RESILIENCE, INTUITION AND FORESIGHT AT CHANGE OF SHIFT IN ICU - WHAT CLINICIANS CAN TELL US

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ABSTRACT

Quality improvement in healthcare over the last decade has begun to take a high reliability perspective. This perspective attempts to apply techniques from other work domains such as; manufacturing, military peacetime operations and especially commercial aviation which embody the desired high reliability organizational (HRO) characteristics. Still healthcare systems have not yet achieved the status of being highly reliable or inherently safe. A key aspect of both high reliability and the emerging resilience perspectives in healthcare involves anticipation. Resilience builds on why things go right rather than how they go wrong.

This research investigated, what techniques ICU clinicians; nurses, physicians & respiratory therapists report that they use to develop their intuition and foresight at change of shift report (CoSR) in ICU. This qualitative research was approved by the Interior Health Research Ethics Board and is based on interviews with these clinicians in their multidisciplinary work setting. All ICU clinicians interviewed agree that face to face communication at CoSR is crucial and that these handoffs reinforce; interdependence, a common mental model and shared peer expectations. The study also found that anticipatory planning and anticipation of the 'big picture' can be transferred within and across clinical disciplines through cascading CoSR.

This may have important implications for multidisciplinary work in healthcare, if expertise is interpreted as learning *how to perceive*. Training in healthcare has typically been profession specific, applying knowledge, rules, facts, procedures and clinical guidelines. These skills and knowledge were typically imparted within, not across professions, and are believed to take the form of linear, decomposable segments of procedural tasks.
These healthcare workers must then learn how to work together in multidisciplinary settings where; anticipation, effective communication, listening, confirmation and the collaborative creation of patient safety is imperative. During CoSR handovers, they learn, (then teach) how to apply their knowledge *in a multidisciplinary context* to gain higher levels of expertise and to make better judgments and decisions.

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Chapter One: Introduction

Most of the literature on patient handovers to date has recommended normative checklists, ASQC (2005, 2008) but few studies have evaluated (or asked) clinicians about how they develop their anticipation, intuition and foresight during change of shift report (CoSR handover). There is much research on the problems associated with clinical handover in patient safety, but much of it is of poor quality and proposes rather mechanistic, normative solutions. (Hill 2010, Hill and Nyce 2010). There are some recent exceptions, however, of clinicians applying clinical checklists which combine high reliability and resilience principles. (Singal,Pitfield,Northway and Krahn 2010)

National patient safety goals (Accreditation Canada 2008*) have tests for compliance to a national standard for handovers including;

i) Use of mechanisms for timely transfer of information,

ii) Staff awareness of the organizational mechanisms, and

iii) Documented evidence that a timely transfer of information has occurred.

Unfortunately, these criteria generally ignore cognitive and social human factors and the joint role(s) of clinicians have in the creation of resilience and patient safety. In February 2010, an entire edition of the Joint Commission Journal on Quality and Patient Safety (Vol 36/ 2) was devoted to Handovers. The lead editorial was; Handoff Improvement – We need to understand what we are trying to fix (Van Eaton 2010). In this editorial, Van Eaton argues for contextualized studies within relevant clinical domains rather than catch all 'fixes'. This is similar to an appeal made more than a decade ago; "Further studies should be conducted to investigate what types of critical skills and knowledge are involved in anticipating and preparing. (Xiao 1997 p.204)

This topic was chosen because there is a very limited literature on CoSR handover in Intensive Care Units (ICU) settings regarding communication of intent, anticipation or foresight. Further no CoSR research was available that looks at the multiple disciplines in ICU.

This study aims to learn; "What techniques do ICU clinicians report that they use to develop their intuition and foresight at CoSR in ICU? This was distinct from studies of patient rounds in ICU. This research was pre-approved by the Interior Health Research Ethics Board (REB). The qualitative research utilized narrative inquiry interviews which were conducted with participants from four ICU subspecialties (physicians, patient care coordinator- supervisory nurses, respiratory therapists and bedside critical care nurses).

There appears to be synergy in the way ICU teams actively update their risk and knowledge models both individually and collectively, prior to rounds. Intention, anticipation and foresight seem to be developed both individually and collectively. It became obvious during this study that the various intra-disciplinary handovers begin an interdisciplinary cascade of planning communication, toward formulating the elusive big picture (foresight) of what was going on for multiple patients and with the ICU disciplines that coordinate their care. This study demonstrates interdependence among the professional groups (especially RRTs, PCCs and Intensivists) in building and sustaining an understanding of the complexity in ICU. The role of the PCC seems to be especially crucial. "There are many good reasons to think of safety as *the presence*, rather than *the absence* of *something*" (Hollnagel, Nemeth, Dekker 2008 p.75) Looking at both the CoSR handover and the human factors literature, this "*something*" seems to be the ability (or not) of clinicians to perceive *differently* and anticipate problems based on weak signals. This of course is characteristics of expertise. "The clinician may attempt to create foresight by asking a more general anticipatory question. Practicing resilience in this way can help us manage the efficiency-thoroughness trade off" (Sheps 2009)

Chapter Two: Literature Review of Human Factors and Change of Shift Report

While change of shift report (CoSR handover) is ubiquitous in healthcare, current research tells us very little about how clinicians think and actually "handover" or transfer their professional responsibility and accountability for care of a patient, or group of patients, to other persons or professional groups. A literature review (Hill 2010) examined the international Change of Shift Report (CoSR handover) literature, including three systematic reviews (2005-2009) and the human factors literature relating to reliability and resilience relative to clinical handover. Further, it reviewed a subset of 24 more recent articles, specifically from a reliability and resilience engineering perspective to determine , to what extent, reliability and resilience [human factors] principles have been used in healthcare CoSR, and specifically if clinical practitioners can (or do) use anticipatory techniques to create foresight (and patient safety) during change of shift report (CoSR handover) in hospitals. While standardization and minimum quantitative data sets may have their place, the review determined that we still need to learn how clinicians create; i) foresight ii) coping strategies , iii) recovery strategies so that they can better manage efficiency and thoroughness tradeoffs (ETTO).

Change of Shift Report – Literature Review

In 2005 the Australian Council for Safety and Quality in Healthcare (ASQHC 2005) published a meta-analysis review (followed up in 2008) on Clinical Handover and Patient Safety. This was a comprehensive review of the published and unpublished literature on clinical handover and patient safety. "The literature review was designed to identify: i) factors relating to clinical handover associated with patient safety, ii) the effectiveness of safety cultures within non-health industries and iii) the quality of evidence and gaps in research."

