphasis, from sickness to wellness, from acute disease and restoration, to chronic illness and maintenance and rehabilitation, has implications for the delivery of care (Broisseau, 1973). Changing disease patterns, complicated by diseases associated with modern life styles, and changing values, have led to a mix of 'high' and 'halfway' technologies, which deal with the consequences of disease or postpone death (Margolis, 1979). Margolis adds that "chronicity
cannot be modelled along the traditional medical model" (p. 124). No longer is illness itself "always the prevailing issue," i.e. "the needs of chronically ill persons go well beyond medical considerations . . ." (Lefton & Lefton, 1979, p. 344, 339).

Government Interest

Politicians and Health Ministry officials are concerned about several trends which affect public expenditure on health care:

Changes in population

- An aging population with implications for increased health care costs requires rethinking of national health policies and programs (Gross, 1978; Schlenker, 1980; Somers, 1980).
- There is increased life expectancy. (As well, the 'baby boom' of the 1940s will be working its way through the system, but it will peak in the first half of the next century.) Population forecasts predict that the number of those over 65 will climb to 20 per cent of the population by 2031. (This may be the peak.) In 1975, those over 65 represented 8.6 per cent of the population but utilized 38 per cent of the total hospital bed capacity (Lefebvre, Zsigmond & Devereaux, 1979).
- The ratio of the older to the total population and to the population of working, 18 to 64, will rise. Among the elderly the proportions of the 'old-old', those over 75, will increase faster than the 'young-old', those from 65 to 74 (Somers, 1980). Hospitalization increases with age
and almost half of those men over 75 and more than one-third of women over 75 are hospitalized each year. In addition, those over 75 stay twice to three times as long in the hospital (Lefebvre et al.).

An aging population needs a different composition of coordinated health services and has more multiple pathologies with slow recoveries (Boulet & Grenier, 1978; Gross, 1978).

Impact of medical care

- "Reduction of mortality from severe or chronic illness lengthens the average duration of the illness and increases its frequency in the total population" (Zook, Savickis & Moore, 1980, p. 465). They found that repeated hospitalizations for the same disease accounted for 60 per cent of all hospital charges and that from 24 to 55 per cent of hospitalizations were more expensive than the first admission.

- A general dissatisfaction with the contribution of medical care to health is growing (Carlson, 1978; Evans, Chap. 10, 1980; Schweitzer, 1978) and there is "growing doubt about the contributions of increased spending for health services to health status" (Battistella, 1978, p. 45).

- There is a concern over the iatrogenic hazards of modern medicine (Battistella; Carlson; Illich, 1976). Carlson says that despite elaborate safety and hygiene measures "infections contracted in hospitals exceed the rate in the
average household" (p. 325).

**Increased costs**

- The increased capability of medical and information technology which could lead to increases in cost (Schlenker, 1980).

- Cost containment pressures which reflect growing dissatisfaction and concern over rapidly rising costs (Berry, 1978), a need for resource use in other areas like energy (Fuchs, 1974), and for "more tangible political benefits" (Boulet & Grenier, 1978, p. 25). Consequently more controls are being placed on hospital spending and innovation although the cost containment problem is rarely clearly defined.

Berry says there is a choice of problems:

1. price inflation of hospital services,

2. rate of increase of total expenditure for hospital care,

3. relative proportion of health expenditure, especially for hospitals, in the Gross National Product,

4. growing government budget for hospital services.

---

1 If the cost per person is increased with no corresponding increase in health status society might reject the increased cost of technology but if there are improvements in health status society may be willing to pay.
National Government

The Federal government had shown its concern for its growing health budget by setting up a Task Force on the Cost of Health Services in 1969. In "Policies for Containing Health Care Costs in Canada," Mennie (1976) discusses a series of federal initiatives. In 1973, the provinces had rejected the federal offer of a five year Trust Fund for new initiatives in health care delivery which was part of a new financing proposal but, by 1975, provincial health ministers committed provinces to targets for the reduction of active-treatment beds, bed to population ratios and numbers of physicians in return for extensions of federal sharing for lower cost alternatives. These negotiations resulted in 1976 in a federal offer of block funds to provinces which included consideration of extended health sharing for alternatives like nursing homes, home care programs and ambulatory care services. McClelland (1977), then Minister of Health, in B. C., stated B. C.'s intention was to use the fifty million dollars it was to receive for a comprehensive long term care program.

Provincial Government

The B. C. government's concern about its control of hospital costs in the late 1970s and early 1980s led to a joint venture with the B. C. Health Association, the Hospital Funding Study. During this time, the then Planning and Development Division of the Health Ministry worked on a Hospital Role Study, which was to define the services each hospital would provide. Ambulatory
care was included in a second draft as one of the broad areas of service. In addition, the Hospital Programs Division was documenting the extent of hospital ambulatory care in the province. However, pressures from the Treasury Board, a change in Minister and Deputy Minister of Health and an increased focus on centralized cost restraint placed these plans in limbo. At the present time (summer, 1982) government's insistence, that hospitals operate with greatly reduced budgets from those expected, may lead to a greater interest in how ambulatory care can reduce the pressure on inpatient beds.

Local Governments

Interest in the possibilities for ambulatory care and in what is currently available comes from regional governments and groups. The Greater Vancouver Regional Hospital District set up a Steering Committee jointly with the Ministry of Health in B. C. to look at all aspects of ambulatory care within its region. Lawrence Ranta, M.D., presented a report on Day Care Surgery to that Steering Committee in January, 1981 and was looking at other aspects of ambulatory care. Previously, the B. C. Medical Centre, formed under provincial legislation in 1973, to coordinate programs and integrate facilities and services, attempted to define ambulatory care. Part of its mandate was "to provide new and improved resources" and one of its objectives was "exemplary functional programs for ambulatory care, preventive care and education . . ." (B.C.M.C., Feb., 1975). In March of 1975, the B.C.M.C. formed an Ad Hoc Committee "to develop a
working definition, a useful classification system, and establish certain priorities" for ambulatory care (B.C.M.C., 1975). When the provincial government changed, the B.C.M.C. became defunct.

Providers of Care

Some hospitals have reacted to cost containment pressures and government interest in ambulatory care by providing new services such as medical day care or surgical day care, both of which can be sold to government as potentially cost saving. Rosengren and Lefton (1969) say that hospitals may innovate in two ways, technological or ideological. With the present restraints curtailing high technology innovation, like new CAT scanners, hospitals have moved to lower technology innovation, like ambulatory care programs. In support of this move to community type health programs, hospitals say they are an important community resource, have management expertise, medical staff leadership, and trustees representing the community (Block, 1979). In the United States, Somers (1972) goes so far as to say: "Only the Hospital Can Do It All - Now." Because there are "grey areas of responsibility" between community health and hospitals the boundary of each system is not clear and "the pressures to be omnipotent are pervasive" (Dartington, 1979, p. 13,23). As well, when "there is evidence of fragmentation one may expect to see compensatory pressures toward integration" (Dartington, p. 29). Though present financial incentives in the hospital system have discouraged more of these kinds of innovations, hospitals see government moving in the direction of ambulatory care. G.T. Sept,
President of the B. C. Health Association, in a speech to the Area Councils in 1981 said that because of cost restraint "we'll be encouraged, no doubt, to further increase ambulatory care whenever possible" (B.C.H.A. News, 1981).

Kast and Rosenzweig (1974) said that organizations in the future would have to adapt to a turbulent environment: there would be a need for continual change and adjustment and expansion of boundaries and domains; they would continue to increase in size and complexity and differentiate activities; they would try to satisfy diverse goals rather than maximize one. Hospital's interest in more ambulatory care appears to be one of these adaptations.

**Recipients of Care**

Patients are also interested in how their care is provided. Thomas (1978) says that there has been a change in the past 25 years in the perception of one's own health, "a loss of confidence in the human form" and consequently more demand for health care (p. 348). Health care has been seen as a basic right (Margolis, 1979). Hospital ambulatory care could then be seen as an extension of necessary services to provide complete comprehensive care that would allow patients greater access to health care.
DESCRIPTION OF AMBULATORY PROGRAMS AT LIONS GATE HOSPITAL

History

Adapting to this changing environment, Lions Gate Hospital in North Vancouver opened a new medical day care facility, in December, 1979, which consists of five offices, two multi-purpose seminar rooms, a minor treatment area, a gym which can be divided into three areas, a work area for staff and a reception area. This opening was the culmination of several years of work on the part of interested physicians, the hospital's Board and staff. The original application to the Ministry of Health for an expansion of services to include "Medical Ambulatory Care and Treatment Services" was made in 1973. This brief, by O.K. Litherland, M.D., saw day care medicine "as relieving the necessity for an inpatient admission entirely in many cases, shortening the length of some inpatient stays, and giving much greater scope to preventive medicine" (quoted in Corbett, 1980, p. 90). John Hunt, an Internist at Lions Gate Hospital, had already started a Diabetic Day Care service and the rehabilitation of patients with cerebrovascular and chronic obstructive lung disease appeared possible in a day care program to R. W. Bell-Irving and O.K. Litherland, Internists at the hospital. Lions Gate Hospital had started Day Care Surgery in 1968 and Psychiatric Day Care in 1971 and felt that a reduction in hospital lengths of stay, shortened for the kinds of diagnoses in those programs, might be due to the introduction of day care. With the contraction of hospital
building and capping of beds in the 1970s it was felt that further ambulatory programs would be necessary to reduce some waiting lists.²

The Ministry of Health's approval of the application finally came in July, 1978. In a letter, dated August 24, 1978, J. Glenwright, then Assistant Deputy Minister, Hospital Programs, defined Day Care as:

... an organized rehabilitative service for patients who come to the hospital for a program of treatment which requires that they remain for either a one half day of 2½ hours, or a full day of 5 hours, to include two or more services, but does not necessitate formal admission as inpatients. The services which may be provided are nursing services, physiotherapy, occupational therapy, speech therapy, vocational counselling, psychological service, social service, and any other necessary treatment service provided by the hospital, plus medical assessment which is financed under medical insurance.

He further reiterated that the purpose of the program was as "an alternative to inpatient care not an add-on program."

Medical Day Centre Programs

While Lions Gate Hospital offers several services which do not require admission to a hospital bed, the ones defined as day care are offered in the Medical Day Centre. These are:

1. Metabolic Energy Control Assessment
   a) Diabetic Day Care

²Background information was obtained from a case study on the "Development of a Hospital Ambulatory Care Centre" presented by John Borthwick, Administrator of Lions Gate Hospital, to a Management class in Health Services Planning, and from Lions Gate's files.
b) Obesity Program

2. Rehabilitation Day Care Programs
   a) Neuro (Neurology) Program
   b) Chronic Obstructive Lung Disease (C.O.L.D.) Program
   c) Back Education Program
   d) Asthma Program

Some other outpatient programs are offered in the Centre for reasons of space but do not fit the definition of day care as given previously.

In order to assess the impact of these programs three were chosen for analysis: the C.O.L.D. Program, Diabetic Day Care, and the Neuro Program. The criterium for selection was that these programs had been operating for a few years and so trends, after the introduction of a program, could be examined.

The following is a description of the activities and types of patients in the programs that are being used for this thesis:

Chronic Obstructive Lung Disease (C.O.L.D.). (July, 1976)

The team consists of a Clinical Director, Nurse, Physiotherapist and an Occupational Therapist. The object of the program is to help chronic obstructive lung disease patients cope with their illness through education, exercise and relaxation.

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3These descriptions are taken from a report, "Ambulatory Care Services at Lions Gate Hospital," which was submitted by the Administration to R. E. McDermit, then Senior Assistant Deputy Minister, Professional and Institutional Services, Ministry of Health, November, 1980.
Patients must have recent Lung Function Studies, E.C.G.s, Blood Gases and Chest X-rays prior to admission to the program.

**Type of Patient** - Patients with demonstrated chronic obstructive lung disease, emphysema, chronic bronchitis.

**Volume of Service** - The program is held two afternoons a week for four weeks. Average enrollment per program is eight.

**Diabetic Day Care** (1964)

The program consists of the Clinical Director, a Nurse and a Dietitian. The object of the program is to prevent hospitalization. The Nurse and Dietitian assess the diabetic patients and run the educational program. A typical day, 0700 to 1700 hours, involves the taking of Blood Sugars, discussion with the Nurse or Dietitian, a snack, lecture from a Pharmacist, Physician or Home Care Nurse, etc., lunch, a group discussion regarding Diabetes, a snack, exercises with the Physiotherapist and a wind-up.

**Type of Patient** - Newly diagnosed diabetic patients, those for eye-tone education, those who are Insulin dependent (with a Youth day every sixth week), and those with Maturity onset Diabetes, and some requiring Insulin infusion.

