

Background

The purpose of this study is to examine the current telemetry monitoring practices at Mount Saint Joseph Hospital, by reviewing the current protocol, patient safety learning system (PSLS) reports, and conducting surveys. In addition, a review of current literature will be conducted and information will be obtained from similar community-sized hospitals, about best practices on telemetry monitoring. Based on the data obtained, possible recommendations are proposed.

- The current protocol involves telemetry monitoring of patients admitted to the medical ward (3rd floor medicine or "3M"). The patients are monitored remotely in ICU by nursing staff. When an alarm or a cardiac concern arises, the ICU nurse pages or calls the medical ward (via a telemetry phone) to inform the primary RN of the change in status.
- A ten-question survey was submitted to both the medical ward and ICU to be completed by all staff members. The data most applicable was found to be the surveys completed by RNs on both the medicine and ICU wards.
- The survey results showed the ICU RNs are less satisfied with the effectiveness of the current practice, with the communication measures, and feel less supported by other care team members when compared to RNs working on medicine.
- The survey results also suggest that the aforementioned are the main concerns, and imply that problems with telemetry monitoring are less of a workload or patient safety issue.
- After contacting 16 similar-sized community hospitals in BC, due to communication barriers, it was difficult to obtain specific information on their telemetry protocols, but a comprehensive list of hospitals and contact information was compiled (see Appendix Table 3).
- The PSLS reports from 2010 to present reveal predominant themes of errors or near-misses pertaining to poor communication between medicine and ICU nurses, updating patient information on new telemetry assignments, equipment issues (missing, uncharged or broken pagers), and patients going out of range.
- Lastly, best practice recommendations are proposed after reviewing current literature. These include improved technology, improved communication methods in conjunction with new technology, and implementation of central telemetry monitoring, to reduce burden on nursing staff.

Methods

- An anonymous survey was designed and distributed to both ICU and the 3rd floor medicine ward. All staff members were given 2 weeks to complete the survey (see Appendix Fig. 1).
- The current protocol "NCS6341 – Telemetry Monitoring" was obtained from Providence Health Care intranet website. It was found in the Nursing Care Standards and is entitled "Cardiac Monitoring: Telemetry (Remote), protocol for (MSJ – Only)".
- Patient Safety Learning System (PSLS) reports were run by Elena Cernicka, the PSLS Coordinator. All three authors reviewed PSLS reports independently and selected events that were relevant for the analysis.
 - For example, a report involving a fall with a person on telemetry was not included, as the report was submitted for reasons pertaining to the fall, and not the telemetry.
 - An example of a report included, might be the inability of an ICU RN to reach/contact the primary RN on the medicine ward, when an arrhythmia was detected for a patient on telemetry.
- The website for each of the five health authorities in BC was utilized to obtain information on the size of each hospital, if inpatient telemetry monitoring services were available, and their contact information. Due to communication barriers (call backs not returned, unable to speak to educators) little information was obtained from this search. However, a list of 16 similar-sized community hospitals was generated for future use (see Appendix Table 3).
- The following online databases on the UBC library website were used to conduct the literature search: PubMed, CINAHL, Cochrane, MedLine, and Web of Science.