The Australian study defined clinical handover as including; "communication between the change of shift, communication between care providers about patient care, handoff, records and information tools to assist in communication between care providers about patient care." Patient safety concerns that affect preventable adverse patient outcomes included;

i. work flow and quality care
ii. ineffective handover can lead to wrong treatment
iii. delays in medical diagnosis
iv. life threatening adverse events
v. patient complaints
vi. increased health care expenditure
vii. increased hospital length of stay

ASQHC 2005

The recommendations from the 2005 review considered system factors, organizational cultural factors, and individual factors. System factors included creating and improving training and handover protocols so as to decrease incidents, delays in care, patient complaints and inappropriate treatment.

> *"The strongest evidence of reducing incidents was when multi-professional groups of clinicians were involved in clinical decision-making during ward rounds and continuity of care was provided and treatment was not prescribed by the on-call clinician but the patients' allocated care team."*
>
> ASQHC 2005

This review indicated that handover practices remain an issue internationally and that there remains a substantial gap in policy and research around clinical handover. No best practice arose from this review around clinical handover. The recommendations around organizational cultural factors included limiting bullying, intimidation and aggression among colleagues and other staff in the workplace, the reduction of aggression and harassment from patients and the revamping of inefficient systems that decrease morale and willingness to engage in teamwork.

ASQHC 2005

The Australian review recommended the following, but did not define how accomplish or measure these;

i. The rating of effective communication skills as a priority when employing staff
ii. Formal and clearly stated communication and handover processes between health care practitioners that includes the minimum level of information required and the method of relaying this information.
iii. A combination of verbal and written communication processes that enable feedback and clarification of information when describing the care and treatment provided.
iv. Ensure that there is a culture that promotes opportunity for new ideas and improved ways of communicating, particularly in response to safety issues from any worker at any level within the organization.
v. Enable specific information to be available around critical or emergency procedures if and when personnel are called in.
vi. Evaluation using well designed studies to assess the effectiveness of handover in relation to organizational cultural changes.

ASQHC 2005

The key risks and critical success factors of handover report outlined in a subsequent meta-analysis (Wong, Yee and Turner 2008) largely ignored the human factors research and was silent on the central role of anticipation, intuition and foresight. Handover mnemonics were, it noted, 'all the rage' and SBAR (Situation, Background, Assessment, and Recommendation) was a common yet unproven method for handover. SBAR is more recognizable as a situational briefing model (such as calling a physician at 2 am about a patient problem) while expressing appropriate signals in urgent circumstances, to get clarity/agreement on a course of action.

Reisenberg's 2009 study of 24 different handoff mnemonics found that 70% of papers used the SBAR acronym, but only one study had Institutional Research Board (IRB) approval (Horowitz 2009). In summary, the quality of these studies was generally quite low, and Reisenberg has called for better quality research to prevent the uncontrolled poor quality experimentation. The recent works of Horwitz, Jeffcott, Patterson, Philibert, Van Eaton and others () are beginning to shed light on the role cognition, anticipation (and resilience) in

clinical handover. What is still unclear in the current clinical handover research are what are the anticipatory techniques healthcare practitioners *already* use to develop their intuition and foresight so that they can prospectively manage and cope with ambiguity and uncertainty.

High Reliability Perspectives in CoSR Literature

The HR perspective is quite dominant in several medically focused papers (Horwitz 2007, 2009, Dixon 2006 and Philibert 2009). As a follow up to his 2007 study of a 1 hr curriculum program for medical residents intended to improve verbal sign-out, Horwitz (2009), studied ``*What covering Doctors are told about their patients*`` and used both quantitative and qualitative assessments of sign-out content, clarity of language, environment, and factors affecting quality and comprehensiveness of oral sign-out. Horwitz called for a standardized CoSR (sign-out) format, minimum data sets with training, minimizing sign-outs that do not involve the primary team, and fostering a sense of direct responsibility for patients among covering staff. Only 41% of his staff had asked clarification questions at sign-out, which was positively associated with his or her supervisor being present.

Philibert (2009) studied sign-outs (CoSR handover) in 116 Physicians and found that handoff or sign-out duration lasted 12 minutes with a median duration per patient of 1.26 – 1.5 minutes. The impact of physician cross coverage of other services was the most problematic, resulting in an uncomfortable trade-off between more frequent hand offs (due to legislated reductions in work hours) and poor communication. A patient`s risk of an adverse event increased by an odds ratio of 6.30 , CI 95% (3.1-12.30) if the physician on call was also cross covering from another service. Philibert however seemed to embrace a more resilient stance towards CoSR handovers than did Horwitz, despite the similarity of study designs.

Pediatric ICU rounds : A recent unpublished] quality improvement initiative at BC Children's Hospital (2008-present), in the Pediatric Intensive Care (PICU) entitled *"Improving Communication at Morning Rounds: Strategies and Pitfalls"* provides some early encouraging news of successful application of both structure (reliability) and flexibility (resilience) to bedside ICU rounds. (Singal,M., Pitfeild,S.,Northway,T.,Krahn,G. 2010)

This group first surveyed their PICU staff (34 RN, 10 MD, 6 Allied Health) and asked questions about how PICU rounds were valued. Only 50% of staff surveyed knew for sure who the patients' doctor (resident/fellow) was. When asked if the daily patient care plan was clear, 30% said "only somewhat or no", 80% said they were unclear at the end of rounds what the plan was. When asked if they thought management errors were made on the basis of miscommunication at PICU rounds, 80% said yes (sometimes or frequently). Finally 82% of PICU staff said rounds could /should be more effective. The BC Children's PICU group created (over a period of 18 months, 2008-2010) a multidisciplinary PICU round handover tool designed that emphasized the role of the bedside critical care nurse, and attempted to minimize the role [and cognitive load] of the off going [post-call] medical resident who had been caring for all PICU patients the night before. The round is supervised by the attending Physician (or Fellow) and structured such that all of the following professions contribute their perspectives in a logical sequence for each patient;

i. Post call medical PICU resident (problem list overnight)
ii. Respiratory Therapist (ventilation / respiratory care strategy)
iii. Bedside Critical Care Nurse (Head to toe systems assessment using handover tool)
iv. Dietician (nutrition needs)
v. Pharmacist (medication issues /reconciliation)
vi. Plan of care is agreed upon at this point
vii. Patient safety checklist completed (risk /benefit of invasive therapies)
viii. Read back of physician orders (re-confirmation)

Appendix G; Pediatric ICU Team Bedside Handover Tool.