**Volume of Service** - A new patient requires 6 to 8 visits in the first 6 months, then 2 visits in the next year, and then 1 visit every 2 years. Stabilization takes 3 to 4 weeks initially. There are an average of 10 patients per session and three sessions a week.
The multidisciplinary team for the program consists of the Clinical Director, Nurse, Physiotherapist, Occupational Therapist, Speech Therapist, and a Social Worker. The object of the program is to reduce the number of days patients remain in the activation ward by providing education and therapy on a day care basis. Patients attend for either a half day, two and a half hours, or a full day for five hours. They receive a minimum of two services within the program time.

**Type of Patient** - About 85 per cent of the patients have had a cerebrovascular accident, the rest include diagnoses like post motor vehicle accidents, head injuries, multiple sclerosis and amyotrophic sclerosis.

**Volume of Service** - Up to 16 patients can be enrolled in the program. Patients attend from 1 to 3 days a week and are enrolled for an indefinite time period, i.e. until they are discharged by the physician.

As the approval for these day care programs stipulated, their purpose was to be an alternative to inpatient care. The issue of whether or not ambulatory care substitutes for inpatient care can be examined in several studies.
CHAPTER III. SUBSTITUTION OF MEDICAL DAY CARE FOR INPATIENT CARE

Throughout the health care literature it is implied or stated that reducing inpatient length of stay by providing less costly programs, will reduce the overall health care cost. Fuchs (1974) states that the only way to affect hospital expenses is by changing one of the variables: admissions, length of stay, or cost per patient day. Fraser (1971) says that when hospitals are used to capacity "attention must be focused on ways of reducing the length of hospital stay required for different illnesses" (p. 157). However, substitutes also cost money and savings may be illusory, depending on the point of view taken. Evans (1980, Chap. 10) stresses "the highly conditional nature of all 'cost savings' statements . . .", that 'savings' always implies a comparison (p. 173). Both Evans and Robinson (1973) and Russell, Devlin, Fell and Glass (1977) emphasize that cost savings associated with an innovation or reduction in length of stay are dependent upon the response of the system or "the use to which released resources are put" (Russell et al., p. 846). Elnicki (1976) and Rennie (1977) conclude that there are no significant savings when substituting alternatives for inpatient care, although Rennie's "estimates of actual and maximum potential savings . . . appear far too small . . ." (Evans, 1980, Chap. 11, p. 211). Evans concludes that if there are to be savings from alternatives there have to be changes in the system of delivering care, such as monitoring case flow, adjusting bed capacity and changing staffing patterns (p. 216, 217).
EXAMINATION OF THE AVAILABLE LITERATURE

The available literature on these issues was examined for: clarification of the issue, for information on what does happen when alternatives to hospitalization are used, and for the relationship of substitution to cost savings. This review is not too concerned with the variable academic rigor of the following studies as most do not relate directly to the methodology in this thesis, but only to explaining why another approach to determining the impact on inpatient use may be necessary. Rarely does a common premise underly the research efforts so an attempt is made to show the range of comparisons, the types of studies and the differing measures of cost and outcome. Not only do the care services differ in level and intensity between studies but often within studies as well. These differences make it difficult to draw conclusions. As the U.S. Department of Health, Education and Welfare report, *Home Health Care* (1976) puts it:

In order to compare two forms or settings of care, it is necessary first to be sure that the level (acute, intermediate, or maintenance) and intensity (continuous or sporadic) of care be matched, regardless of the place in which it is provided. Thus the characteristics and service needs of both patient groups must be comparable. Only when these elements are aligned is it possible to make deductions about the costs of care. (p. 50)

Two studies on day hospital programs suggest ambulatory care does substitute. A program at St. Mary's of the Lake Hospital in Kingston, Ontario offers a geriatric outpatient department, a day hospital, some beds, a team approach and five full time house physicians for the chronically ill (Schuman,
Beattie, Steed, Gibson, Merry, Campbell & Kraus, (1978). Discharge statistics, for three month periods, were analyzed for one year prior to the program and one year following. The program resulted in a decreased length of stay and increased patient turnover. Kaplan (1981) evaluated the day hospital program at Moss Rehabilitation Hospital in Philadelphia to see if patients could be treated in the day hospital without increasing their length of stay and with lower costs. The program provided a full array of services and a patient spent five days a week, and as long as medically required, in therapeutic activities. Kaplan emphasizes this was not outpatient or day care but rehabilitation care. The number of patients, 18, was too small to make generalizations about length of stay (9 had above average length of stays and 9 below average) but he claims a 23 per cent savings in cost based on per diem charges.

In a review of adult day care research Weiler and Rathbone-McCuan (1978) report on two federally funded projects in the U.S. which provide day programs of health services, the Levindale Adult Treatment Center and the Lexington Center for Creative Living. The Levindale Adult Treatment Center (Rathbone-McCuan, Lohn, Levenson & Hou, 1975) evaluated participants six times in twenty months in a comparison among a group in institutional care, a community service group and a group living independently in an apartment. Day Care was found to have a superior clinical outcome to the other groups and was more cost-effective than institutional care. What is not stressed, in their study, is that costs were based on per diem program rates and the community
group, although less effective, had the highest cost-effectiveness ratio because its costs were less than half those of day care or institutional care. The Lexington Center for Creative Living (Weiler, Kim & Pickhard, 1976) uses a per diem cost which is determined from direct costs and estimates what it might cost to start a new centre. The study's conclusions are that adult day care is effective and a less costly alternative to the present way of caring for the chronically ill elderly. Weiler and Rathbone-McCuan (1978) consider day care as "an option for those inappropriately institutionalized" and feel it is a necessary adjunct for a continuum of care (p. 136). They also point out that "few delivery systems have been so extensively studied before implementation into a national policy as adult day care" (p. 151).

The research on medical day care varies in kinds of programs compared. Those studies included here provide day care of the Model I variety, as Weissert (1978) has labelled it. He divides adult day care into two discrete models: Model I is day care affiliated with a health care institution with physical rehabilitation as a goal using physician and allied health professional services; Model II is multipurpose, usually affiliated with community service agencies, offering social activities, arts and crafts and serving clients with fewer diagnosed medical problems.

Weissert, Wan, Livieratos & Katz (1980) compared patients who had been randomly assigned to day care and home care and found the direct costs of home care to be less. After a multi-stage analysis of the data, i.e. excluding contaminated cases, comparing users with non-users, and including contaminated
cases, it was decided that the influence of day care on physical functioning was not significant but "may have had some effect upon prolongation of life" (p. 579). Day care's "impact upon institutionalization in skilled nursing facilities" was considered inconclusive (p. 583). In an earlier review of data Weissert (1978) had compared ten day care programs with nursing home care, estimating the per diems, and found adult day care to be less costly unless used for a long period of time. Adult day care had higher daily costs but was not considered more expensive than nursing homes when considering a 'period of care', as it was part-time. Part of the high costs of the day care was the cost of the transportation provided to reach the centre. Grimaldi (1979) says Weissert overstates the average annual cost of nursing homes because he presumes patients would have been in nursing homes for the entire year period. He finds the average stay in a nursing home to be two to six months. However, Weissert presumes patients to be in day care for an entire year as well, but only on a part-time basis. What is not looked at is the different times patients might spend in each type of care depending on the services offered and their rates of recovery.

Some authors suggest that alternatives do not substitute for inpatient use, that they are added on to the care already provided and may even increase inpatient use. Hammond (1979), who reviewed several studies on the cost-effectiveness of home care, and Pegels (1980), who examined the issues of institutional versus non-institutional care, both suggest that the alternative of home health care may just shift the costs of health care from
institutions to community services and increase total costs of health care by adding a new group to the delivery system.\textsuperscript{4} Evans, Kinnis and Robinson (1978) in a cost analysis of a surgical day care unit at the Children's Hospital, found little impact on inpatient use. In fact, total surgical activity had expanded. After examining surgical day care since its inception, Evans and Robinson (1980) conclude that "... the existing delivery system seems incapable of realizing the potential savings from an innovation such as surgical day care. It is presumably incapable of realizing the savings from other types of innovation as well" (p. 880).

Much of the research on alternatives tries to deal with the question of cost but studies use different numerators, e.g. direct and/or indirect costs, and denominators, e.g. per person, per patient day, per episode. Some studies use per diem costs or charges which do not adequately reflect true cost, some use average cost per patient day. Sometimes direct costs are measured as all services and costs associated with an individual's treatment (Babson, 1973); sometimes they are measured as "payments made to the health industry for the treatment or detection of illness" (Berk & Chalmers, 1981, p. 393). Indirect costs are defined by Babson as fixed costs of the hospital that are largely independent of the types of cases. A different connotation is

\textsuperscript{4}It may be that the authors are not including all indirect costs when measuring the costs of institutional care which is different from the substitution issue.
given by Berk and Chalmers who explain indirect costs as the loss of output "incurred both by the patient and by the relatives or friends who may provide unpaid nursing services as well as restricting their production in their own sector of the economy" (p. 393). Disagreement exists over whether or not loss of output to society should be included in determining costs. Berk and Chalmers insist that these costs "cannot be ignored if the purpose of the exercise is to reduce the total cost of illness . . ." to society as a whole (p. 393).

Complicating comparisons further is the fact that those studies which include indirect costs to society use different measurements: time lost by the patient and the family (Adler, Waller, Day, Kasap, King & Thorne, 1974), only time lost by the patient (Piachaud & Weddell, 1972), time lost by the family with only an estimate of the patient's time (Prescott, Cuthbertson, Fenwick, Garraway & Ruckley, 1978).

Some authors have reviewed groups of studies on ambulatory care, examining both clinical outcome and cost data. Berk and Chalmers applied rigorous experimental standards with explicit definitions of direct and indirect cost, to 109 clinical studies comparing ambulatory and inpatient care. Direct costs were resources used and indirect costs were loss of output to the economy. They concluded that only four studies contained sufficient appropriate data on which to make decisions: Adler et al., Gerson and Hughes (1976), Piachaud and Weddell, and Prescott et al. These were randomized controlled trials with
data on direct and some indirect costs. In addition, in only two of the matched control studies were direct costs measured to Berk's and Chalmers's standards: Creese and Fielden (1977) and Stone, Patterson & Felson (1968). Only Creese and Fielden measured indirect costs completely. However, the authors of 75 of the 109 studies concluded: lower cost in ambulatory care with a better clinical outcome in the ambulatory setting (10 studies), with the same clinical outcome in both settings (61 studies), with a better clinical outcome in the inpatient setting (3 studies), and with an indeterminate clinical outcome (1 study). Even the studies chosen by Berk and Chalmers as appropriate do not compare very well to each other as they are of different kinds of ambulatory care, for example, 2 days stay in hospital versus 6 or 7 days stay (Adler et al.) or home care versus hospital care (Gerson & Hughes).

In two studies of home care compared to hospital care both found home care to be less costly although their costs were measured differently. Gerson and Hughes studied home care services offered for short-stay patients so that the time in home care was the same as it would have been in the hospital. In some diagnostic categories days of hospital care were reduced and Gerson and Hughes compared the cost, per episode of illness, in both settings. Creese and Fielden studied a small sample of severely disabled patients needing regular mechanical help

They assume that only randomized controlled trials provide any support. This is a very conservative position and not very useful in the field.
following polio. They compared direct and indirect costs per year of care and assumed people were from single person households. Costs per patient week, based on the operating costs of the respiratory unit, were compared with costs of care per week that were provided at home. "The available data suggest that even with such severely dependent patients home care may be a more economic proposition than constant hospital care" (p. 120). Even with studies of one kind of alternative such as home care, the services offered in the programs, the study populations and the cost denominators were all different.

Are the cost savings of substituting alternatives illusory? In the short-run fixed hospital costs do not change very much and total hospital expenditures usually go up with the addition of an alternative form of care (Berk & Chalmers, 1981; Evans & Robinson, 1980; Freiberg, 1979). Jonsson and Lindgren (1980) point to the fallacies in estimating savings of early discharge in that reducing length of stay will raise average costs, not lower them, because of the resource intensity in the first few days of care and then savings will depend on how the use of labour changes. They suggest costs may increase in the primary sector and the costs to society will increase.

Nevertheless, there may be ways to promote savings. In the long-run it might be possible to reduce the capital costs of equipment and buildings if ambulatory care is substituted totally for a particular inpatient program. It may be possible to close beds or wards if a drop in numbers of patients is large enough. Perhaps the number of beds for a geographical area may be reduced
(Elnicki, 1976; Evans & Robinson, 1980). In addition the benefits of alternatives are often given short shrift because they are more difficult to measure and identify and "empirical research . . . underestimates the benefits and hence underestimates the benefit/cost ratio" (Freiberg, 1979, p. 485).