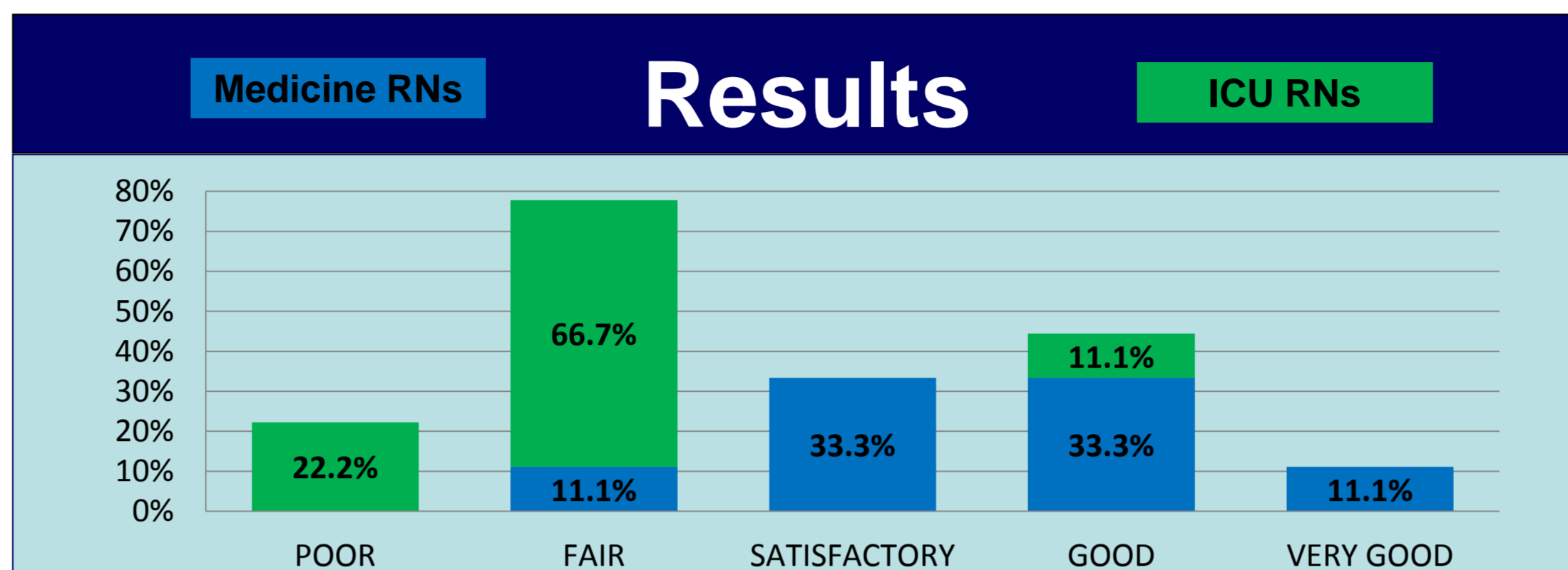


Fig. 1 RNs from medicine and ICU were asked to rate the effectiveness of the current telemetry protocol. Responses were n=9 from ICU, n=8 from medicine.

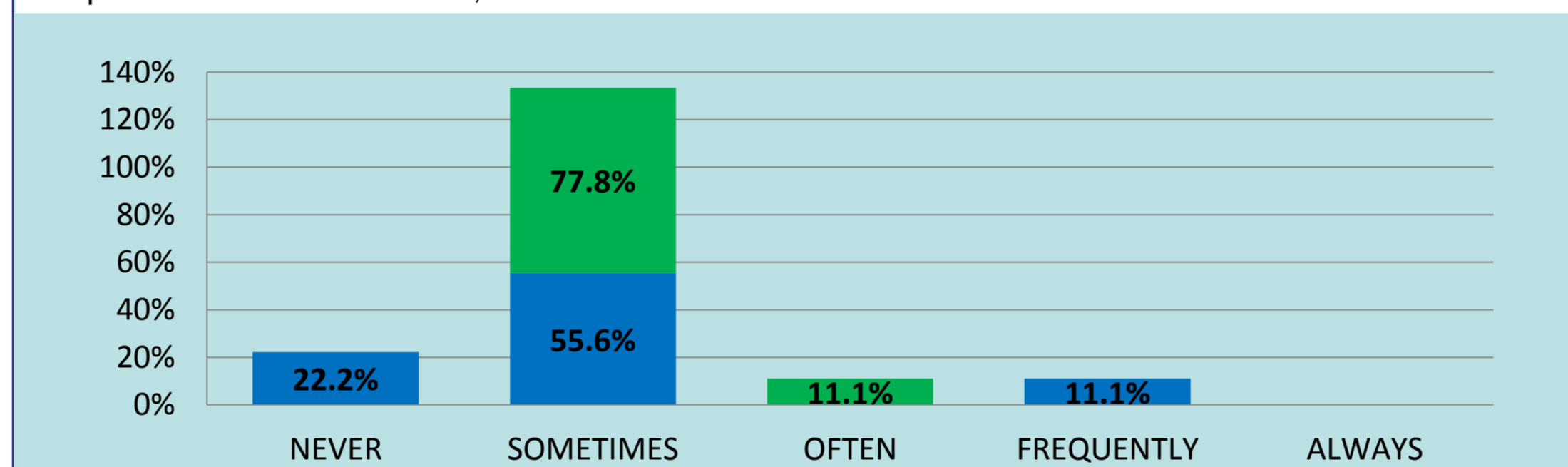


Fig. 2 RNs from medicine and ICU were asked to rate if they feel patient's safety is at risk using the current telemetry protocol. Responses were n=8 from ICU, n=8 from medicine.