This handover tool has embedded a patient safety checklist and included patient care goals for the day. This Bedside Handover Tool remains at the bedside from 0700- 1600 hrs and is revisited on afternoon rounds to confirm whether the predictions were correct. The feedback from PICU staff is that bedside nurses feel more valued, rounds are perceived as more organized (they do not take any more time) and the patient care plan is clearer. The value of the patient safety checklist, embedded within the tool was that it prompted busy clinicians to take care of the basics, such as removing indwelling central venous line and foley (urinary) catheters appropriately, thereby (theoretically at least) reducing preventable infections.

The other benefit stated was that it showed respect for each profession's role and recognized their unique expertise. Medical residents began to "pre-round" their patients and most thought that their plans were better. " The gold standard has to be 100% clarity and accuracy at the bedside……..it's not personal, it's patient care"(Singal 2010)

When questioned at the grand round presentation of this QI study, the author said "Using a memory aid is a positive way to manage complexity" "(Singal 2010) Another physician said, "We are the elephant in the room", and that this was a very positive interdisciplinary project for the PICU team, to improve the quality and fidelity of communication [and patient care] at rounds.

So are High Reliability principles the answer? High Reliability Organizations (HROs) embody five characteristics which Weick & Sutcliff (2001) describe as *mindfulness* such as ; i) preoccupation with failure, ii) reluctance to simplify interpretations, iii) sensitivity to operations, iv) commitment to resilience and v) deference to expertise. Within HROs, the commitment to resilience means that they "develop capabilities to detect, contain and bounce back from those errors that are part of the indeterminate world". (Weick & Sutcliffe 2001 p.14) Herein lies both a similarity and a distinction between resilience in HRO and

Resilience Engineering concepts. ``Although there is some overlap these are distinct ideas.... Healthcare`s variability, diversity, limited resources, specialization and ad hoc teams mean that HRO characteristics such as redundancy and extensive training are simply not achievable. `` (Jeffcott 2009a p.257).

Resilience Perspectives in CoSR Literature

The concept of resilience in practice may not be new, but our appreciation of it as a technique to; create foresight, cope with complexity and effectively rescue patients is just emerging. (Jeffcott 2009) This is reflected in the more prospective, clinician centered language used in these most recent studies. Of the 24 authors cited in the focused literature review, 50% indicated explicitly or inferred that the study subjects should participate, or had participated in the design of the CoSR handover format. 71% indicated that CoSR recipients should ask questions during report, (this is now an accreditation requirement in the USA and Canada). However the literature suggests that questions during CoSR occur rarely.(Stevens 2009 a, Horwitz 2009,Vollp 2003). Further no authors had any objective data to establish if foresight, coping and recovery skills had improved.

One study reviewed a bedside CoSR handover triad in the Emergency department involving i) oncoming RN staff, ii) off-going RN staff and iii) patients. (Baker 2009) This, of course is very common in ICU nursing. Baker does not indicate the influence interruption and time constraint had in her emergency department during bedside report. Still, Baker`s method could be a practical and customizable method to achieve safe handoffs (provided you have the time) at the bedside in many settings (with conscious patients).

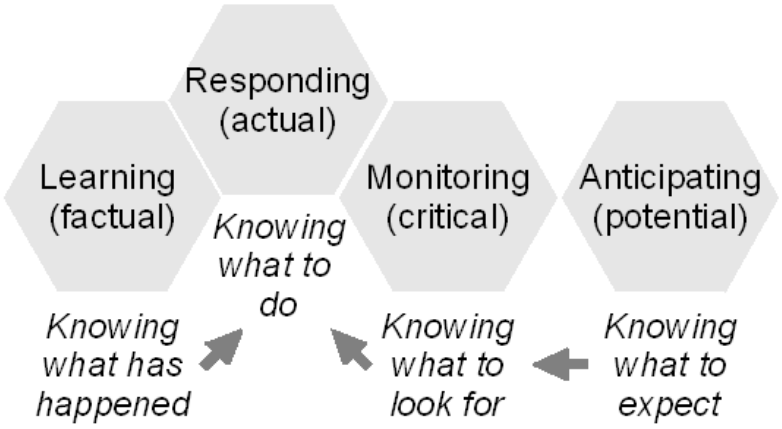
Resilience

Clinicians experience successes far more than failures, while using essentially the same tactics to get through their day. A resilience perspective looks at how clinicians create success or dynamic stability by modifying their tactics to the constantly evolving clinical situation. Resilient clinicians assess, reassess and use resources proactively in the face of anticipated or realized disruptions. They dynamically balance and proactively manage production pressures such as; changing patient acuity, interruptions, time constraint and conflicting priorities in order that they effectively balance efficiency-thoroughness tradeoffs. Resilient systems of care require anticipation of changes, constant attention, course corrections, reassessment, monitoring and feedback.

Hollnagel, Nemeth, Dekker (2008)

Hollnagel says that a working definition of resilience can be made more explicit by identifying four main factors, each representing an essential system capability. These four essential capabilities are; Learning, Responding, Monitoring and Anticipating:

Fig 1. The four essential capabilities of Resilience Erik Hollnagel



i. Response involves knowing *what to do,* and how to respond to regular and irregular disruptions and disturbances by adjusting normal functioning. This is adaptation is based on perceived and understood feedback, the ability to address the *actual.*

ii. Monitoring involves knowing *what to look for,* by monitoring (constantly or periodically) that which is or could become a threat in the near term, such as monitoring vital signs in response to therapy. Since we don't usually monitor everything, this is the ability to address the *critical.*

iii. Anticipating is knowing *what to expect,* or how to anticipate developments and threats further into the future, such as potential disruptions, pressures, and their consequences. This is the ability to address the *potential*...

iv. Learning involves knowing *what has happened* and how to learn from experience, in particular, how to learn the right lessons from the right experience. This is the ability to address the *factual.*

If a resilient system (or individual) is to be able to pay attention to the: actual, the critical, the potential, and the factual, then the principles of resilience engineering may then be manifest in practice.

Hollnagel, E. *Scope of resilience engineering* (unpublished draft).
2010 June 3-4 Beyond Reliability – Vancouver BC

Like a bicyclist, a healthcare provider can create dynamic stability through receiving and acting upon constant inputs and feedback. The following example of the Intensive Care Unit in this study, illustrates a "resilient recovery", one where not following a 'rule' saves a life.