SPECIFIC DAY CARE PROGRAMS IN THE LITERATURE

There are a few studies of the impact of specific day care programs on hospitalization, although they are rare and most of them do not deal with costs. Those chosen here relate to the programs at Lions Gate Hospital: two are programs for chronic airway obstruction, four are Diabetic Day Care and one a Stroke Day Care Centre.

Chronic Obstructive Lung Disease

Two studies of the effectiveness of chronic airway obstruction programs were found. Petty, Hudson & Neff (1973) describe a program which used patient education, reconditioning and bronchial hygiene. They found reduced hospitalization for individual patients. Hudson, Tyler and Petty (1976) assessed 44 survivors four years after entry into a program. The 44 were divided into a group of 14 who had an average of 38 days of hospitalization.

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6 There were a total of 182 patients enrolled in the program, 113 received a questionnaire on their hospitalizations for a year prior to the program and 70 returned the questionnaire. Of these 70, 44-four year survivors were assessed.
each in the year before the program and a group of 30 patients who had none in the year prior to program entry. Their progress was measured at three month intervals the first year after the program began, then at six month intervals for three years. There was a decline in pulmonary function in both groups over the four years. The first group reduced days of hospitalization to an average of 12 days per year for a period of four years. This finding was statistically significant. The second group increased hospitalization, averaging 2 days per patient per year for the four years.

When the data of the two groups was combined, patients averaged 12 days of hospitalization the year prior to the program and 5 days per year for the four years after. The difference in number of days of hospitalization was significant for the first year after the program but not the subsequent years. The authors conclude that their study "shows a decrease in days of hospitalization for patients with severe chronic airway obstruction, and the decrease was maintained through four years of follow-up" (p. 610).

Based on per diem charges for hospitalization in one of the hospitals used by the patients in this study and on the patients' actual lengths of stay, costs of hospitalization for the year before patients entered the program were estimated. The average cost of hospitalizations for the four years after the program was also calculated. The savings were $51,120 per year. Deducted from these savings were the costs of the outpatient program: some patients requiring oxygen therapy, salaries of staff and indirect
costs of the program. Physicians' fees were not included in either cost calculation. The savings were $20,741 per year.

**Diabetic Day Care**

Though Diabetic Day Care programs have been operating since the early 1960s there have not been many studies on impact. Warner and Hutton (1980), reviewing cost/benefit and cost/effectiveness analyses in health care literature, note conspicuous absences, one of which is diabetic therapies.

Two studies on diabetic clinics, one in Australia (Moffit, Fowler & Eather, 1979) and one in California (Miller & Goldstein, 1972), suggest substitution. Moffit et al. assessed hospital admissions for diabetics in three month periods from October, 1974 to June, 1977 at Royal Newcastle Hospital and compared those admissions to diabetic admissions for other doctors in their own hospital and to another hospital, Belmont. A five day outpatient education program plus stabilization course for insulin-dependent diabetics had started in September, 1975. A total of 387 patients were involved from September, 1975 to June, 1977. These patients were unstable diabetics from their clinic and other unnamed sources. The authors found the average length of stay in hospital had been reduced from 10.7 days in the year before the program to 5.8 days during April, May and June, 1977. They claim that only their unit had shown a steady fall in bed occupancy, based on average length of stay, due to Diabetes. What is visible from their graph that they fail to mention is that their bed occupancy for Diabetes is over twice as
high initially (October - December, 1974) as the other two
comparison groups and only falls to the level of the other two.

Miller and Goldstein, in their study of the Diabetes section
of the Los Angeles County University of Southern California
Medical Center, found, after the introduction of a telephone
answering service to streamline referrals, the physician clinic
population of diabetics had increased from 4000 (in 1968) to
6000 patients (in 1970) and the number of hospital admissions
had decreased from 2680 to 1250, for the two year period. The
average number of hospital days per year for the diabetic clinic
patients dropped from 5.6 per patient in 1968 to 1.74 in 1970,
the new rate being 64 per cent superior to the national average.
They also found that the incidence of hospital admissions was
reduced by 56 per cent.

In another review of a Diabetic Day Care Center, in Phoenix,
Arizona, Matthes (1979) studied a group of new insulin-dependent
patients who came to the Center every day for 5 days to receive
insulin and education and then returned once or twice a week until
their Diabetes was regulated, for two to six months. The Center
saw approximately 200 patients a year. She estimates the cost of
the clinic to be one-quarter to one-third the cost of hospital
care per patient per year, based on the per diem charges of each
type of care. Using the $95 cost per day in the hospital and an
estimate of 10 hospital days per year per diabetic she compares
the minimum hospital cost of $950 per year to the cost of 12
sessions in the clinic at approximately $310. These are fairly
rough estimates and she does not go into any more detail.
Gordon and Weldon (1973) used a different approach to evaluate the impact of Diabetic Day Care Centres, which had been implemented in 1969, on hospital use in Nova Scotia and found no impact. They examined time trends in six years, 1967-1972, of data from the hospitals in different regions of the province. They first compared trends in patient day rates between regions with and without diabetic clinics and concluded that "... the provincial hospital system as a whole showed no response, in terms of patient-day rates, to the introduction of the clinics and that regions with the clinics had similar experience to the regions without clinics" (p. 200). These investigators looked at other measures of utilization such as length of stay and found no difference between regions with and without diabetic day programs although there was a fairly consistent downward trend in length of stay. They also examined data on diabetics with multiple diagnoses, as a measure of increased severity of the disease, and found no difference between regions.

Cerebrovascular Disease

Although Feigenson (1979) reviews several studies on stroke rehabilitation units which show that the units can significantly improve a patient's functioning most of the studies are on hospital bed units and deal with clinical outcome. However, a study in Michigan by Oster and Kibat (1975) describes a Stroke Day Care Center with 108 participants attending between February, 1972 and June, 1973. Hospital records for all stroke patients for one year before the day care project began were
examined for comparison with records one year after the program
opened. No data are provided but the authors state that "the
data did not indicate that length of stay had been significantly
reduced by the day care project" (p. 66). They felt that the
statistical validity of their study was impaired by the small
sample and lack of a broad comparison base. There was "a slight
cost reduction for the average Stroke Day Care Center patient on
a per diem basis" compared to stroke patients in beds (p. 66).

CONCLUSIONS

Despite differences in the measurement of clinical and econo-
ic outcomes, the intensity and level of service in day care and
inpatient programs and in the type and quality of the studies,
a few general conclusions can be made:

1. Clinical outcome appears to be the same or better for
ambulatory programs when compared to hospitalization.

2. There may be savings in the long run with the use of
ambulatory programs if they substitute for hospital
programs and if there is an appropriate system response,
(i.e. the closing of beds), but this has not usually
happened.

3. Except for the Gordon and Weldon (1973) study the impact
on rates of inpatient utilization has been dealt with
only briefly using individual cases and the results are
inconclusive.
Because other approaches such as in-depth follow-up studies or retrospective studies of patient groups are often unsatisfactory and do not look at the total system response, this thesis will develop a methodology, similar to Gordon, Smith, and Weldon (1973), for determining the impact of medical day care programs on inpatient use. This methodology is outlined in the next chapter.
CHAPTER IV. METHODOLOGY

In this thesis, average lengths of stay, patient days and the number of cases of inpatient use are examined for diagnoses in the three medical day care programs chosen, i.e. C.O.L.D. Program, Diabetic Day Care and the Neuro Program, in an effort to determine what impact these programs had. In order to obtain the necessary information written permission to use data on the day care programs and on inpatient use at Lions Gate Hospital was obtained from the Hospital's Administrator (Appendix A) and from the Hospital Programs Division of the Ministry of Health (Appendix B). In addition, a letter was sent to all physicians with visiting privileges at the hospital, by the Coordinator, informing them of the project (Appendix C).

DISEASES OF INTEREST

Diagnostic categories were taken from the program referral forms which are completed by the referring physician. To ensure that these diagnoses covered the majority of people likely to be in these programs the categories were discussed with the Clinical Directors of the programs. As seen in Table I, II, and III, these diagnostic categories were then coded to match the International Classification of Diseases (1968 and 1979). The

\footnote{Data for the Back Program was collected but not used in this thesis. It has been included in Appendix D.}
Medical Records Department at Lions Gate checked the listing for comparability but there are still some problems translating from one Revision, i.e. the 8th, to the other, i.e. the 9th. Problems with comparability are discussed in the section on limitations of the study.

Table I

Diagnoses Chronic Obstructive Lung Disease Program (I.C.D. 8th and 9th Revision)

<table>
<thead>
<tr>
<th>I.C.D. 8th Revision</th>
<th>Code #</th>
<th>Code #</th>
<th>I.C.D. 9th Revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRONCHITIS, EMPHYSEMA &amp; ASTHMA</td>
<td></td>
<td></td>
<td>CHRONIC OBSTRUCTIVE PULMONARY DISEASE &amp; ALLIED CONDITIONS</td>
</tr>
<tr>
<td>Bronchitis, unqualified</td>
<td>490</td>
<td>490</td>
<td>Bronchitis, not specified as acute or chronic</td>
</tr>
<tr>
<td>Chronic Bronchitis</td>
<td>491</td>
<td>491</td>
<td></td>
</tr>
<tr>
<td>Emphysema</td>
<td>492</td>
<td>492</td>
<td></td>
</tr>
<tr>
<td>OTHER DISEASES OF THE UPPER RESPIRATORY TRACT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bronchiectasis</td>
<td>518</td>
<td>494</td>
<td></td>
</tr>
<tr>
<td>Other Pneumonconioses &amp; related diseases (516.0 to 516.2)</td>
<td>516</td>
<td>495</td>
<td>Extrinsic allergic alveolitis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>496</td>
<td>Chronic Airway Obstruction not elsewhere classified</td>
</tr>
</tbody>
</table>

Table II

Diagnoses Diabetic Day Care (I.C.D. 8th and 9th Revision)

<table>
<thead>
<tr>
<th>I.C.D. 8th Revision</th>
<th>Code #</th>
<th>Code #</th>
<th>I.C.D. 9th Revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISEASES OF OTHER ENDOCRINE GLANDS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>250</td>
<td>250</td>
<td>(250.0 - 250.9)</td>
</tr>
<tr>
<td>I.C.D. 8th Revision</td>
<td>Code #</td>
<td>Code #</td>
<td>I.C.D. 9th Revision</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------</td>
<td>--------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Malignant Neoplasm of brain</td>
<td>191</td>
<td>191 (191.0 - 191.9)</td>
<td></td>
</tr>
<tr>
<td>Benign Neoplasm of brain &amp; other parts of nervous system (225.0 - 225.9)</td>
<td>225</td>
<td>225 (225.0 - 225.9)</td>
<td></td>
</tr>
<tr>
<td>Meningitis, with no organism specified as cause</td>
<td>320.9</td>
<td>322</td>
<td></td>
</tr>
<tr>
<td>Encephalitis, Myelitis &amp; Encephalomyelitis</td>
<td>323</td>
<td>323 (323.0 - 323.9)</td>
<td></td>
</tr>
</tbody>
</table>

**HEREDITARY & FAMILIAL DISEASES OF THE NERVOUS SYSTEM**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Code #</th>
<th>Code #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other diseases of brain</td>
<td>347.9</td>
<td>331.8 Other Cerebral degeneration (331.8 - 331.89)</td>
</tr>
<tr>
<td>Hereditary diseases of the striato pallidal system, hereditary chorea</td>
<td>331.0</td>
<td>331.9 Cerebral degeneration, unspecified</td>
</tr>
<tr>
<td>Other &amp; unspecified hereditary &amp; familial diseases of the nervous system</td>
<td>333.9</td>
<td>333 Other extrapyramidal disorders (333.0, 333.4, 333.5)</td>
</tr>
<tr>
<td>Hereditary ataxia (332.0 - 332.9)</td>
<td>332</td>
<td>334 Spinocerebellar disease (334.0 - 334.9)</td>
</tr>
<tr>
<td>Multiple sclerosis</td>
<td>340</td>
<td>340</td>
</tr>
</tbody>
</table>

**OTHER DISEASES OF CENTRAL NERVOUS SYSTEM**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Code #</th>
<th>Code #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paralysis agitans</td>
<td>342</td>
<td>332 Parkinson's disease (332.0 - 332.1)</td>
</tr>
<tr>
<td>Other cerebral paralysis</td>
<td>344</td>
<td>342 Hemiplegia (342.0 - 342.9)</td>
</tr>
<tr>
<td>Motor neurone disease (348.0 - 348.9)</td>
<td>348</td>
<td>335.2 Motor neuron disease (335.20 - 335.29)</td>
</tr>
<tr>
<td>Other diseases of spinal cord</td>
<td>349</td>
<td>336 (336.0 &amp; 336.1)</td>
</tr>
<tr>
<td>Other &amp; unspecified alcoholism</td>
<td>303.9</td>
<td>357.5 Alcoholic polyneuropathy</td>
</tr>
</tbody>
</table>

**CEREBROVASCULAR DISEASE**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Code #</th>
<th>Code #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subarachnoid haemorrhage</td>
<td>430</td>
<td>430 Intracerebral hemorrhage (430.0 - 430.9)</td>
</tr>
<tr>
<td>Cerebral haemorrhage</td>
<td>431</td>
<td>431 Other &amp; unspecified intracranial hemorrhage (431.0 - 431.9)</td>
</tr>
<tr>
<td>Occlusion of pre-cerebral arteries</td>
<td>432</td>
<td>432 Occlusion &amp; stenosis of pre-cerebral arteries (432.0 - 432.9)</td>
</tr>
<tr>
<td>Cerebral thrombosis</td>
<td>433</td>
<td>433 (433.0 - 433.9) (cont.)</td>
</tr>
</tbody>
</table>
Table III (cont.)