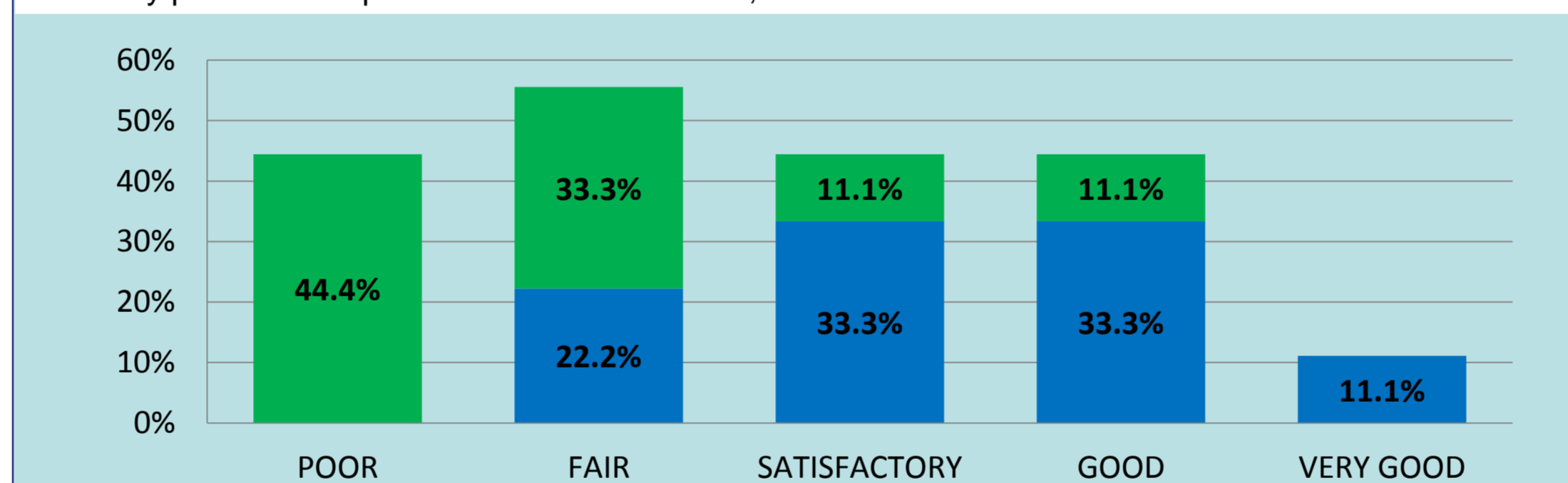


Fig. 3 RNs from medicine and ICU were asked, in regards to telemetry monitoring, to rate how well they feel team members are communicating. Responses were n=9 from ICU, n=9 from medicine.

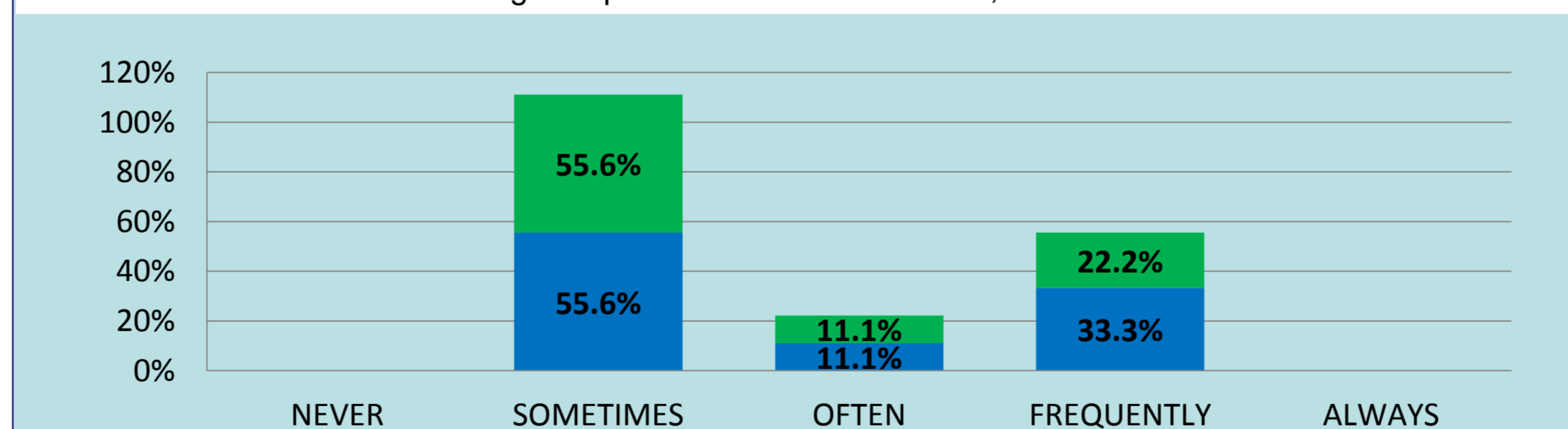


Fig. 4 RNs from medicine and ICU were asked to rate when caring for telemetry patients, whether they feel the workload is reasonable. Responses were n=9 from ICU, n=8 from medicine.