A woman in her mid 50s had had a successful lobe resection for lung cancer, and was in the ICU the day after surgery. Mid day, after ambulating for the first time since surgery, she suddenly collapsed in the ICU hallway from what is quickly determined to be a massive cardio-pulmonary embolus (clot). By chance the patient's family, surgeon, intensivist, nurse practitioner, ICU nurse were all present in the ICU. The definitive treatment is immediate cardio-thoracic surgery on cardiopulmonary bypass which is not available at this hospital. Despite it's absolute contraindication in post operative patients, a decision was quickly taken (with familial consent) by the Intensivist to administer Tenectaplase, a potent drug intended dissolve the clot(s). This expectedly resulted in massive post operative bleeding which was successfully managed, despite considerable risks and challenges. Rapid effective teamwork had saved this patient's life. She was able to return to her family (well) within several weeks.

White 2009 in Hill and Nyce,J. 2010

How clinicians use discretionary space is an important part of expertise, and individual resilience. Success (or failure) as judged by the clinical outcome may determine the organizational response. In this case of being 'clinically between a rock and a hard place', the outcome was positive and could be celebrated or more likely accepted as a natural product of ICU expertise, things like this occur all the time. Had the patient died, however, the clinical judgment of the Intensivist might be scrutinized in hindsight.

If clinicians experience success far more that failure, using essentially the same tactics why are we surprised by failure? From an organizational resilience perspective, 'work processes do not choose failure, but drift toward it as production pressures change (usually increase) and erode defenses that normally keep failure at a distance. This drift is a result of systematic and predictable organizational factors at work, not simply erratic individuals". The following are patterns found in 'second stories';

i. *Workers continually revise their strategies to remain sensitive to the possibility of failure while adapting to increasing resource and production pressures.*
ii. *Workers are only partially aware of the potential for failure*
iii. *Change creates new paths to failure and new demands; even strong and resilient coping strategies can become ineffective over time.*
iv. *Overconfidence in the coverage of anticipation of types and mechanisms of failure*
v. *Missed side effects of change*

Patterson, E.S., Cook, R. I. and Woods, D.D. (1994)

A recent example in British Columbia was the failure of a medical device reprocessing (MDR) system in a hospital. Bone chips were discovered on a 'sterile' instrument immediately pre- incision, while being readied for use in orthopedic surgery. As a result all elective surgery was cancelled for a week [with much negative media coverage] while the "problem" was remedied. One of the contributing, upstream factors was government mandated improvements in access, reductions in surgical wait times [production pressure] in the context of fiscal restraint [budget cuts] which meant an increasing technical load on MDR staff who did not the sufficient; time, resources or tools to respond to the demand…and the system organization / prioritization failed. The MDR workers were in the center of this embarrassing drift into failure.

Efficiency –Thoroughness Tradeoffs - ETTO

"The predominant explanations that psychologists and engineers attribute performance failures to, is a mismatch between demand and capacity, but that they curiously neglect the fundamental fact that *everything takes time*, and *takes place in time*." (Hollnagel 2009 p.26)

Fig 2. Efficiency - Thoroughness Tradeoffs (ETTO) Erik Hollnagel

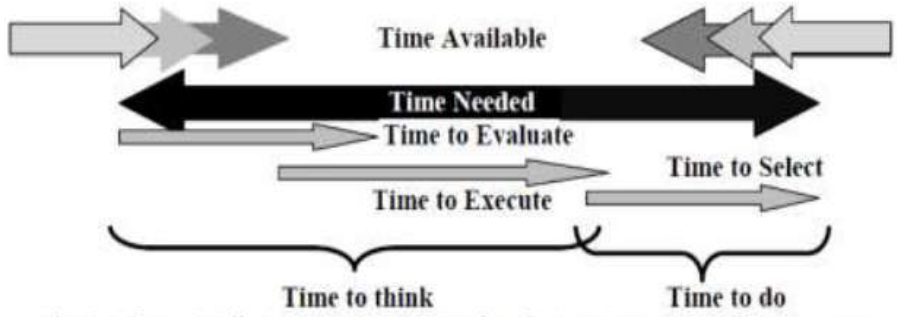


Fig 2.2: from (Hollnagel 2009 p.27) Overlapping representation of action steps

"Efficiency –Thoroughness Trade Offs (ETTO) are continually managed in real time by practitioners and often times thoroughness is intentionally sacrificed for efficiency". (Hollnagel 2009 p.61) Change of shift report is an example where tradeoffs of efficiency (time constraint, production pressure) and thoroughness (clinical detail, faint signals, subtle nuances) are common. The following illustrates the attempt by a Respiratory Therapist to manage this ETTO in ICU under severe time constraint.

> *A Registered Respiratory Therapist (RRT) is receiving fifteen -thirty minute change of shift report (CoSR) in an Intensive care unit (ICU) for his eight to ten patients, [most of whom are on life support]. In this short time period which includes multiple interruptions, he will conduct a rapid "head to toe" review of organ system problems and ongoing treatment for all of his patients and interact with several different colleagues. He feels that the first CoSR in his 'set' of four shifts is the most risky because many of his patients are new to him. There is no standard process for this, everyone does it differently. With experience he has developed his own habit of asking both the Registered Nurses (RN) and Registered Respiratory Therapist*

(RRT); "What should I be most worried about tonight and why?" Other colleagues have their own techniques as well.

(Hill 2010)

At the micro level, at change of shift report (CoSR handover) for example, a healthcare worker may develop individual strategies in an attempt to cope with ambiguous cues, data overload and interruptions under severe time constraint.

Expertise - The power to see the invisible Klein

Expertise:

One view of experts is that they have accumulated lots of knowledge. In many fields the time thought to be needed to develop this expertise is ten years (Klein 1999 p.147) . However Klein's work "*Sources of Power, how people make decisions*", [suggests that] experts see their world differently. They see things the rest of us cannot. Their accumulation of domain experience does not weigh them down but rather lightens them up. Experts may not even realize that others are unable to detect what seems obvious to them….their power to see the invisible. (Klein 1999 p. 147)

The things experts are able to see things that are invisible to novices such as; i) patterns , ii) anomalies, iii) the big picture /situation awareness, iv) the way things work, v) opportunities and improvisations, vi) past or future events (anticipation), vii) subtle cues too small for novices to detect and viii) their own limitations. These eight aspects of expertise are related to what Klein calls primary "Sources of Power"; Pattern Matching (Intuition) and Mental Simulation. Pattern matching is the ability to detect typicality, [the state of normalcy, that which is typical] and to notice events that did not happen or other anomalies that violate a pattern, based on their experience. Mental simulation is the ability to see events that happened previously and events that are likely to happen in the future. Other sources of expertise are the ability to make fine discriminations [judgments] involving perceptual

learning and to see and manage one's own limitations. So experts may know more than novices, but they *know and act differently than novices*. Their expertise is aided by *learning how to perceive*, their knowledge and rules used are incidental. (Klein 1999 p 168) Experts can also stand back from their own thought processes (meta-cognition), the process of thinking about thinking. Experts are better at forming situation awareness and the big picture, and can also detect when they are starting to lose it, and intervene earlier avoiding panic.