<table>
<thead>
<tr>
<th>I.C.D. 8th Revision</th>
<th>Code #</th>
<th>Code #</th>
<th>I.C.D. 9th Revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEREBROVASCULAR DISEASE (cont.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cerebral Embolism</td>
<td>434</td>
<td>434</td>
<td>Occlusion of cerebral arteries (434.0 - 434.9)</td>
</tr>
<tr>
<td>Transient cerebral ischaemia</td>
<td>435</td>
<td>435</td>
<td>(435.0 - 435.9)</td>
</tr>
<tr>
<td>Acute but ill-defined cerebrovascular disease</td>
<td>436</td>
<td>436</td>
<td></td>
</tr>
<tr>
<td>Generalized ischaemic cerebrovascular disease</td>
<td>437</td>
<td>437</td>
<td>Other &amp; ill-defined cerebrovascular disease (437.0 - 437.9)</td>
</tr>
<tr>
<td>Other &amp; ill-defined cerebrovascular disease</td>
<td>438</td>
<td>438</td>
<td>Late effects of cerebrovascular disease</td>
</tr>
</tbody>
</table>

OTHER SYMPTOMS REFERRABLE TO NERVOUS SYSTEM & SPECIAL SENSES

| Disturbance of speech | 781.5 | 784.3 Aphasia |
| 784.5 Other speech disturbance |

INTRACRANIAL INJURY

| Subarachnoid subdural & extradural haemorrhage | N852 | 852 | (852.0 - 852.5) |
| Other & unspecified intracranial haemorrhage following injury | N853 | 853 | (853.0 - 853.1) |
| Intracranial injury of other & unspecified nature | N854 | 854 | (854.0 - 854.1) |

POPULATION FOR STUDY (Table IV)

The persons using these programs reside mainly in School Districts #44, North Vancouver, and #45, West Vancouver. It was decided to obtain information on those patients, from School District #44 and #45, who were admitted to Lions Gate Hospital with these diagnoses and those who went elsewhere in the Province for service. Data were also obtained on inpatients, with these diagnoses, from the rest of the Greater Vancouver Regional District.
(G.V.R.D.) who were admitted to the other G.V.R.D. hospitals.
The rest of the G.V.R.D. includes School Districts #36 through #41 and #43. As well, information was obtained on those patients, from the rest of the G.V.R.D., with the diagnoses of interest, who were admitted to Lions Gate Hospital (L.G.H.).

Table IV
Geographic Areas in the G.V.R.D. by School District

<table>
<thead>
<tr>
<th>School District</th>
<th>Geographic Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>Surrey</td>
</tr>
<tr>
<td>37</td>
<td>Delta</td>
</tr>
<tr>
<td>38</td>
<td>Richmond</td>
</tr>
<tr>
<td>39</td>
<td>Vancouver</td>
</tr>
<tr>
<td>40</td>
<td>New Westminster</td>
</tr>
<tr>
<td>41</td>
<td>Burnaby</td>
</tr>
<tr>
<td>42</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>Coquitlam</td>
</tr>
<tr>
<td>44</td>
<td>North Vancouver</td>
</tr>
<tr>
<td>45</td>
<td>West Vancouver</td>
</tr>
</tbody>
</table>

It was not possible to select one or two similar hospitals for comparison because the catchment areas in the G.V.R.D. generally overlap a great deal, though the North Shore, i.e. School Districts #44 and #45, is a fairly contained area.

STUDY DESIGN

A multiple time series design was chosen for its advantages in controlling sources of internal invalidity, such as history, maturation, regression, selection, and the interaction of these (Campbell & Stanley, 1963, p. 56). Information for each of ten years, 1970 to 1980, was collected on patients with the diagnoses of interest in S.D. #44 and #45 and in the rest of the G.V.R.D. The possibility of a change in trend before and after the
introduction of a program could be studied for Lions Gate Hospital and some comparison to what was happening in the G.V.R.D. could be made. As well, the effect of patients leaving one area and entering another, or 'spill-out' cases could be examined. The design also would control for changes over time as what happens on the North Shore in terms of prevalence of disease, medical practice, etc. may well happen in the rest of the G.V.R.D. A multiple time series design, using precollected data (hospital discharge tapes) is low cost compared to other types of studies (Shortell & Richardson, 1978; Gordon & Weldon, 1973).

Variables of Interest

The day care programs were initiated to prevent hospitalization or so that patients could be discharged earlier. After the introduction of a program, then, there should be some reduction in either length of stay in hospital, the number of cases or patient days in hospital for the diagnoses included in the programs (assuming that all other things are equal). The impact of a program, the independent variable, on inpatient utilization, the dependent variable, was measured by collecting data on number of cases, patient days and average length of stay. Anderson (1973) says that admission rates and average lengths of stay, the two components of patient days, are differentially altered by the factors affecting utilization, such as the demographic characteristics of the population, etc. and behave differently over time. For example, in his study age was highly associated with admission rates but not with average length of stay.
In order to look at the impact of the program on inpatient use, intervening variables (or other factors which may affect utilization) have to be examined. Roemer and Shain (1959) identified three types of factors as potential determinants of utilization: patient determinants, hospital determinants and physician determinants.

**Patient Determinants**

Those factors relating to patients include: incidence and prevalence of illness, attitude to illness, cost to the patient, marital status and housing and social level. McKinlay (1972) includes age, sex, education, religion, ethnicity and socioeconomic status as variables affecting utilization and he discusses several studies using the 'sociodemographic approach'. There is disagreement over the effect of some of these factors. Anderson found socioeconomic factors like income level, education level and ethnic composition to have very little impact on the use of hospital facilities in New Mexico but found use to be sensitive to the age structure of the population. Posner and Lin (1975) found the factor of age, which is usually assumed to be an important determinant of length of stay, to have less clear effects than is usually thought because of the many confounding influences like the extent to which social class influences age effects, and the fact that the aged population tends to be "... lower income, more urban and of different household composition than the general population" (p. 855). However, Lefebvre et al. (1979) state that higher participation rates, i.e. higher number of cases per 100,
in each age group, and longer stays, are characteristic of the elderly. Gordon, Smith and Weldon (1973) in their Nova Scotia study, found that although it would be ideal to show utilization by age and sex, the number of separations, even for the high volume conditions, was fairly low "and thus the numbers involved in age and sex specific groupings would, in most cases, be too small for meaningful interpretation" (p. 195).

Obviously all these variables could not be controlled in the present study. Attempts were made to control for changes in population and age structure. Any changes in the incidence and prevalence of the illnesses under study were examined by looking at changes in the utilization data. Sex was not taken into account partly because it would divide the population of patients into very small groupings when combined with separations by age and also because it is difficult to obtain population figures for the School Districts which have all age groupings divided by sex. Lefebvre et al., projecting average length of stay by age and sex groups, do show differences between males and females in actual and projected average lengths of stay but those differences are parallel in most cases (p. 86,88).8

It was postulated that the ratio of males to females in S.D. #44 and #45 and in the rest of the G.V.R.D. would not change drastically between 1970 and 1980 and so would not affect a comparison of patient days or average length of stay. To assess this

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8In one of their two methods of projection, females over 75 years have an increasingly higher average length of stay than males over 75 (p. 82).
possibility the 1971 and 1976 census data were examined. The ratio of males to females is provided in Table V. These figures do show that the ratio of males to females changes somewhat more in the G.V.R.D. between 1971 and 1976 for those over 65 years than in any other age group. As well, there is a difference in direction, as the ratio of males to females increases in the over age 65 group in S.D. #44 and #45 and decreases in the rest of the G.V.R.D. There has been no correction in this thesis for the possibility of a change in the ratio from 1976 to 1980.

Table V
Changes in Number of Males per 100 Females
S.D. #44 & #45 compared to the rest of G.V.R.D.

<table>
<thead>
<tr>
<th>Years</th>
<th>0 - 14</th>
<th>15 - 44</th>
<th>45 - 64</th>
<th>65+</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.D. #44 &amp; #45 1971</td>
<td>104.12</td>
<td>100.38</td>
<td>96.84</td>
<td>66.29</td>
</tr>
<tr>
<td>1976</td>
<td>104.29</td>
<td>101.16</td>
<td>94.47</td>
<td>67.02</td>
</tr>
<tr>
<td>REST OF G.V.R.D. 1971</td>
<td>104.59</td>
<td>102.42</td>
<td>92.20</td>
<td>79.94</td>
</tr>
<tr>
<td>1976</td>
<td>104.72</td>
<td>101.25</td>
<td>93.25</td>
<td>75.86</td>
</tr>
</tbody>
</table>

Hospital Determinants

The hospital determinants discussed by Roemer and Shain are: the supply of beds, efficiency of bed utilization, the financing of hospital costs, availability of alternative bed facilities and outpatient services. They claim that where hospital prepayment
covers everyone, as shown by studies in Saskatchewan, the rates of hospitalization "vary directly with the supply of beds in a local area" (p. 12). Anderson also found the supply of hospital beds to be the "major determinant of utilization in an area" (p. 104). However, Luke and Culverwell (1980) found that hospital lengths of stay varied directly with hospital occupancy rates contrary to their expectations based on the rationing hypothesis. They suggest that "hospitals lack the capacity to respond effectively to the fluctuating demands placed upon their resources ..." (p. 60). Whether or not hospitals respond to occupancy rates does not affect the data in this thesis which are adjusted for population differences.

The financing of hospital costs is the same for all the G.V.R.D. hospitals. The efficiency or inefficiency of bed utilization and the availability of alternative bed facilities such as other hospitals, extended care and long term care, should be relatively similar for all these hospitals. Outpatient services in the form of ambulatory programs at Lions Gate are the independent variable here. Analysis of the data was complicated by the fact that some G.V.R.D. hospitals have outpatient services and these services are all different from each other as well as being different from those offered at Lions Gate Hospital.

Physician Determinants

The physician determinants are: supply of physicians, method of medical remuneration, nature of community medical practice, medical policies in the hospitals, level of medical alertness and medical teaching needs (Roemer and Shain). Although the medical
teaching needs of the teaching hospitals in the G.V.R.D. would be different from Lions Gate Hospital's it is not possible to measure how this might affect the overall utilization in the G.V.R.D. for the diagnoses of interest. Some attempt was made to examine the medical policies in Lions Gate Hospital and the nature of community medical practice on the North Shore when analyzing the data but it was not possible to do this for the rest of the G.V.R.D. hospitals. It is only of concern to this thesis if these policies and practices change over time and change differently in S.D. #44 and #45 from the rest of the G.V.R.D.

PROCEDURE

Assumptions about the programs' effects are that improvements in a patient's knowledge of his/her condition and skills for coping will prevent or lessen the need for hospitalization. While there are controversies over whether or not a change in knowledge leads to changes in action or beliefs (McKinlay), the end result, i.e. a reduction in cases or patient days, can be measured. Linking such a result to the programs will be more difficult.

Data Collection

In order to obtain average length of stay, cases and patient days, Hospital Programs Division of the Ministry of Health implemented a computerized search of hospital discharge tapes,
from 1970 to 1980, for all the G.V.R.D. hospitals, for the diagnoses of interest. As well, for 1976, a census year, the data on diagnoses were categorized by age groupings. These were:

0 - 14, 15 - 44, 45-64, 65 - 74, 75+

Actual population figures in these age groupings were obtained for the census years of 1971 and 1976 and projections for other years (B.C. Research, 1974, 1979). Because earlier projections (1974) for 1972 to 1975 proved to be incorrect revised figures were obtained by logarithmical interpolation (Barclay, 1978). (See Appendix E.) For 1977 to 1979, population figures were obtained from B.C. School District Population Estimates, by Five Year Age Groups. (For population figures used see Appendix F.)

It was difficult to analyze the data in similar age groupings with different data sets so the two age groupings shown on the summarized hospital discharge tapes, i.e. 65 - 74 and 75+, were combined into one category, 65+.