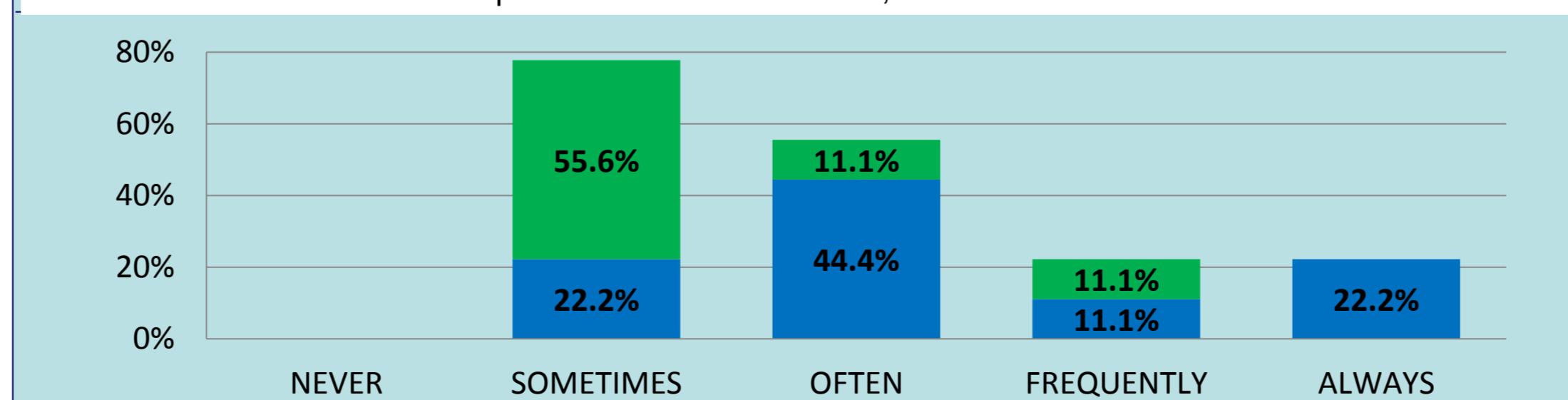


Fig. 5 RNs from medicine and ICU were asked to rate whether they feel supported by other care team members while caring for cardiac patients. Responses were n=7 from ICU, n=9 from medicine.

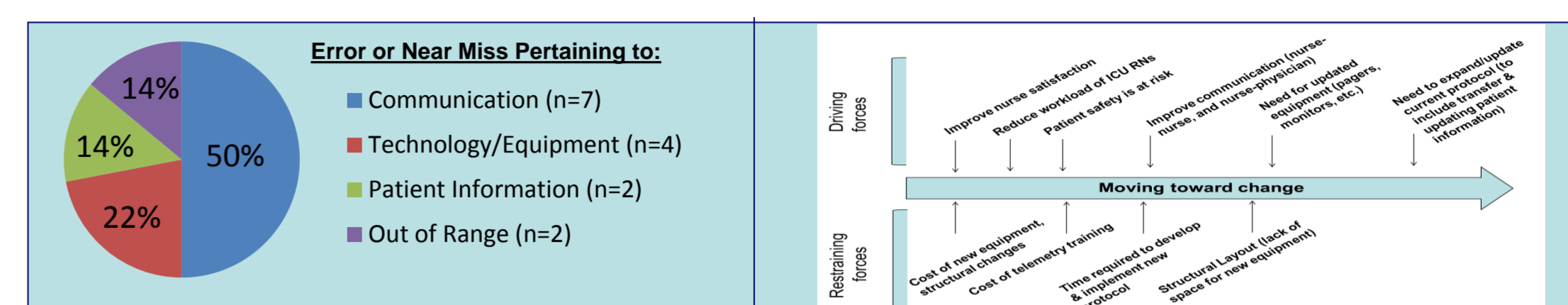


Fig. 6 Patient Safety Learning System (PSLS) results from 2010-2013.

Fig. 7 Force field analysis of driving versus restraining forces to change current protocol.

Discussion

Given the survey results, PSLS reports and the literature review, the following is a list of problems identified from this study, and the associated recommendations proposed as to how to improve the current telemetry monitoring protocol and practice at MSJ.

PROBLEM: Unclear physician orders, lack of physician follow-up

- Piepenbrink (2011) recommends using a computerized physician order entry (CPOE) system to create an enhanced order set specific to telemetry.
 - This would address the communication concerns, raised by all RNs, observed in the PSLS reports and survey results.
- Reilly & Humbrecht (2007) suggests using specific criteria and assessment tools to identify patients who are at higher risk for developing serious arrhythmias, which can provide safe management of cardiac patients as well as decrease the average time of telemetry monitoring.
 - By having an assessment tool, telemetry charting would be standardized and in one place.