This may have important implications for training in healthcare, if expertise is interpreted as learning *how to perceive*. The fields of technical training in healthcare are dominated by knowledge, rules, facts, procedures and clinical guidelines. Skills and knowledge are typically imparted as linear, decomposable segments of procedural tasks. (Klein p.168) While this strategy can be effecitve in high turnover roles with minimally educated workers, they are not sufficient to teach highly educated people how to apply their detailed knowledge *in context* to gain higher levels of expertise and make better judgments and decisions. *"Confidence dissipates when novices realize that applying procedures depends upon context, and no one can tell them what that context is. Judgment and decision making in natural settings are rarely straightforward.* (Klein p. 169) To continue the bicycle metaphor, most people outgrow the need for training wheels, and develop a sense if bicycle dynamics. *"Novices follow rules whereas experts do not"* (Dreyfus 1986) So if we want people to think like experts it makes sense that we should understand how experts are thinking, *or at least ask them about this and to extrapolate from these statements,* which of course is the point of this work.

An understanding of how experts think might be achieved using detailed cognitive task analysis which describes the expertise needed to complete complex tasks.(See Klein 1999 p.169-175) Expertise can be divided into three broad categories; Social, Cognitive and Physical. Cognition is described as macro-cognition (planning & detection) and micro-

cognition (puzzle solving). Both forms of cognition are usually tested in real world settings, such as Intensive care units or OR theaters.

> *Macro-cognition tends to focus on cognitive functions such as decision making embedded in several tasks, sense-making and situational assessment, and problem detection, and on the processes that support these phenomena such as attention management, mental stimulation and storyboarding, and developing mental models.*
>
> (Farrington-Darby & Wilson 2006 p.24)

The cognitive psychological characteristics of experts include having greater skill in;

i. Producing inferences when monitoring ambiguous cues, by making meaning and assessing implications of actions.
ii. Anticipation and processing cues preventatively to make better predictions,
iii. Taking a wide range of global and local data into account in diagnosis,
iv. Encoding new information quickly and completely and
v. Assessing and applying strategies.

(Summarized from Cellier et al in Farrington-Darby & Wilson 2006 p.10 Table 1)

"Intuition is a sacred gift. Rationality it's faithful servant" Einstein (nd)

Intuition

"Intuition depends on the use of experience to recognize key patterns that indicate the dynamics of the situation." (Klein 1999 p.31) Intuition can be said to have a basis in biology, in that healthy subjects experience emotionally *anticipated consequences* of good or bad decisions.

> *"A study involving neonatal nurses in 1993, showed how NICU nurses picked up subtle and ambiguous cues to diagnose early stages of neonatal sepsis before any definitive lab diagnosis, yet they could not describe how they knew. The cues were different for each nurse and each nurse relied on his or her patterns of previous experience. Almost half of the cues were not recognized in the medical literature, and some were the opposite of sepsis cues in adults."*
>
> (Klein 1999 p.40)

Clinical intuition is a controversial topic. Holistic intuition nevertheless supposes that, in our modeling of the world, we are unconsciously influenced by the gaps, redundancies and hidden connections in the data. (Brokensha 2002)

> *"Appreciable evidence now supports the view that useful clinical intuition, far from being an 'esoteric talent', is directly related to knowledge and experience and that it is particularized knowledge that plays a vital role for experts, not inexplicable powers of intuition."*
> (Gott 1988 in Brokensha 2002)

Sense-making in the intensive care unit

Albolino, Cook and O'Conner (2007) studied collective sense-making between attending and resident ICU doctors during bedside ICU rounds. This research looked at how experienced and trainee physicians conducted both formal [collective] sense-making at intervals (during teaching rounds) versus the sense making on the fly (during their work). This was a cooperative set of activities that focused sharply on plans, uncertainties and possibilities of the near future. The ICU round was crucial in collective sensemaking and this shared [collective] sense was a precondition to accomplish the actions that followed. In his or her supervisory / teaching role, "the attending physician is engaged in sense-making about the patient and also in making sense of the presenter's own sense-making". (Albolina 2007 p.134) "Following each [rounds] presentation, the case discussion undergoes a change as attention shifts from; what has happened in the past to what is likely to happen in the future and what actions need to be undertaken" (Albolino 2007 p.134) "Once rounds are complete, the remainder of the day is handled on the fly. Sense-making takes place in real time and the success of rounds is measured, in part, by how well that picture painted at rounds (sense-making at intervals) anticipated the needs of patients through the day. "(*Albolino 2007 p.134)*

> *"Making sense of circumstances and the situation is critical to coordinate cooperative work. The work of ICU teams involves many patients and many different activities in parallel. Work is distributed in ways that make it impossible for any individual to sustain a complete understanding of the situation."* (Albolino 2007)

Situation Awareness (SA) – an ill-defined construct

Endsley said that situation awareness (SA) has three distinct levels; including ; i) Perception of critical factors, ii) Understanding the meaning of these factors integrated within one's own goals and iii)Understanding what may happen in the near future. "Situation awareness involves far more than accurately perceiving the environment. It includes the comprehension of that meaning in context to your own goals and anticipation of the future state". (Endsely 1995) An important and early caution regarding the use of the construct of situation awareness (SA) was described by Flach in 1995. The distinction Flach made between SA *as a phenomenon description* (Level 2 concept) versus SA *as a causal agent* (Level 3 concept) is important. The latter is to be avoided.