LIMITATIONS OF THE STUDY

Threats to Internal Validity

Most of the threats to the internal validity of the study are controlled by the design. However, the intervening factors which cannot be controlled may affect the results if those factors differ between S.D. #44 and #45 and the rest of the G.V.R.D. or between the years prior to a program's introduction and after.
Some of these likely factors will be examined in the analysis. The rest of the G.V.R.D. was chosen to look at differences in long term trends, and the effects of boundary crossing.

There are problems inherent in the collection of data which may produce biases. The hospital discharge tapes record the diagnosis on discharge which may be different from that written on a referral form. Patients may be misclassified in either case and diagnoses on ambulatory care referral forms are not always specified clearly. The quality of hospital discharge data has been questioned by Corn (1980) and Demlo, Campbell and Brown (1978). While Demlo et al. found information on hospital admission and discharge dates highly reliable, 99 per cent, it was much less reliable for principal diagnoses, 57 per cent to 65 per cent (p. 998). They felt that to determine basic utilization trends and lengths of stay, "analyses based on three-digit coding or broader diagnostic groupings may suffice" (p. 1004). However, Demlo et al. say that "whenever discharge data is used to measure changes in utilization patterns . . ." the amount of error should be assessed when measurements are taken, " . . . including the influence of false negative and false positive diagnoses . . ." (p. 1004).

In Canada, the Canadian Hospital Insurance system is working on systematic data collection. Because Admissions forms are the same in all hospitals in B. C. and channelled to one funding source, admission and discharge data are probably highly reliable here, too. As it was not possible to measure the influence of false negative and false positive diagnoses any changes in
utilization patterns could be associated with changes in the reliability of the diagnoses in this study.

Changes in the measuring instrument are of concern. There are difficulties in comparing the 8th Revision of the International Classification of Diseases (1968) with the 9th Revision (1979). This change took place in January, 1979 so the data from the final year may not be comparable. For example, late effects of cerebrovascular disease, #438 in the 9th Revision does not appear in the 8th. Although assurances were given by Lions Gate Hospital's Medical Records Department, that these cases had been spread through #436 - 438 previously, the dramatic increase in 1979 did not seem to substantiate this assumption. A computerized program for converting the 8th Revision to the 9th would be necessary if more of this kind of research were to be done.\(^9\) This program might increase the accuracy of determining comparable categories but would not help when those categories did not exist previously. In addition, the final year, 1979, is a fiscal year, April 1st, 1979 to March 31st, 1980, while the other years are calendar years. Because of this change in the recording of discharge data three months, January to March, 1979, are missing from this data.

\(^9\)Apparently Hospital Programs Division of the Ministry of Health did not have such a conversion program at the time these data were compiled.
Threats to External Validity

It would be difficult to predict that any impact from these programs on inpatient hospital use would occur in other hospitals with similar programs. If there is no effect, even with similar programs and conditions, there may still be an impact from a program in another hospital or area. There could be an interaction between the type of patients selected for a program and the program itself and this kind of interaction might hinder generalization to other programs.

METHOD OF ANALYSIS

Data on average lengths of stay, cases and patient days were examined for diagnoses in the programs to see if there were definite trends in S.D. #44 and #45 before and after the programs. The C.O.L.D. program began in June, 1976, and the Neuro program in July, 1979 so there might be some measurable impact from these programs. Diabetic Day Care started in 1966 at Lions Gate Hospital and first started in October, 1972 in some hospitals in the rest of the G.V.R.D. (B.C. Ministry of Health, Annual Report, 1979).

First the data were examined to see if any trends could be observed and what order of magnitude they might be. This was done for average length of stay and then for cases and patient days. Then, adjustments were made for population differences and crude rates per 10,000 population derived. As the crude rates might be biased by differences in the age composition of the two areas the data for age structure by diagnoses, in 1976, were examined and
age adjusted rates determined. The effect of 'spill-out' cases was then looked at to see if adding them to the other rates made a difference. Finally, the other factors which might affect the rates were examined.

**Statistical Tests**

Least squares regression of utilization on time, with utilization measured in real numbers and natural logs was attempted. The impact of the program was assessed by introducing a dummy variable (before the program = 0, after the program = 1) into the regression analysis.

**PRESENTATION OF DATA COLLECTED**

Data were collected and summarized on diagnoses in three programs: the C.O.L.D. program (Table VI), Diabetic Day Care (Table VII), and the Neuro program (Table VIII).

The focus of the next chapter is the C.O.L.D. program which had three years of data. Diabetic Day Care and the Neuro program are also discussed but to a lesser extent.
Table VI:
C.O.L.D. Average Length of Stay, Cases & Patient Days
By Year & Geographic Area

<table>
<thead>
<tr>
<th>YEARS</th>
<th>S.D. #44 &amp; 45 to L.G.H.</th>
<th>G.V.R.D. to L.G.H.</th>
<th>S.D. #44 &amp; 45 to rest of Province</th>
<th>Rest of G.V.R.D. to rest of G.V.R.D. Hosps.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AvLOS Cases</td>
<td>AvLOS Days</td>
<td>AvLOS Cases</td>
<td>AvLOS Days</td>
</tr>
<tr>
<td>1970</td>
<td>11.44</td>
<td>9.4</td>
<td>38.81</td>
<td>14.40</td>
</tr>
<tr>
<td></td>
<td>1075</td>
<td>49</td>
<td>621</td>
<td>17327</td>
</tr>
<tr>
<td>1971</td>
<td>11.06</td>
<td>4.20</td>
<td>8.84</td>
<td>13.22</td>
</tr>
<tr>
<td></td>
<td>1139</td>
<td>21</td>
<td>168</td>
<td>16483</td>
</tr>
<tr>
<td>1972</td>
<td>8.47</td>
<td>59.86</td>
<td>11.0</td>
<td>13.02</td>
</tr>
<tr>
<td></td>
<td>779</td>
<td>419</td>
<td>143</td>
<td>15185</td>
</tr>
<tr>
<td>1973</td>
<td>13.28</td>
<td>10.40</td>
<td>13.94</td>
<td>11.90</td>
</tr>
<tr>
<td></td>
<td>1129</td>
<td>52</td>
<td>223</td>
<td>12803</td>
</tr>
<tr>
<td>1974</td>
<td>10.22</td>
<td>9.33</td>
<td>13.06</td>
<td>13.11</td>
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<tr>
<td></td>
<td>552</td>
<td>28</td>
<td>248</td>
<td>14458</td>
</tr>
<tr>
<td>1975</td>
<td>12.67</td>
<td>52.67</td>
<td>7.25</td>
<td>12.62</td>
</tr>
<tr>
<td></td>
<td>75</td>
<td>9</td>
<td>116</td>
<td>1002</td>
</tr>
<tr>
<td></td>
<td>919</td>
<td>37</td>
<td>165</td>
<td>13553</td>
</tr>
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<td>1977</td>
<td>9.10</td>
<td>149.0</td>
<td>5.32</td>
<td>14.03</td>
</tr>
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<td></td>
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<td>2</td>
<td>19</td>
<td>14.03</td>
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<tr>
<td></td>
<td>664</td>
<td>298</td>
<td>101</td>
<td>13537</td>
</tr>
<tr>
<td>1978</td>
<td>12.21</td>
<td>13.50</td>
<td>7.90</td>
<td>15.30</td>
</tr>
<tr>
<td></td>
<td>73</td>
<td>4</td>
<td>20</td>
<td>15.30</td>
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<td></td>
<td>891</td>
<td>54</td>
<td>158</td>
<td>14660</td>
</tr>
<tr>
<td>1979/80</td>
<td>10.60</td>
<td>16.0</td>
<td>6.0</td>
<td>19.66</td>
</tr>
<tr>
<td></td>
<td>742</td>
<td>48</td>
<td>90</td>
<td>25600</td>
</tr>
</tbody>
</table>
## Table VII
Diabetes Average Length of Stay, Cases & Patient Days
By Year & Geographic Area

<table>
<thead>
<tr>
<th>YEARS</th>
<th>AvLOS Cases</th>
<th>AvLOS Pt. Days</th>
<th>AvLOS Cases</th>
<th>AvLOS Pt. Days</th>
<th>AvLOS Cases</th>
<th>AvLOS Pt. Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>12.32</td>
<td>13.15</td>
<td>12.74</td>
<td>19.29</td>
<td>111</td>
<td>1368</td>
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<tr>
<td></td>
<td>13.15</td>
<td>13</td>
<td>12.74</td>
<td>19.29</td>
<td>1368</td>
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<td>19.29</td>
<td>1156</td>
<td>19.29</td>
<td>1156</td>
<td>22297</td>
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</tr>
<tr>
<td>1971</td>
<td>14.64</td>
<td>15.64</td>
<td>19.13</td>
<td>20.27</td>
<td>95</td>
<td>1391</td>
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<tr>
<td></td>
<td>15.64</td>
<td>11</td>
<td>19.13</td>
<td>20.27</td>
<td>1391</td>
<td>172</td>
</tr>
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<td></td>
<td>20.27</td>
<td>1118</td>
<td>20.27</td>
<td>1118</td>
<td>22657</td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>22.53</td>
<td>18.33</td>
<td>65.46</td>
<td>20.28</td>
<td>88</td>
<td>1983</td>
</tr>
<tr>
<td></td>
<td>18.33</td>
<td>9</td>
<td>65.46</td>
<td>20.28</td>
<td>1983</td>
<td>165</td>
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<td></td>
<td>20.28</td>
<td>1216</td>
<td>20.28</td>
<td>1216</td>
<td>24661</td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>20.43</td>
<td>10.25</td>
<td>31.73</td>
<td>22.93</td>
<td>88</td>
<td>1798</td>
</tr>
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<td></td>
<td>10.25</td>
<td>12</td>
<td>31.73</td>
<td>22.93</td>
<td>1798</td>
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<td>22.93</td>
<td>1287</td>
<td>22.93</td>
<td>1287</td>
<td>29517</td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td>24.31</td>
<td>13.32</td>
<td>19.50</td>
<td>19.69</td>
<td>94</td>
<td>2285</td>
</tr>
<tr>
<td></td>
<td>13.32</td>
<td>19</td>
<td>19.50</td>
<td>19.69</td>
<td>2285</td>
<td>253</td>
</tr>
<tr>
<td></td>
<td>19.69</td>
<td>1292</td>
<td>19.69</td>
<td>1292</td>
<td>25436</td>
<td></td>
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<tr>
<td>1975</td>
<td>18.44</td>
<td>6.67</td>
<td>22.86</td>
<td>19.78</td>
<td>84</td>
<td>1549</td>
</tr>
<tr>
<td></td>
<td>6.67</td>
<td>6</td>
<td>22.86</td>
<td>19.78</td>
<td>1549</td>
<td>40</td>
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<tr>
<td></td>
<td>19.78</td>
<td>1255</td>
<td>19.78</td>
<td>1255</td>
<td>24829</td>
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<tr>
<td></td>
<td>9.45</td>
<td>11</td>
<td>15.14</td>
<td>21.37</td>
<td>1781</td>
<td>104</td>
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<tr>
<td></td>
<td>21.37</td>
<td>1305</td>
<td>21.37</td>
<td>1305</td>
<td>27885</td>
<td></td>
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<tr>
<td>1977</td>
<td>15.32</td>
<td>13.33</td>
<td>13.36</td>
<td>20.49</td>
<td>81</td>
<td>1241</td>
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<tr>
<td></td>
<td>13.33</td>
<td>9</td>
<td>13.36</td>
<td>20.49</td>
<td>1241</td>
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<td>20.49</td>
<td>1368</td>
<td>20.49</td>
<td>1368</td>
<td>28029</td>
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<tr>
<td>1978</td>
<td>32.19</td>
<td>7.83</td>
<td>18.65</td>
<td>23.53</td>
<td>84</td>
<td>2704</td>
</tr>
<tr>
<td></td>
<td>7.83</td>
<td>6</td>
<td>18.65</td>
<td>23.53</td>
<td>2704</td>
<td>47</td>
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<tr>
<td></td>
<td>23.53</td>
<td>1332</td>
<td>23.53</td>
<td>1332</td>
<td>31342</td>
<td></td>
</tr>
<tr>
<td>1979/80</td>
<td>23.51</td>
<td>38.40</td>
<td>8.38</td>
<td>24.80</td>
<td>70</td>
<td>1646</td>
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<tr>
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<td>38.40</td>
<td>5</td>
<td>8.38</td>
<td>24.80</td>
<td>1646</td>
<td>192</td>
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<tr>
<td></td>
<td>24.80</td>
<td>1312</td>
<td>24.80</td>
<td>1312</td>
<td>32535</td>
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<tr>
<td>-------</td>
<td>-------------</td>
<td>----------</td>
<td>----------------</td>
<td>----------</td>
<td>----------------</td>
<td>----------</td>
</tr>
<tr>
<td>1970</td>
<td>31.33</td>
<td>257</td>
<td>31.33</td>
<td>20</td>
<td>33.81</td>
<td>99</td>
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<td>1971</td>
<td>26.44</td>
<td>293</td>
<td>57.10</td>
<td>58</td>
<td>37.21</td>
<td>84</td>
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<tr>
<td>1972</td>
<td>41.34</td>
<td>317</td>
<td>167.98</td>
<td>54</td>
<td>39.57</td>
<td>115</td>
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<tr>
<td>1973</td>
<td>57.59</td>
<td>321</td>
<td>240.60</td>
<td>48</td>
<td>57.39</td>
<td>92</td>
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<tr>
<td>1974</td>
<td>51.88</td>
<td>303</td>
<td>260.10</td>
<td>31</td>
<td>36.15</td>
<td>102</td>
</tr>
<tr>
<td>1975</td>
<td>41.72</td>
<td>368</td>
<td>183.38</td>
<td>47</td>
<td>57.89</td>
<td>91</td>
</tr>
<tr>
<td>1976</td>
<td>55.30</td>
<td>371</td>
<td>139.38</td>
<td>68</td>
<td>47.88</td>
<td>96</td>
</tr>
<tr>
<td>1977</td>
<td>61.60</td>
<td>377</td>
<td>126.61</td>
<td>66</td>
<td>85.26</td>
<td>90</td>
</tr>
<tr>
<td>1978</td>
<td>47.67</td>
<td>390</td>
<td>57.77</td>
<td>65</td>
<td>65.98</td>
<td>104</td>
</tr>
<tr>
<td>1979/80</td>
<td>69.94</td>
<td>360</td>
<td>199.96</td>
<td>53</td>
<td>81.49</td>
<td>67</td>
</tr>
</tbody>
</table>
The questions explored using this methodology were:

- Does hospital medical day care reduce average length of stay, number of cases or patient days?
- How adequately does this methodology answer this question?

The time frame was chosen for the C.O.L.D. program analysis but was useful for the Diabetic Day Care analysis as well. The Neuro program data were also examined despite the previously mentioned complications with the 1979/80 data. As Freiberg (1979) states: "the impact of substituting an alternative for inpatient care is especially difficult to analyze and to predict because of the influence of . . . subtle, nonquantifiable variables" (p. 479). Often the variables are assumed to affect treatment groups before and after the treatment in the same way but Evans and Robinson (1980) say that "any inferences drawn from utilization data under the \textit{ceteris paribus} assumption (i.e. other things being equal) can only be impressionistic and tentative" (p. 877). An attempt will be made to look at alternate explanations or impinging variables to see if we can get a clearer view of any possible causal relationships.
FINDINGS OF THE STUDY

C.O.L.D. PROGRAM

Average Length of Stay, Cases and Patient Days

Does the data on average length of stay, for those with chronic obstructive lung disease, tell us anything about the C.O.L.D. program's impact on inpatient use? As there are a full three years of data after the program began, in July of 1976, the questionable 1979/80 data can be ignored if necessary. When the data on average length of stay is graphed (Fig. 1), the graph shows a drop in average length of stay in 1977 for S.D. #44 and #45 after the C.O.L.D. program started, but a subsequent rise in 1978. Average length of stay in S.D. #44 and #45 has a general trend upwards till 1976. In the rest of the G.V.R.D. it falls until 1973 and then starts to rise, taking a large jump between 1978 and 1979/80.

To see if the drop in average length of stay in S.D. #44 and #45 was related to the introduction of the program a regression analysis, using a dummy variable for the program, was run on average lengths of stay in S.D. #44 and #45, and in the rest of the G.V.R.D. None of the regressions on the G.V.R.D. data were significant for any interactions between average length of stay, trend (over the ten year period) or the program (dummy variable). The results for the regression run on the data from S.D. #44 and #45, for those patients using Lions Gate Hospital, are reported in Table IX.
Figure 1
C.O.L.D. Average Length of Stay
By Year & Geographic Area

Table IX
Regression Analysis on Average Length of Stay
C.O.L.D. Patients in S.D. #44 & 45 Using L.G.H.

<table>
<thead>
<tr>
<th>RUNS</th>
<th>CONSTANT</th>
<th>TREND</th>
<th>DUMMY</th>
<th>TREND X DUMMY</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>11.030</td>
<td>.0525</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.474)</td>
<td>(.250)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>10.030</td>
<td>.394</td>
<td>-2.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(5.849)</td>
<td>(.914)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(-.910)</td>
</tr>
<tr>
<td>III</td>
<td>9.819</td>
<td>.438</td>
<td>3.283</td>
<td>-.676</td>
</tr>
<tr>
<td></td>
<td>(5.322)</td>
<td>(.952)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(.305) (-.558)</td>
</tr>
</tbody>
</table>

VARIABLES: Constant = 1.0 in all years;
Trend = 1 in 1970, 2 in 1971 to 10 in 1979/80;
Dummy = 0 in 1970 to 1975, .5 in 1976 (half a year of prog.)
1 in 1977 to 1979/80.
(The t ratio is in brackets.)
A look at the total data for average length of stay, grouped into three years prior to the introduction of the C.O.L.D. program, 1973 - 1975, and three years after, 1976 - 1978, (Table X), reveals a 5 per cent reduction (.57 days) in average length of stay for those in S.D. #44 and #45 going to Lions Gate Hospital, a savings of 157 patient days but only 3 fewer cases. On the other hand, the data from the rest of the G.V.R.D. shows an increase of 15 per cent in average length of stay (1.91 days) with 292 fewer cases and 1,846 more patient days that in 1973 - 1975.

Table X
C.O.L.D. Average Length of Stay, Total Cases & Patient Days
By Three Year Groupings & Geographic Area

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AvLOS</td>
<td>Cases</td>
</tr>
<tr>
<td>S.D. # 44 &amp; 45 To L.G.H.</td>
<td>12.29</td>
<td>214</td>
</tr>
<tr>
<td>Rest of GVRD to rest of GVRD Hosps.</td>
<td>12.54</td>
<td>3181</td>
</tr>
</tbody>
</table>

If the 1979/80 questionable data are included and the data grouped by four years prior to the program and after (Table XI), the results appear conclusive. For the four years after the program started there is an 8 per cent reduction in total cases and a 6 per cent reduction in total patient days, with an almost 3 per cent lower average length of stay. By comparison, in the rest of the G.V.R.D., despite a 3.5 per cent decrease in cases there is a 22 per cent increase in patient days and a 27 per cent increase in the average length of stay.
Table XI
C.O.L.D. Average Length of Stay, Total Cases & Patient Days
By Four Year Groupings & Geographic Area

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AvLOS</td>
<td>Cases</td>
<td>Pt.Days</td>
<td>AvLOS</td>
<td>Cases</td>
<td>Pt.Days</td>
</tr>
<tr>
<td>S.D. #44 &amp; 45 to L.G.H.</td>
<td>11.14</td>
<td>306</td>
<td>3410</td>
<td>11.44</td>
<td>281</td>
<td>3216</td>
</tr>
<tr>
<td>Rest of GVRD to rest of</td>
<td>12.67</td>
<td>4347</td>
<td>55089</td>
<td>16.07</td>
<td>4191</td>
<td>67350</td>
</tr>
<tr>
<td>GVRD Hosps.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If we take these findings seriously, they suggest that S.D. #44 and #45 might have gone up by 3.4 days average length of stay for C.O.L.D. if the trend followed the pattern in the rest of the G.V.R.D. If the 281 cases in S.D. #44 and #45 from 1976 to 1979/80 are multiplied by the extra 3.4 days, there might have been an additional 955 patient days in S.D. #44 and #45, i.e. 239 patient days per year. As there are about 100 people a year in the C.O.L.D. program this would mean a savings of 2.4 days for each person in the program per year. However, with the data being questionable, we are not certain that this is happening.

The graphs of cases (Fig. 2) and patient days (Fig 3) over the ten year period show a slight decline to 1974 in S.D. #44 and #45 and then a levelling off. In the rest of the G.V.R.D. there is a decline in cases to 1978 and in patient days to 1977 and then a sharp increase. It could be, then, that the program has ensured that cases and patient days do not increase in S.D. #44 and #45, rather than causing a definite decrease. However, a regression
analysis on both S.D. #44 and #45 and the rest of the G.V.R.D.,
cases and patient days, found this data to be not statistically
significant.

Figure 2
C.O.L.D. Cases
By Year & Geographic Area
Figure 3
C.O.L.D. Patient Days
By Year & Geographic Area
Conclusions on the Raw Data

There is a large difference between the two areas on numbers of cases and patient days but not that much difference in average length of stay. Rather than a definite downward trend it appears as if length of stay failed to rise, as it did in the rest of the G.V.R.D., for S.D. #44 and #45 patients going to Lions Gate Hospital. The data on average length of stay for both areas proved to be not statistically significant. The rapid increase in cases and patient days for the rest of the G.V.R.D. in the 1979/80 data could be due to the change in I.C.D. codes but this change should also have affected Lions Gate Hospital. (A check of the raw data proved that these figures were not miscalculated.) However, in the 1979/80 data there was an extra category, #496, chronic airway obstruction, not elsewhere classified. This category had only 26 cases and 217 patient days for S.D. #44 and #45 using Lions Gate Hospital, an average length of stay of 8.35 days, but in the rest of the G.V.R.D. this category had 485 cases and 13,398 patient days, an average length of stay of 27.62 days.

One can speculate on a dramatic increase in the prevalence and severity of the disease but why does this not occur in S.D. #44 and #45? Again, the data for this final year is questionable. The big difference in cases and patient days between the two areas may be due to a difference in population so adjustments for population were made.
Adjustments for Population Differences

Adjusting for differences tends to pull the trends together but does not change the direction for both case rates (Fig. 4) and patient day rates (Fig. 5).

Figure 4
C.O.L.D. Case Rates
By Year & Geographic Area
As the rates per 10,000 population could be biased by differences in the age composition of the population the age structure of C.O.L.D. inpatient cases for 1976, a census year, was examined and age adjusted rates determined for each year, as described in Appendix G. Age specific rates were derived for 1976 for the total G.V.R.D. (including S.D. #44 and #45) using total G.V.R.D. population figures. (See Table XII.)
Table XII
C.O.L.D. Age Specific Rates for Total G.V.R.D.
Per 10,000 Population, 1976

<table>
<thead>
<tr>
<th></th>
<th>0-14</th>
<th>15-44</th>
<th>45-64</th>
<th>65+</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>6.73</td>
<td>1.52</td>
<td>12.92</td>
<td>46.83</td>
<td>9.90</td>
</tr>
<tr>
<td>Patient Days</td>
<td>29.06</td>
<td>9.00</td>
<td>178.35</td>
<td>829.80</td>
<td>137.20</td>
</tr>
</tbody>
</table>

Using these age specific rates, standardized rates for both areas were derived for the years from 1971 to 1979, for cases (Fig. 6) and patient days (Fig. 7).

Figure 6
C.O.L.D. Age Standardized Case Rates
By Year & Geographic Area
Standardizing the rates for age differences does not seem to change the previously identified trends.

'Spill-Out' Cases

What happens to the trends if those cases who left the North Shore to go to other hospitals in the province, or who left the rest of the G.V.R.D. to go to Lions Gate Hospital, are added to the case and patient day rates? There appear to be no changes in the trends when 'spill-outs' are added to case rates (Fig. 8) and patient day rates (Fig. 9). When the average length of stay of
these totals is graphed (Fig. 10) the same general trend appears as in Figure 1, i.e. a slight downward trend in S.D. #44 and #45 from 1976.

Figure 8
C.O.L.D. Case Rates Including 'Spill-Outs'
By Year and Geographic Area

However, average length of stay for all patients in S.D. #44 and #45 is higher in 1970, when 'spill-outs' are included, and draws the trend line up, making it almost parallel to that for the rest of the G.V.R.D. This change creates the appearance of a sharper drop in 1977, away from the trend in the rest of the G.V.R.D. It may point to some effect from the C.O.L.D. program. (See Fig. 10.)
Figure 9
C.O.L.D. Patient Day Rates Including 'Spill-Outs'
By Year & Geographic Area

![Graph showing patient day rates by year and geographic area.]

Figure 10
C.O.L.D. Average Length of Stay Including 'Spill-Outs'
By Year & Geographic Area

![Graph showing average length of stay by year and geographic area.]