PROBLEM: Nurses dissatisfied with communication

- Wild et al. (2004) recommends interdisciplinary rounds can improve staff satisfaction and contribute to staff retention.

PROBLEM: ICU RNs not always available to attend to telemetry patients

- Peterson et al. (2002) suggest contracting telemetry-monitoring services similar to larger hospitals that have dedicated trained telemetry monitor watchers.
 - Having technicians/dedicated telemetry monitoring personnel would address the issue raised in PSLS reports about unanswered alarms, and could be cost effective as there is less training needed for RNs.
 - This was something also suggested by ICU RNs
 - Improved patient care, as dedicated telemetry watchers are more experienced in reading telemetry graphs and nurses have more time to spend with their patients.
- A centralized telemetry monitoring system (TMS) model allows nurses to attend more to the patients rather than monitor continuously. It also prevents the negative effects of alarm fatigue and desensitization by reducing monitor alarms on the unit (Bonzheim et al., 2011).

PROBLEM: Equipment malfunctioning (pagers, monitors, tele packs)

- Peterson et al. (2002) highlight that all monitoring systems be upgraded to ones that are more sensitive to detect quality arrhythmias.
- The use of bi-directional voice communication, such as a two-way communication badge technology, reduces alarm hand-off and response time when compared to the one-way communication devices (alphanumeric pagers); it also allows nurses to quickly ask questions and confirm receipt of the information, and thus improves patient care (Bonzheim et al., 2011).
 - To address the pager malfunctions/communication problems raised by RNs in survey and PSLS reports.

PROBLEM: Lack of telemetry training for medicine RNs

- Create/use a full-scale online telemetry course that includes orientation, education about telemetry policies, and arrhythmia detection/ interpretation, to train nurses on medical/surgical floors with telemetry (Piepenbrink, 2011).
 - Both medicine and ICU RNs expressed concern about the lack of telemetry education provided to medicine RNs. ICU RNs also requested non-mandatory periodic review sessions on interpretation of telemetry graphs.

PROBLEM: Patient Transfers

- Modify/expand the MSJ Telemetry Protocol NCS6341 regarding transfer procedures. The protocol states "when patients transfer to other sites, telemetry pack must remain on ward". Expanding this section to include steps for transfer, would improve communication between staff.
 - The PSLS reports and survey results revealed concerns about transferring patients on telemetry: not updating patient information upon transfer to SPH, from ER, or when leaving the ward (ie. patients leaving ward wearing telemetry packs and incidences of incorrect telemetry packs on incorrect persons) - there is a need for improved updating of patient information.

References

- Bonzheim, K. A., Gebara, R. I., Bridget, M., O., Ellis, R. D., Brand, M. A., Balar, S. D., Stockman, R., Sciberras, A. M., & Haines, D. E. (2011). Communication strategies and timeliness of response to life critical telemetry alarms. *Telemedicine Journal and e-Health*, 17(4), 241-248.
- Cale, D. D. (2007). A new perspective on patient monitoring. *Nursing Management*, 38(12), 24-26.
- Gross, B., Dahl, D., & Nielsen, L. (2011). Physiologic monitoring alarm load on medical/surgical floors of a community hospital. *Biomedical Instrumentation and Technology*, 45(1), 29-36.
- Peterson, M.C., Whetten, D.K., Renlund, D.G., & Coletti, A. (2002). Sensitivity of rhythm disturbance detection by community hospital telemetry. *Annals, of Noninvasive Electrocardiology*, 7(3), 219-221.
- Piepenbrink, J. (2011). Taking alarm standardization to the floors with a telemetry training system. *Biomedical Instrumentation and Technology*, 45(1), 25-28.
- Providence Health Care. (July, 2009). Nursing care standards protocol: Cardiac monitoring: Telemetry (Remote), protocol for (MSJ-Only). Retrieved from Providence Health Care Intranet.
- Rajecki, R. (2008). eICU: Big brother, great friend. Remote monitoring of patients is a boon for nurses, patients, and families. *RN*, 71(11), 36-39.
- Reilly, T. & Humbrecht, D. (2007). Fostering synergy: A nurse-managed remote telemetry model. *Critical Care Nurse*, 27(3), 22-26.
- Wild, D., Nawaz, H., Chan, W., & Katz, D. L. (2004). Effects of interdisciplinary rounds on length of stay in a telemetry unit. *Journal of Public Health Management and Practice*, 10(1), 63-69.

Appendix

Appendix A Table 1. Literature review summary. This table highlights the most recent and relevant literature regarding best practice standards in telemetry monitoring.