> "*.. there is a danger of circular reasoning in which Situational Awareness (SA) is presented as the cause of itself. As a causal explanation, SA is a simple, easy-to-understand wrong answer that, in the end, will be an obstacle to research. "* (Flach 1995)

Situation Awareness remains a problematic concept fifteen years later, being a concept that is difficult to define, or prove the existence of. "There is no unitary understanding of the concept in the human factors literature or among the practitioner communities that apply the label". " There remain some hard questions about consciousness and the dynamics of experience that underlie the conscept of situation awareness (SA). One reason this is the case is that questions about situation awareness are fundamentally questions about consciousness. These are ontological (or metaphysical) questions and will not be resolved ……. in this lifetime. ."(Dekker, Hummerdal and Smith 2010)

Anticipation

> *"Naturalistic Decision Making (NDM) ,[such as work in Intensive Care] , involves two critical elements ;i) Integration of problem solving with other activities, embedded into the larger physical and perceptual context and ii) Continuity of activities over time. The cognitive efforts at any one time are related to the anticipation of future events and activities.*

(Xiao 1997 p.198)

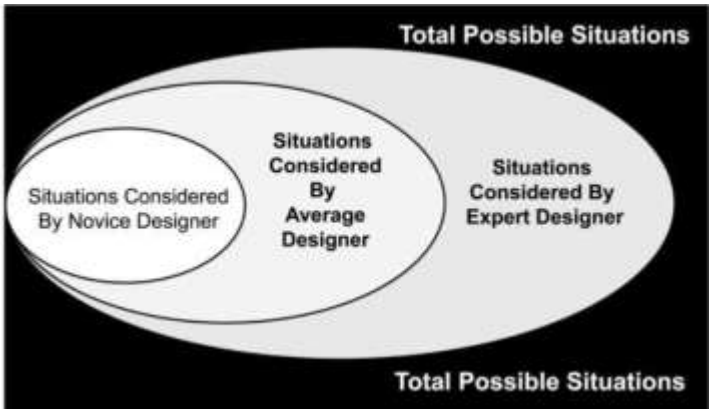
Planning expertise in anesthesiology was studied through observation of 40 cases, in which expert anesthesiologists searched for clues or warning signs that may indicate potential problems. (Xiao 1997) In preparing their ' mental workspace', anesthesiologists listed points of consideration, and 'these warning flags served to guide their attention in a dynamic, multi-tasking environment involving multiple (at times) conflicting goals". *"Timely identification of concerns is more often valuable to practitioners than solutions, and practitioners need more support in identifying potential problems than in solving them."* (Xiao 1997 p.198-204) The generic strategy was to reduce the response complexity through anticipation of future situations, mental preparation (simulation) and organizing their physical workspace. Anticipation is a commonly described attribute or requirement in resilience. Practitioners who sense problems earlier seem to maintain a higher more positive self consciousness about their beliefs and their validity. They also tend to have institutional support for their doubtfulness, and are able to attend closely to the proximal issues and to actively challenge interpretations (Weick & Sutcliffe 2001 p.159)

Lina Larrson (2010) recently conducted a study of handover conversations with anesthesiologists in Sweden, entitled ; "To mobilize for the future, the anaestetist's hand-over talk." She describes in the English abstract, how anesthesiologists create mental images of their patients with numerical values and social attributes, creating an image of their patient. They construct this image of the patient and associated tasks in past,.present and potential future frames.

In the chapter "Requisite Imagination – the fine art of anticipating what might go wrong" , Abramski and Westrum 1999 argue that some designers have the ability to imagine key aspects of the future they are planning , and this involves anticipating what might go wrong, as well as how to test for problems when the plan or design is developed.

Figure 3 Requisite Imagination – the fine art of anticipating what might go wrong

Adapted from Abramski and Westrum 1999 Fig. 1



Foresight

> *"Often, what are seen as clear warnings with the benefit of hindsight after the fact, were discounted before the fact. "*(Woods 2009)

David Woods says that establishing foresight involves extremely difficult cognitive work and is an unstable process involving dynamic patterns of system behavior and assessments of where systems are resilient or brittle. Foresight is difficult to establish when there are dynamic or cyclical tradeoffs of efficiency, and it requires personal or organizational self reflection to critically evaluate adaptive capacity in order to recognize when brittleness is on the rise.

> *"The creation of foresight relies on resilience and anticipation, looking for gaps between work as imagined and work as performed and how practitioners anticipate bottlenecks in order to prepare for the unexpected, prospectively. Finally, foresight is created by managing system resilience."* (Woods 2009)

Summary

Some recent application of HR principles to Pediatric ICU handover rounds appears useful. Resilience principles, especially intuition, anticipation and foresight may be useful in the

dynamic management of efficiency thoroughness tradeoffs. The development of expertise is related to meta-cognition and to adjusting how one perceives the world to apply considerable knowledge. Clinicians can and do learn how to perceive and manage their attention by interacting with more experienced peers. They may develop expertise [and intuition] through use of feedback and pattern matching. The creation of foresight relies on resilience and anticipation, to proactively detect bottlenecks in order to prepare for the unexpected, thereby by managing and creating system resilience.

Chapter Three – Research Question and Qualitative Methods

Research Question
Research Ethics Review and Certification
Methodology / Epistemology
Methods

- Participant recruitment
- Participants (MD/ CCRN/ PCC-RN/ RRT)
- Data confidentiality and security
- Interview questions
- Data gathering and transcription

Research question: "What techniques do ICU clinicians (nurses, physicians & respiratory therapists) report that they use to develop their intuition and foresight at change of shift report in ICU?

Research Ethics Review: A detailed research proposal was submitted to the Health authority's Research Ethics Board (REB) and revised for the REB several times. The process reviewed all aspects of the research including methodological appropriateness and ethical considerations. The process was a delegated review because the research did not include clinical research on human subjects. Appendices A_1,A_2 , B and C include the; i) information form, ii) consent form, iii) interview guide and iv) the REB Certificate as required by this process.

Methodology /Epistemology:

The qualitative methodology used here is narrative inquiry which explores the research question posed. The clinicians' individual lived experience, reported by them in an interview of change of shift report in ICU was the topic under study. The participants of the study are all practicing clinicians in three different disciplines in the same ICU setting, (Physicians, Nurses and Respiratory Therapists). The methodology is informed by the more general objective of attempting to improve anticipation of and the avoidance of preventable adverse events. This methodology was chosen over others such as; grounded theory, ethnography and phenomenology because there is no theory being tested and the study did not involve

direct observation in the practice setting. For this research question, interviews are also an appropriate approach from an epistemological standpoint, "how you know, what you know". "The notion of collaborative construction of knowledge positions the interview as a social interaction where the respondent and interviewer share interest in the topic." (Warren and Karner 2010).This is certainly the case here, and participants volunteered an hour to be interviewed on the topic. " Interviews can tell us about the social interactions of the interview, but they can also provide accounts of circumstances outside of it." Warren and Karner (2010) p.173

Methods:

Participant recruitment:

After a preliminary operational meeting, Dec 10 / 2009, permission was granted by the clinical managers/directors of ; Intensivists, Nurses and Respiratory therapy to conduct the study in the Multisystem ICU at Kelowna General Hospital pending REB approval. The researcher and the three leaders discussed ways to avoid any perceived or real coercion including ; i) Participation being completely voluntary, ii) The managers would simply distribute the research study brochure (Appendix A_1) by internal mail and/or Email, and not discuss participation with their staff. The managers had no knowledge of who had accepted the invitation, and were indeed careful to avoid any perception of coercion.