Conclusions

Adjusting for age differences and for 'spill-out' cases does not appear to affect the results shown by the raw data, but there is definitely something different happening in the two areas. Even if the final year of data is omitted the same trend occurs, i.e. average length of stay rising in the rest of the G.V.R.D. and falling slightly or failing to rise in S.D. #44 and #45. More puzzling than this trend is the big difference in standardized case and patient day rates between the two areas. Patient day rates in the G.V.R.D. are sometimes 100 per cent or more higher than those in S.D. #44 and #45, over the years.

Other Factors Affecting Utilization

Patient-Disease Determinants

Changes in numbers of cases or in patient days might have been affected by a change in the prevalence of C.O.L.D. When prevalence is measured by admissions to the hospital by disease group per 10,000 population, then, the prevalence of C.O.L.D. did not change in the ten year span studied here, remaining at less than .07 per cent for S.D. #44 and #45 and less than .13 per cent for the rest of the G.V.R.D. It might be postulated that, although the prevalence did not change, there was an increase in the severity of the cases using inpatient care which required longer stays, particularly in the G.V.R.D. However, if patients are admitted more frequently in the G.V.R.D. this might also account for the increase in cases.

The age of the patient appears to be a large factor in
inpatient use, i.e. those over 65 used 76 per cent of the total C.O.L.D. patient days in S.D. #44 and #45. Because of the increasing population over 65, in both areas one might expect an increase in patient days and average length of stay but it is hard to explain the jump in patient days in the rest of the G.V.R.D.

**Hospital Determinants**

An increase of one hospital bed to 1000 population appears to increase average length of stay by one day (Anderson, 1973). It could be postulated, then, that a decrease in the number of beds at Lions Gate Hospital might decrease the average length of stay. In January, 1978, beds were decreased from 485 to 456 so a drop in length of stay might be expected. This occurs for the Neuro patients but not for those with C.O.L.D. or for the Diabetic patients. Bed capacity changed in several of the G.V.R.D. hospitals in 1978 so it is difficult to relate this factor to lengths of stay.

The availability of alternate bed facilities that came with the implementation of Long Term Care in January, 1978 and the earlier addition of Home Care in 1972, might have had an effect on average length of stay. There is a temporary decrease in average length of stay for C.O.L.D. in 1972 and again in 1979 at Lions Gate Hospital. It did not occur in the rest of the G.V.R.D. although some C.O.L.D. programs started there in 1972.
Physician Determinants

An increase in the supply of physicians, particularly Internists, might have had an effect on the number of cases or patient days. The number of Internists remained at eleven, in 1970 / 1971, 1976 / 1977 and 1981 / 1982. There were no increases in subspecialities relating to C.O.L.D. Neurology went from one specialist in 1971 to four in 1976 and down to two in 1981. The physician population on the North Shore appears fairly stable with major changes in only Anaesthesiology and Psychiatry.

CONCLUSIONS

Other factors which might affect utilization do not appear to have a noticeable effect. The program was intended to reduce average length of stay, decrease the number of cases and patient days. Little or no significant program impact was found.

SUMMARY

Number of cases and patient days differ greatly between those in S.D. #44 and #45 going to Lions Gate and those in the rest of the G.V.R.D. going to other G.V.R.D. hospitals. It appears that average length of stay fails to rise in S.D. #44 and #45 in

10 The information on numbers of specialists is taken from the Medical Directories of the College of Physicians and Surgeons, 1971-72, 1976-77, 1981-82, which lists specialists practising in North and West Vancouver.
1979/80, as it does in the rest of the G.V.R.D. Adjusting for population and age differences hardly changes the trend. Adding 'spill-out' cases which leave each area seems to point to a program effect, in that the trend falls more sharply away from the trend in the rest of the G.V.R.D. A review of other factors which might affect utilization does not reveal any major effects.

There is a small drop in average length of stay after the introduction of the C.O.L.D. program which proved to be not statistically significant. However, there are small numbers of cases in S.D. #44 and #45 and only three years of data after the program began, one year of which may be skewed by the apparent coding problem. Also the addition of 'spill-outs' makes the downward trend after 1976 appear more striking. If the trend in S.D. #44 and #45 had continued to follow that in the rest of the G.V.R.D. it may have risen. What is interesting and may deserve further study is that the average length of stay and number of cases increase dramatically in 1979/80 in the rest of the G.V.R.D. and not in S.D. #44 and #45, and that population and age adjusted cases and patient days are much higher in the rest of the G.V.R.D. than in S.D. #44 and #45.
DIABETIC DAY CARE

Average Length of Stay

Does the data on average length of stay for Diabetics show that Diabetic Day Care has an impact on inpatient use? As the program began in S.D. #44 and #45 in 1966 and in the rest of the G.V.R.D., in some hospitals, in 1972, one would expect that average length of stay would be lower in S.D. #44 and #45 in the early 1970s and then both trends would converge sometime after 1972.

A graph of the average length of stay of Diabetics (Fig. 11) shows that in 1970 and 1971, although average length of stay was rising, it was much lower for those in S.D. #44 and #45 using Lions Gate Hospital than in the rest of the G.V.R.D. However, average length of stay fluctuates much more in S.D. #44 and #45 than in the rest of the G.V.R.D. The trend is towards increased lengths of stay in both areas. If there had been an initial impact, from Diabetic Day Care at Lions Gate Hospital, which kept average lengths of stay below those in the rest of the G.V.R.D., it disappeared by 1972.
Figure 11
Diabetes Average Length of Stay
By Year & Geographic Area

Cases and Patient Days

As the Diabetic Day Care program was intended to reduce the number of cases entering the hospital and the patient days the data for both were graphed (Fig. 12 and Fig. 13). From the data it appears that the number of cases and patient days are much lower in S.D. #44 and #45 than in the rest of the G.V.R.D. Although the number of cases remain more or less parallel in both areas, the trend for patient days in the rest of the G.V.R.D.
is upwards and in S.D. #44 and #45 relatively flat. Perhaps population differences are responsible for the differences.

Figure 12
Diabetes Cases
By Year & Geographic Area

Conclusions on the Raw Data

While there is a large difference in the patient day trends, the average length of stay, despite wide fluctuations in S.D. #44 and #45, increases in both areas. If the drop in patient days in the rest of the G.V.R.D. after 1973 is due to the Diabetic programs it is a delayed reaction and does not last. The Diabetic Day Care program at Lions Gate Hospital may be keeping the cases and patient days relatively stable in School District #44 and #45.
Adjusting for Population Differences

Adjusting for population differences tends to pull the case rates together but does not change the previous trend. The
case rate is graphed in Figure 14. The patient day rate in the rest of the G.V.R.D. follows the same trend while adjusting for population in S.D. #44 and #45 tends to exaggerate the previous trend and show up more fluctuations. While the patient day rates are pulled more closely together the rate in the rest of the G.V.R.D. is still more than twice as high in most years as that in S.D. #44 and #45, (Fig. 15).

**Figure 14**

**Diabetes Case Rates**

By Year & Geographic Area

Adjustment for Age Differences

Age adjusted rates were determined, as for C.O.L.D., but as the trends are similar to the population adjusted rates they are not presented.
'Spill-Out' Cases

What happens to these trends if 'spill-out cases are added to the case (Fig. 16) and patient day rate (Fig. 17)? While the number of cases in S.D. #44 and #45 increases only slightly, the number of patient days increases by up to 43 per cent (in 1972). The trends in the rest of the G.V.R.D. remain about the same.
When the average length of stay including 'spill-outs' is graphed (Fig. 18), average length of stay for S.D. #44 and #45 shows an increase in some years but still fluctuates in the same way as the average length of stay without 'spill-outs' (Fig. 11). The trend in the rest of the G.V.R.D. remains about the same as without 'spill-outs'.

Conclusions

The increase in patient days in S.D. #44 and #45, when the 'spill-out' cases are added, suggests that in some years cases with high lengths of stay from S.D. #44 and #45 were going to other hospitals in the province. The great fluctuations from year to year, in S.D. #44 and #45, and high lengths of stay suggest that
the Diabetic Day Care program has not had a stabilizing effect on the patients on the North Shore. The rest of the G.V.R.D. has a much more stable average length of stay, at least until 1977.

Figure 17
Diabetes Patient Day Rates Including 'Spill-Outs'
By Year & Geographic Area

Patient Days in Tens per 10,000 Pop.

Rest of GVRD to all GVRD Hosps. (Inc. L.G.H.)

S.D. #44 & 45 to all Hosps. in province

Years

1971 72 73 74 75 76 77 78 79/80
As with C.O.L.D., changes in the prevalence of Diabetes may have affected the case or patient day rates. Oakley, Pyke and Taylor (1973) say that the overall prevalence of known cases of Diabetes is about 1:200, or .5 percent of the population of Britain, but that this proportion is higher among old people. This would mean 50 cases or more per 10,000 population which is much
higher than hospital admissions in the total G.V.R.D. Oakley et al. also state that the cause of death for Diabetics is often some other condition so Diabetes cases may be admitted to hospital for other diagnoses. Because severe cases of Diabetes often have these complicating conditions they may not always be recorded as Diabetic, except in the secondary diagnosis and these cases would have to be examined to determine the true effect.

Hospital Determinants

The drop in occupancy rate in 1976 corresponds to a rise in average length of stay for Diabetics and the increase in occupancy in 1977 with a decrease in average length of stay. However, the slightly declining occupancy rate from 1972 to 1976 is not reflected in the Diabetes data.

The decrease in the number of hospital beds in 1978 at Lions Gate does not appear to have had any effect, in fact, average length of stay is an all time high of 32 days in that year for S.D. #44 and #45.

CONCLUSION

There is no apparent impact from the Diabetic Day Care program on inpatient use either in the number of cases or patient days. There is a large difference between the two areas in case rates and patient day rates, with the rest of the G.V.R.D. being higher but average lengths of stay are similar in both areas. The average length of stay fluctuates much more in S.D. #44 and #45. If there was an effect from the program at Lions Gate Hospital it was prior
to 1972, when average lengths of stay were much lower in S.D. #44 and #45. The introduction of programs in some hospitals in the rest of the G.V.R.D., in 1972, does not seem to have changed the trend in the average length of stay in that area.

**NEURO PROGRAM**

The Neuro program for patients with cerebrovascular disease, multiple sclerosis and other neurological problems, started in 1979 so there are not enough data after the program's introduction to show any effects. There are also complications with the 1979/80 data as mentioned previously. In addition, it appears that data on lengths of stay for Extended Care may have been included and the large jump in 1979/80 in inpatient days may be due to an increase in Extended Care beds. Future research should separate Extended Care data so effects could be distinguished. A brief review of findings follows.

**Average Length of Stay (Fig. 19)**

The general trend for average length of stay in both areas is upward. Both S.D. #44 and #45 and the rest of the G.V.R.D. show marked increases in 1979/80 but this may be the coding problem, and both areas have fairly similar average lengths of stay.

---

11 This jump also occurred for C.O.L.D. so the increase in Extended Care beds may not be relevant unless it also relates to the C.O.L.D. data.
Cases and Patient Days

The data for cases (Fig. 20) and patient days (Fig. 21) were graphed. The rest of the G.V.R.D. appears to have a much higher number of cases and patient days than does S.D. #44 and #45 but when the data were adjusted for population case rates (Fig. 22) and patient day rates (Fig. 23) paralleled each other. Again patient day rates are much higher in the rest of the G.V.R.D. than in S.D. #44 and #45, but both increase dramatically. The introduction of the Neuro program in June, 1979 does not appear to have changed the trend in S.D. #44 and #45, at least not before April, 1980.
Figure 20
Neuro Diagnoses Cases
By Year & Geographic Area

Cases in Hundreds

Rest of GVRD to rest of GVRD Hosps.

S.D. #44 & 45 to L.G.H.

1970 71 72 73 74 75 76 77 78 79/80 Years
Figure 21
Neuro Diagnoses Patient Days
By Year & Geographic Area

Figure 22
Neuro Diagnoses Case Rates
By Year & Geographic Area
Figure 23:
Neuro Diagnoses Patient Day Rates
By Year & Geographic Area

'Spill-Out' Cases
What happens to this data when the 'spill-out' cases are added? There appear to be no changes in the general trend when 'spill-out' cases are added to the case rate (Fig. 24), patient day rate (Fig. 25), or average length of stay (Fig. 26) in either S.D. #44 and #45 or in the rest of the G.V.R.D.
Figure 24
Neuro Diagnoses Case Rates Including 'Spill-Outs'
By Year & Geographic Area

Cases in Tens per 10,000 Pop.

Rest of GVRD to all GVRD Hosps. (Inc. L.G.H.)

S.D. #44 & 45 to all Hosps. in province

1971 72 73 74 75 76 77 78 79/80
Years

Figure 25
Neuro Diagnoses Patient Day Rates Including 'Spill-Outs'
By Year & Geographic Area

Patient Days in Hundreds per 10,000 Pop.