Bonzheim et al. (2011). Communication Strategies and Timeliness of Response to Life Critical Telemetry Alarms. <i>Telemedicine and e-Health</i> , 17(4), 241-246	<ul style="list-style-type: none"> -In a centralized TMS model a technician is employed to assist nurses who may/may not have the experience/skills to interpret advanced cardiac telemetry rhythms. -It allows the nurse to attend to the patients rather than monitor continuously. -It also prevents the negative effects of alarm fatigue and desensitization by preventing the need for monitor alarms on the unit. -However, if information is not communicated rapidly and effectively after alarm detection, appropriate interventions for the patient may not be implemented. -The use of bi-directional voice communication such as a two-way communication badge technology markedly reduced alarm hand-off and response time. -The badge has features including voice-activation, hands-free operation, and an automated escalation pathway -This type of communication when compared to the one-way communication devices (alphanumeric pagers) allowed nurses to quickly ask questions and confirm receipt of the information, and thus improved patient care.
Gross, B., Dahl, D., & Nielsen, L. (2011). Physiologic Monitoring Alarm Load on Medical/Surgical Floors of a Community Hospital. <i>Biomedical Instrumentation & Technology</i> , 45(1), 29-36. Retrieved from	<ul style="list-style-type: none"> -"False alarms" cause alarm fatigue and desensitize nurses -It was found that alarms in the critical care setting are too sensitive for a medical/surgical floor -This study was conducted in a community hospital in urban Arizona and shows that when patients are cared for outside high acuity areas, it is not clear what parameters for alarms are optimal to detect and prevent patient deterioration. -A remote telehealth centre was responsible for monitoring and communicating any critical events investigating the sourcing alert data, and if the alert was clinically important, "the telehealth center would either contact the patient directly via the two-way telepresence system (voice and video), contact the patient's nursing assistant (for technical events), or contact the patient's nurse via the in-building wireless phone system." (p.31)
Piepenbrink, J. (2011). Taking alarm standardization to the floors with a telemetry training system. <i>Biomedical instrumentation & technology</i> , 45(1), 25-28	<ul style="list-style-type: none"> -Computerized physician order entry (CPOE) system was used to create an enhanced order set for telemetry to address utilization and parameter defaults in order to improve communication about telemetry patients between nursing staff and physicians. -"The appropriateness of utilization was included to better define candidates for telemetry and to provide reminders about the duration of the orders" (p. 26). -Having better defined alarm parameters decreased low-level false alarms -A full-scale online telemetry course was created to train nurses on medical/surgical floors with telemetry -"The online course covered orientation, education about telemetry policies, and arrhythmia detection/ interpretation. The test requires a 100% score and annual accreditation is expected" (p.26).
Webner, C. (2001). Applying evidence at the bedside: A journey to excellence in bedside cardiac monitoring. <i>Dimensions of Critical Care Nursing</i> , 30(1), 8-18.	<ul style="list-style-type: none"> - Provides practice standards from the American Heart Association for electrocardiographic monitoring in hospital settings and guidelines for bedside cardiac monitoring - Provides suggestion of using practice standards and guidelines to create a protocol about transferring patients to remote telemetry as well as developing a critical thinking tool for bedside cardiac monitoring.
Rajecki, R. (2008). eICU: Big brother, great friend. Remote monitoring of patients is a boon for nurses, patients, and families. <i>RN</i> , 71(11), 36-39.	<ul style="list-style-type: none"> - The idea of a "big brother" that uses high definition camera, microphone, and high speed computer data lines in a central location to monitor patients with telemetry - Staffed 24/7 by intensivists and experienced ICU nurses to monitor data, trends, and "things that nurses on the floor do not have time to do" (p.37) - Uses Safewatch software that runs a variety of algorithms and rates the acuity of patients; has closed circuit cameras and 2-way speakers capability that allow effective communication; allows to compare various day's lab results by simply hitting a button.
Cale, D. D. (2007). A new perspective on patient monitoring. <i>Nursing Management</i> , 38(12), 24-26	<ul style="list-style-type: none"> - Uses newer and wireless technologies (like antennae and wireless controls) to move tele patients into a centralized place or a "war room" where trained technicians and expert clinical staffs could devote full attention to reading the monitors and responding to alarms - Installs a special dedicated telephone line from the ward room to ICU ward (bright color and has a distinctive ringtone) - Nurses, not technicians, have the full responsibilities and accountabilities in setting the alarm - Invite electrophysiologists and cardiologists to help with evaluation and decision process
Reilly, T. & Humbrecht, D. (2007). Fostering synergy: A nurse-managed remote telemetry model. <i>Critical Care Nurse</i> , 27(3), 22-26.	<ul style="list-style-type: none"> - The American Association of Critical Care Nurses' synergy model for patient care combines actions of both nurses and patients, recognizes that dynamic characteristics of patients drive a nurse's competencies and enable patients' optimal outcomes - Specific criteria and assessment tools are used to identify patients who are at highest risks for serious arrhythmias - The study has indicated that nurses' responses to remote telemetry alarm are inversely correlated with workload of each nurse - With the use of specific criteria and assessment tools, nurses are more likely to provide safe and efficient management of patient care and a significant decrease in the mean cardiac telemetry monitoring time for telemetry patients.
Wild, D., Nawaz, H., Chan, W., & Katz, D.L. (2004). Effects of interdisciplinary rounds on length of stay in a telemetry unit. <i>Journal of public health management and practice</i> , 10(1), 63-69.	<ul style="list-style-type: none"> -An RCT in a community hospital with 160 beds; a total of 84 patients (only patients who were admitted on the telemetry ward) were randomized. -Interdisciplinary rounds (IR) were not found to decrease the length of stay of telemetry patients in a community hospital. -However, IR was found to improve staff satisfaction, which can contribute to staff retention. -More studies are needed to determine the influence of IR on quality of care and cost effectiveness of inpatient care.
Peterson, M.C., Whetten, D.K., Renlund, D.G., & Coletti, A. (2002). Sensitivity of Rhythm Disturbance Detection by Community Hospital Telemetry. <i>Annals of Noninvasive Electrocardiology</i> , 7(3), 219-221. DOI: 10.1111/j.1542-474X.2002.tb00166.x	<ul style="list-style-type: none"> -In this study, a community hospital as the one described above was compared to an academic tertiary hospital. -At the community hospital it was found that telemetry reports did not include significant reports that occurred-for example 5 of the 10 sets of recordings had rhythm changes that were not detected by routine monitoring, and these changes should have resulted in changes in treatment and consultation by the cardiologist. -Some simple solutions include the use of a trained dedicated telemetry monitor watcher, update monitors to include better quality arrhythmia detection, and arrhythmia detection capability, and "smaller hospitals possibly using contracted telemetry monitoring services from larger hospitals that have dedicated monitor watchers." (p. 221)