Participants: Thirteen (13) participants were recruited and interviewed over a period of 2 months. These included four (4) subgroups of clinicians specializing in Intensive care medicine. It comprised of; four physicians, four Respiratory Therapists, five Critical care nurses, three of whom had acted as Patient Care Coordinators (PCC). Patient Care Coordinators worked 12 hour days on rotating shifts every day of the week and functioned as unit managers. All of these clinicians normally oversee or provide direct care to a group of

hospitalized ICU patients, and give / receive CoSR to colleagues with similar responsibilities. The interviews were conducted away from the 'bedside', with individual ICU practitioners in a location near the ICU that allowed for privacy and no interruptions.

Data confidentiality and security:

All participants were provided with the consent form (Appendix A_2) at least 1 week before the interview scheduled, and each signed the consent immediately prior to interview. The consent form details the data security measures which include; i) that the recordings and printed discussions are password protected and kept in separate locked cabinets ,ii) Audio recordings are/were double deleted from the digital recorder, iii) All documents / data will be securely retained for seven years (June 2017).

Interview Questions: The question bank was pilot tested (Feb 8/2010) with a volunteer who had recent clinical experience. This interview was audio recorded and was observed by an experienced qualitative researcher who confirmed that the interview questions were indeed, open ended. These questions (Appendix B) were used as a general guide, but the methodology allows for some flexibility in using, adding to, deleting, expanding, or in other ways changing the substance or order of these questions. During the participant interview, the researcher used probes to help clarify both issues and questions. Any potential bias was mediated by; open ended questions and member checking post interview to ensure the interviews had accurately captured the clinician's meaning. This narrative inquiry approach was strengthened by the researcher's familiarity with the subject area of change of shift report (CoSR) in Intensive care environments.

Data gathering: Fourteen, face to face interviews were conducted, each in private with each participant. (One interview was duplicated due to audio recorder failure). Interviews were digitally (audio) recorded, the use of this recording device was disclosed in the consent form, and the device was in plain view during the interview. Digital audio interview files were

transcribed and edited by comparing the transcribed text to the recorded information to ensure accuracy and punctuation. The purpose of this qualitative interview was to elicitate narrative stories from the participants that indicate meanings *they give* to those aspects of Change of shift report in ICU we discussed in the interviews. The edited transcripts were then sent to each participant, (April 2010) prior to further data analysis as "member checking" to ensure that their meaning was accurately captured.

Table 1 – Data by ICU subgroups

ICU Subgroups	Data transcribed pages
Patient Care Coordinator - Nurse (3)	36 total (Range 11-14) mean 12 pgs
Bedside Critical Care Nurse (2)	13 total (Range 6-7) mean 6.5 pgs
Registered Respiratory Therapist (4)	42 total(Range 9-12) mean 10.5 pgs
Physician Intensivist / Internist (4)	40 total (range 6-15) mean 10 pgs
All ICU participants	132 pgs transcribed data single spaced

Chapter Four – Research Results and Analysis

Analytic approach:

The intent was to develop [as an endpoint] analytic descriptions of any recurrent patterns or themes that emerged from the data, to construct a cohesive representation of the meanings represented within the data, while being open to the direction that the data takes the analysis. Warren & Karner (2010) p.218

It was anticipated (but by no means certain) that a set of recurrent themes would emerge and that they could be linked to the research literature, however (at least initially) the analysis technique bracketed the patterns in the literature. This was a conscious effort to avoid prejudicing emergent analytic descriptions or patterns. This did however result in a tendency sometimes to see the 'forest rather than the trees', the trees being the research question posed.

Analysis phases:

1. Initial transcript analysis and member checking
2. Open Coding
3. Analytic patterns and themes (Research results)
4. Narrowing the focus
5. Collation of themes - Potential themes of analytic descriptions
6. Validation process

Phase 1 Analysis: A conceptual understanding of *what* research questions the data answered was attempted. At this stage, member checking was done by email [each participant's data only to each participant]; so as to confirm that their individual interview themes, ideas and meaning were consistent with what the participant meant to say. There were no additions or deletions to the 132 pages of transcribed data after this point.

"If your goal is to understand the meaning of the life-world of your subjects, then asking them if you have it correct is one way to verify your approach". (Warren and Karner 2010 p. 243)

Phase 2 Analysis: Open coding of raw data transcripts sought the big picture from the data before narrowing down the analytic focus. The insights that came during re-reading transcripts were the first steps in identifying initial patterns and themes. It was important to be open at this point so as to not miss something important, by prematurely precluding it." (Warren and Karner 2010 p. 218)

Research Results:

Phase 3 Analysis: Open coding was used to develop analytic patterns and themes. A thematic summary follows on Table 2.

Table 2 - Change of Shift Report – Thematic summary
1 Receiving report : • Requirement for face: face listening to short term goals, tasks and & big picture (radar) in anticipation of what might happen today and then next day. Involves all
2 Opportunity to ask questions; • Face: face exchange opportunity to seek clarity on diagnostic dilemmas ["wierdomas"] & synthesis about histories & big picture (radar) to aid anticipation. Involves all
3 Characteristics of an excellent CoSR • Dynamic balance of; brevity, relevance of selected clinical detail (data) and synthesis (telling a coherent story). Involves all
4 Techniques to improve anticipation, intuition and Foresight. Involves all
5 Integration of multiple reporting mechanisms. Involves all except bedside RN
6 Preparation for giving CoSR • Preparation is a mind set – What does my colleague want to know so that s/he can get going? Developing a coherent, relevant and brief story for your colleague is the purpose. Involves all
7 Traffic Control (PCC only) • Anticipating workload, staffing, equipment, transfers, and family dynamics on top of clinical dynamics.
8 Managing bedside rounds. Involves all
9 Continuity of medical approach • A team of 5 Intensive care doctors recognize that while their science is consistent (protocols/ guidelines) their artistry and performance is highly individual. They recognize that both ICU staff and, [at times] patients and families see this. They have developed a few strategies to manage it.
10 Managing communication within the ICU Involves MD& PCC only
11 Bedside coverage for breaks Involves RRT & RN only
12 Peer approval / Variation in CoSR content "Do unto others" Involves all

Phase 4 Analysis: The focus was narrowed here by asking 'What is the most compelling aspect of this data, relevant to the research question; "What techniques do ICU clinicians (nurses, physicians & respiratory therapists) report that they use to develop their intuition and foresight at change of shift report in ICU? Five (of twelve) themes were examined in more detail since they all emerged from discussions by ICU clinicians about their; preparation, anticipation and intuition during Change of Shift Report. These themes include;

Techniques to improve anticipation, intuition and foresight.