Rest of GVRD to all GVRD Hosps. (Inc. L.G.H.)

S.D. #44 & 45 to all Hosps. in province

1971 72 73 74 75 76 77 78 79/80
Years
What is interesting to note is the very long average lengths of stay for the cerebrovascular diseases categories of the Neuro diagnoses (I.C.D. #430 - #438) for those coming to Lions Gate Hospital from the rest of the G.V.R.D. (Fig. 27). It is not clear why this is happening.

CONCLUSION

There are not enough data to determine whether or not the Neuro Program had an impact on average length of stay, cases or patient days. There is no change in 1979/80 when the program started except for a slight drop in cases and an increase in patient days. No impact from the program can be seen as yet but there may be a problem with the 1979/80 coding.
GENERAL CONCLUSIONS

With the data used in this thesis it appears that there is no impact on inpatient use from these programs. Although these results are not conclusive they advance our information and point to several areas which could be explored further. The methodology proved workable but it did not definitely answer the question. The methods used in this thesis, applied to similar data, with more
years of program data and with stricter control of extraneous variables, such as Extended Care inpatient use, may still provide some answers.

What should be investigated further are the reasons for the big differences in the rates for these diagnoses, between S.D. #44 and #45 and the rest of the G.V.R.D. As well with greater numbers of clients and more years of the program, the C.O.L.D. program may provide more conclusive answers. The answers, it seems, have to be determined for each program separately.
CHAPTER VI. IMPLICATIONS FOR POLICY AND PLANNING

"... The boundary between the scientific and the political is neither clear nor immutable."

(Langbein, 1980, p. 5)

With complex policy issues, such as substitution of alternatives or allocation of resources, clear insights are not always possible. When research findings are inconclusive, clear decisions may not be possible. However, the results can be useful for policy discussions and further evaluation and planning. "... The identification of trends and the formulation of continuing predictions is a relevant aspect of the process of social policy development" (Hall, Land, Parker & Webb, 1975, p. 497).

This study adds to the development of theory about the impact of ambulatory care on inpatient use. The results imply that there is no impact from these medical day programs on rates of inpatient use. This finding would be consistent with the similar study of Diabetic Day Care by Gordon and Weldon (1973) and with the Day Care Surgery studies by Evans and Robinson (1980).

Why have there been no demonstrable effects from these day care programs? Are beds being filled by more seriously ill patients who remain longer? If so, why are patients becoming more seriously ill? Do the programs not have any effect on patients' health status? Are patients put into day care programs after longer hospitalizations? Are physicians reluctant to make more use of these programs? Perhaps their training still orients them to inpatient hospital
care. Do nurses or other hospital personnel see day care as threatening to the number of jobs in the hospital?

Some of these questions may be answered now that rationing of beds may have to take place and now that other alternatives may have to be used instead of hospitalization. More coordination between hospitals and community health programs would help. If episodes of inpatient use could be studied we might obtain a better picture of what is happening.

In a Canadian College of Health Service Executives' Seminar at the G.F. Strong Centre in Vancouver, in September, 1981, Stan Dubas, Senior Assistant Deputy Minister of the provincial Ministry of Health, pointed to five areas of government concern:

- resources for the chronically ill
- lower cost alternatives to institutional care
- utilization of non-physician manpower
- geographical imbalances
- coordination among all concerned with health care in Canada

Ambulatory care may address the first three but these policy and planning issues will require more policy related research. Policy oriented analysis could "upgrade the general discussion of . . . cost containment strategies . . ." and aid the planning of future programs (Raskin, Coffey & Farley, 1980, p. 11).

Whether or not ambulatory programs reduce length of stay may not be the right question. There are limits to medicine as is discussed by Lewis Thomas (1978). He points out that "no treatment exists for preventing the recurrence of stroke"; that for
pulmonary disease, "although technologies exist for the improvement of aeration by the damaged lungs, and thus for some prolongation of life, there are no measures available for stopping or reversing the process of the disease"; and that "disability and death of diabetics mostly in middle-age and later, are now due to chronic kidney disease and the occlusion of arteries . . . virtually nothing is known about the cause of vascular lesions, and there is no therapy to stop or reverse the process" (p. 343, 344). Perhaps government's concern should be with the improved health status of individuals as the result of the programs and ways of measuring that improvement. Perhaps the focus should be on evaluating the existing institutionalized programs rather than only on new alternatives. Multiple evaluations studying process-outcome, alternatives and the cost-effectiveness of various parts of the total system are required.

However, the provincial government's mandate for these programs was a reduction in length of stay or patient days and this reduction cannot be demonstrated. Does this mean that day care programs should not be encouraged as alternatives to hospitalization? Without any changes to the existing institutions the programs appear to be added on to institutional care. With present reductions in hospital beds, further studies of day care may produce different results. As yet the delivery system has not responded to innovation or cost containment strategies with any notable success (Evans & Robinson, 1980; Raskin et al.). Many changes would be needed to aid the process: monitoring the case flow institutionally and regionally (Evans, Chap. 11, 1980;
Weiler & Rathbone-McCuan, 1978), new reimbursement mechanisms which would provide financial incentives for institutions to move to ambulatory care, a manpower and education policy with a focus on the 'team' approach.

Because health care is an intricate system "... change when it does occur is most likely to come in those areas in which the forces of new knowledge, economics and ideology converge" (Mechanic, 1978). If 'ideology' includes political expediency, Mechanic may well be right.

---

12 The present closure of hospital beds may aid the process.
LITERATURE CITED


Corn, R. F. "Quality Control and Hospital Discharge Data." Medical Care, Vol. XVIII, No. 4, April, 1980, 416-426.


Gebbie, K. M. "Developing an Ambulatory Care Program: Key Issues." Hospital Progress, December, 1976, 72-75.


Dear Dr.

Re: Thesis on "Impact of Ambulatory Medical Care on hospital in-patient utilization".

Lorna Romilly, a student in the Health Sciences Planning programme at U.B.C., is working on the above thesis. She has been given permission by Lions Gate Hospital administration to use hospital data for her research purposes.

It will be necessary for her to examine Ambulatory Care and Treatment Service (A.C.T.S.) patient records to collect the following data:

- Programme
- Age
- Sex
- Diagnosis
- School District or Municipality
  (for geographic location)

The patients' names will not be used and patient confidentiality will be maintained.

This information is needed to compare in-patient hospitalization data in these categories. Hospital programmes will be supplying the in-hospital data.

We require your approval for her to examine your patients A.C.T.S. chart.

If this is not satisfactory, please contact Valerie Young, A.C.T.S. Co-ordinator, by 6th January, 1981.

Thank you for your help in this matter.

Yours sincerely,

Original signed
by Valerie Young,
Coordinator
## APPENDIX D
### Diagnoses Back Program
(I.C.D. 8th and 9th Revision)

<table>
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<th>I.C.D. 8th Revision</th>
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<th>Code #</th>
<th>I.C.D. 9th Revision</th>
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<td>Lumbago (Other Non-Articular Rheumatism)</td>
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### INTERVERTEBRAL DISC DISORDERS

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<td>Radicular syndrome of lower limbs</td>
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### OTHER & UNSPECIFIED DISORDERS OF THE BACK

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APPENDIX D (cont.)

Back Program Diagnoses Average Length of Stay, Cases & Patient Days By Year & Geographic Area

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<th>S.D. #44 &amp; 45 to L.G.H.</th>
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APPENDIX E

MEASURING THE RATE OF POPULATION GROWTH (Barclay, 1958, p. 207)

- Assume that the rate of growth is constant between 1971 and 1976.

- A constant rate of growth produces larger and larger increments because the base of the population becomes larger.

\[
\frac{P_2}{P_1} = (1 + r)^n
\]

where \(P_2 = 1976\)

\(P_1 = 1971\)

\(r = \) annual rate of growth

\(n = 5 \) years

- Using logarithms \((1 + r)^n\) becomes

\[
\log (1 + r) = \frac{\log \left( \frac{P_2}{P_1} \right)}{n}
\]

\[\log (1 + r) = \frac{\log \left( \frac{P_2}{P_1} \right)}{5}\]
APPENDIX F

POPULATION FIGURES USED IN THIS STUDY

School District #44 & #45 Population
By Year & Age

<table>
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<tr>
<th>YEAR</th>
<th>0 - 14</th>
<th>15 - 44</th>
<th>45 - 64</th>
<th>65+</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>34,700</td>
<td>55,925</td>
<td>27,820</td>
<td>9,450</td>
<td>127,895</td>
</tr>
<tr>
<td>1972</td>
<td>33,327</td>
<td>57,259</td>
<td>28,436</td>
<td>9,833</td>
<td>128,855</td>
</tr>
<tr>
<td>1973</td>
<td>32,008</td>
<td>58,625</td>
<td>29,066</td>
<td>10,231</td>
<td>129,930</td>
</tr>
<tr>
<td>1974</td>
<td>30,741</td>
<td>60,023</td>
<td>29,710</td>
<td>10,645</td>
<td>131,119</td>
</tr>
<tr>
<td>1975</td>
<td>29,524</td>
<td>61,455</td>
<td>30,368</td>
<td>11,076</td>
<td>132,423</td>
</tr>
<tr>
<td>1976</td>
<td>28,355</td>
<td>62,920</td>
<td>31,040</td>
<td>11,525</td>
<td>133,840</td>
</tr>
<tr>
<td>1977</td>
<td>27,249</td>
<td>63,238</td>
<td>31,453</td>
<td>12,032</td>
<td>133,972</td>
</tr>
<tr>
<td>1978</td>
<td>26,212</td>
<td>63,217</td>
<td>31,576</td>
<td>12,298</td>
<td>133,303</td>
</tr>
<tr>
<td>1979</td>
<td>25,361</td>
<td>64,576</td>
<td>32,063</td>
<td>12,883</td>
<td>134,883</td>
</tr>
</tbody>
</table>

School District #36 - #41, #43 Population
By Year & Age

<table>
<thead>
<tr>
<th>Year</th>
<th>0 - 14</th>
<th>15 - 44</th>
<th>45 - 64</th>
<th>65+</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>223,725</td>
<td>394,465</td>
<td>188,170</td>
<td>94,065</td>
<td>900,425</td>
</tr>
<tr>
<td>1972</td>
<td>218,866</td>
<td>404,070</td>
<td>190,565</td>
<td>96,053</td>
<td>909,554</td>
</tr>
<tr>
<td>1973</td>
<td>214,112</td>
<td>413,909</td>
<td>192,991</td>
<td>98,083</td>
<td>919,095</td>
</tr>
<tr>
<td>1974</td>
<td>209,461</td>
<td>423,988</td>
<td>195,448</td>
<td>100,155</td>
<td>929,052</td>
</tr>
<tr>
<td>1975</td>
<td>204,912</td>
<td>434,312</td>
<td>197,936</td>
<td>102,271</td>
<td>939,431</td>
</tr>
<tr>
<td>1976</td>
<td>200,460</td>
<td>444,880</td>
<td>200,460</td>
<td>104,430</td>
<td>950,230</td>
</tr>
<tr>
<td>1977</td>
<td>194,201</td>
<td>447,091</td>
<td>199,023</td>
<td>106,103</td>
<td>946,418</td>
</tr>
<tr>
<td>1978</td>
<td>191,769</td>
<td>454,979</td>
<td>199,569</td>
<td>108,999</td>
<td>955,316</td>
</tr>
<tr>
<td>1979</td>
<td>189,660</td>
<td>466,668</td>
<td>200,942</td>
<td>113,542</td>
<td>970,812</td>
</tr>
</tbody>
</table>
Appendix G

Adjusted or Standardized Rates (Barclay, 1958, 161-166)

Indirect Standardization ("applying a standard set of rates to different populations by age" (p. 161).)

The object is to calculate the number of expected cases or patient days "to be expected in one population on the basis of some information from another population" (p. 161). In this study the number of 'expected cases' or 'expected patient days' is used to calculate the standardized case rate or the standardized patient day rate.

This method requires data of the actual populations by age, the total number of cases and patient days in both the actual populations during the years, 1971 - 1979, the complete schedule of age specific case rates and age specific patient day rates of the standard population (the total G.V.R.D. population in 1976), and the crude case rate and patient day rate of the standard population.

The actual population figure for each year at each age group is multiplied by the corresponding age specific case rate and patient day rate which gives the number of expected cases or expected patient days if the actual population had had the standard case or patient day rates at each age group. The actual number of cases or patient days for a particular year are divided by the expected cases or patient days for that year to provide ratios. These ratios are multiplied by the crude case rate or patient day rate of the standard population (total G.V.R.D. population in 1976) to obtain standardized case rates and standardized patient day rates.

In this way "the probable influence of a population's age composition on its crude ..." case rate and crude patient day rate can be shown "when its actual age specific rates are not known" (p. 166).