Appendix

MSJ Telemetry Survey

Please complete and leave in the envelope attached by **Nov. 15, 2013**

With the assistance of UBC nursing students, we are reviewing the current telemetry protocol used on the 3rd floor of MSJ. Please complete this [10 question survey \(front and back of this page\)](#) at your convenience. Contact Tom Sinclair with any questions. Thank you for your participation!

1. Do you work on 3rd floor medicine (3M) or ICU? (Please check all that apply)

3M
 ICU

2. Occupation? (Please check all that apply)

RN Charge Nurse
 MSI LPN
 Resident Care Aid
 Physician Unit Clerk
 NP ESN

3. Please rate the effectiveness of the current telemetry protocol (attached).

Poor Fair Satisfactory Good Very Good

4. Do you feel patient's safety is at risk utilizing the current telemetry protocol?

Never Sometimes Often Frequently Always

Comments: _____

5. Regarding telemetry monitoring, how well are care team members communicating?

Poor Fair Satisfactory Good Very Good

Comments: _____

6. When caring for cardiac patients, do you feel the workload is reasonable?

Never Sometimes Often Frequently Always

Comments: _____

7. Do you feel supported by other care team members while caring for a cardiac patient?

Never Sometimes Often Frequently Always

Comments: _____

8. Please provide suggestions for ways to improve/change the current protocol.

Comments: _____

9. Do you have any other comments or suggestions regarding telemetry monitoring at MSJ?

Comments: _____

10. Please rate how well this survey addressed issues pertaining to telemetry monitoring at MSJ?

Poor Fair Satisfactory Good Very Good

Did we miss anything?
Comments: _____

Thank you for your participation! Your feedback is greatly appreciated!

Appendix Table 2. Nurses written responses from MSJ Telemetry Survey

Blue = 3M responses, Green = ICU

question #4

communicate between unit and ICU

because patients gets annoyed with the telemetry pack and remove it

pager at times not work, sometimes unaware pager is not working

telemetry pager is often not functional, often skin under electrodes hairy, electrodes not being changed after and dated; *see cardiac monitoring protocol; nurses should be trained with ECG interpretation

communication would be better: RNs on medicine, despite not being responsible for telemetry monitoring would benefit from being better trained around telemetry

ward RNs sometimes/usually forget to call ICU when pt has moved to another bed or pt arrive in their unit from ER. When ICU RNs busy - on telemetry - not monitored

sometimes if ICU has only 2 RNs and both RNs are in patients' rooms. Sometimes ward nurses don't notify when patients arrives in the ward or if with changes on room assignments

when calling/paging the ward, there is a delay on the response- due to concerns with the pages

sometimes when it is busy, ICU RNs can't consistently monitor pt rhythms

telemetry is currently miss-used. As in pts are sometimes put on tele who do not need it + left on for too long. Some doctors order tele so ICU can watch the pt on the ward as they think tele means "close

monitoring" of patients than they would have if not on tele. These pts are not admitted with either cardiac conditions or arrhythmias

Question 5

communication between ICU and medicine could be improved from both sides

telemetry patients should be seen by cardiologists/ assessed at times. Pts are on tele for a long period of time

limited number of medical doctors come into ICU to verify rhythms and heart rates. Medical doctors and cardiologists should also liaise with ICU nurses regarding telemetry. Patients on telemetry should have cardiology consult

some physicians don't come into ICU to check on patients rhythm and alarms

eg: one doctor asked if tele strips can be posted in progress notes instead of ECG section as she never looks in ECG section. There should be "one" place to chart for telemetry. Pts who are on tele should have cardiology consult

Question 6

sometimes there are more than 2 patients in workload

this is a case/case basis

in ICU, it is reasonable if ICU has the baseline staffing (3 nurses)

question 7

CRNs when around are very helpful when caring for cardiac patients with unstable status

This depends the patient workload and status

depends on number of patients and RNs in ICU... there were times that there are only 2 RNs with patients in ICU and 6 telemetry

depending on workload and condition of pt

question 8

medicine RNs would benefit from increased knowledge/more training. If time ICU nurse would attend med. Nursing around to discuss cardiac patients

train RNs for ECG interpretation, can ICU nurse pace cardiac patients

transferring patients on telemetry between hospitals is challenging, pts will go to SPH from MSJ on tele however one transported back with tele and once back at MSJ we put tele back on; SPH should send

pts back on tele if pt needs it

possible in-service/education to read ECG and more knowledge re: heart rhythm

impaired communication between []

isolated RN dedicated to assess/care

need to make sure appropriate pts are put on telemetry, make sure pt are taken off telemetry in a timely manner

concerns about geographical layout

better communication with doctors and ICU RNs. Rationale why patient is on telemetry should be clearly stated on medical notes and guidelines for ICU RNs on looking after the tele patients/ expectation

from ICU-RNs

improve: expectation from ICU RNs communication

dedicated RN/shift to telemetry

question 9

more current telemetry devices like SPH cardiac 5 A/B; medicine nurses should be trained in interpretation of ECG; education around use of electronic devices and pace makers

for newly pt diagnosed with concern in rhythm possible monitoring in ICU

education/review on ECG interpretation; documentations of ICU RNs on interdisciplinary notes- to facilitate communication between RNs/doctors

we are following the existing protocol. It is frustrating to be asked to follow an imaginary one that changes with a whim

Appendix Table 3. List of community hospitals in BC

- Campbell River & District Regional Hospital
-59 beds acute care; 5 beds ICU
-250-850-2141
- Cariboo Memorial Hospital
-31 beds; has an ICU
-250-392-4411
- Chilliwack General hospital
-104 beds, has cardiac step-down, ICU
-604-795-4141
- Cowichan District Hospital
-95 beds, has ICU
-250-737-2030
- Dawson Creek and District Hospital
-62 beds, has ICU
-250-782-8501
- Delta Hospital --NO INPATIENT CARDIAC
-50 beds; they have a cardiac care unit,
-604-946-1121
- East Kootenay Regional Hospital
-beds?, has ICU
-250-426-5281
- Kelowna General Hospital
-beds?, has cardiac step-down and ICU
-250-862-4000
- Kootenay Boundary Regional Hospital
-75 beds, has ICU
-250-368-3311
- Peace Arch Hospital
-146 beds (a little too big I think); cardiac and ICU
-604-531-5512 (TRY EXTENSION 753185)
- Penticton Regional Hospital
-129 beds, has ICU, 250-492-4000
-8 telemetry beds on a medical unit
-8 other telemetry beds somewhere else
-Currently reviewing their protocol
-Please contact MONICA ADAMACK at 250-870-4608
- University Hospital of Northern British Columbia
-beds?? ICU, critical care
-250-565-2000
- Powell River General Hospital
-33 beds; has ICU
-604-485-3211
- Ridge Meadows Hospital
-125 beds, cardiac services and ICU
-604-463-4111
- Shuswap Lake General Hospital
-40 beds, has ICU
-250-833-3600
- West Coast General Hospital
-52 beds, has ICU
-250-731-1370

Appendix Fig. 1 Survey designed and distributed to Mount Saint Joseph Hospital medicine and ICU units.