- Opportunity to ask questions
- Characteristics of an excellent CoSR
- Preparation for giving CoSR
- Traffic Control (by the PCC).

Again, care was taken at this point not to relate these emergent themes to the literature already reviewed. This collation was subdivided by ICU profession to first get a profession specific view point for each of; MDs, PCCs, RRTs and RNs.

An incidental but crucially important finding was that interdependent communications which occurred during the cascade of different reporting mechanisms at handoff was mapped. There appears to be an active synergy in the way ICU teams update their; risk models anticipation, intention and foresight both individually and collectively. It became obvious that various handovers begin an interdisciplinary cascade of planning communication, toward formulating the elusive big picture (foresight) of what was going on for multiple patients and how the ICU disciplines coordinate their care. The Intensive Care CoSR Integration Map documents the overlapping and cascading report during the time period (defined by one Intensivist) as "Sacred Time". (Table 3) This study demonstrates interdependence necessary among the professional groups to build and sustain an understanding of the complexity in ICU. The role of the PCC seems crucial.

Table 3 - ICU CoSR Integration Map - Overlapping and cascading report

TIME	LOCATION	TOOLS	Change of Shift Report (Staff going home to Staff starting shift)
0700-0730	RRT report @ ICU desk	RRT Daily CoSR report format - Kardex	A side: RRT going RRT starting; B side: RRT going RRT starting (12 hr D / N) — High level clinical review ,multi systems/ 6-10 patients per RRT pair
0715-0745	*Nursing (Charge to PCC) report in private report room*	ICU Pt Census - Notes made by PCC ICU RN CoSR for Charge or PCC.jpg	*Charge RN (12 hr nights)* — *Patient Care Coordinator RN (12 hr days)* Intra disciplinary • *Unit Manager view of ICU /PARR/SCCU and other units* • *Very rapid & prioritized ,high level clinical, logistics & psycho-social review ,multi systems/ 20 + patients* • *After this, most PCCs will do a 'drive by' round at each bedside in ICU to re-confirm information shared by night time charge RN, and get the **big picture** of the unit*
0730-0745	12 x ICU Bedside RN CoSR	ICU Flowsheet Very detailed	RN going RN starting (repeated)
0730-0740	ICU	RRT daily CoSR	2 RRTs starting the day in ICU – Intra disciplinary, may do cross over report to coordinate breaks
0745-0900	Initial care RRT /RN	Initial RRT / RN exchange info	ICU RRT & Bedside RN exchange information on their patient from different perspectives While both RN /RRT begin their detailed clinical assessments
0730-0900	ICU Bedsides	RN crossover	Bedside RNs coordinate breaks & anticipated transports or interventions. PCC aware
0900 - 0930	X-RAY VIEWER ROUNDS	(PACS) ICU Pt Census - Notes made by PCC	PCC-RN INTENSIVIST PHARMACIST RRT Med Student Social / Dietary • *Very rapid & prioritized ,high level clinical problems based review & important logistics review* • *Interdisciplinary multi systems/ 20 + patients, (12 beds ICU + 8 beds Surgical –CCU / PARR)*
0930 - LATER	BEDSIDE ROUNDS	EACH BEDSIDE ICU Flowsheet Very detailed	INTENSIVIST BEDSIDE RN RRT PCC-RN PHARMACIST OTHERS • *More detailed head to toe problem based round / Interdisciplinary multi systems / 12 ICU beds*

Several Intensivists noted that interruptions and absences during rounds were problematic. "ICU 'sacred time' was seen by one Intensivist as between 0700-1100 hrs during which all hands should be 'on deck'.

> *"I feel that from 0700- about 1100 is "sacred time" and all hands should be on deck for rounds." MD-D*

> *" Sometimes rounds are very disjointed because we're getting interrupted a lot or there are people crashing in Emergency or on the wards or the RTs are absent because they're doing a transport, and those are the situations where information doesn't get passed on, the information gets missed. That is the problem. For a while there both RTs were often out of the unit at the same time. …….. It was really bad for a while and finally I just said "look, there has to be one of them on rounds with us". How can they not come on rounds with us and know the plan for the day? So it has been a lot better "MD-C*

Phase 5 Analysis: The collated themes by profession were inventoried to look for common patterns among these groups. Common themes were; i) Less experienced practitioners seem to be more aware (or concerned) about how they are perceived and more likely to tailor their report to the expectations of their more senior peers, ii) An ideal Change of Shift Report (CoSR handover) is described by all as a balance of ; brevity, relevance of clinical detail (data) and rhetoric as well as synthesis (telling a brief, relevant and coherent story) and iii) Preparation is seen as a learned skill and one reinforced by one's peers;

> *"I personally go in before those rounds and see the patients that may be unstable, or I will ask the staff who they are worried about. I find that that is where most of the information is gleaned from what has happened last week and anticipation of what might happen today and then next day."MD-B*

Intuition and Foresight at CoSR handover – What Physicians tell us

The four physicians interviewed discussed CoSR handover in two settings; i) the weekly Intensivist Handover (signout) round, conducted away from the bedside and ii) daily handovers. For the weekly Intensivist handover, (Monday mornings) most intensivists interviewed said that they; i) Look over at the unit quickly before handover rounds, ii) Prepare pre-handover , iii) Ask RN/RRT staff who they are worried about, iv) Ask open ended questions such as 'What else is on the radar ?" And v) Read their colleague's notes to learn about their: goals, problem list, what they've done with each one and what they expect.to occur in the future. None of the physicians said that they learnt or used any specific routines developed to anticipate and develop intuition and foresight.

One physician said;

> " *...This is an area where you can get a lot more bang for your buck if you actually are focusing on those patients who could get sick or are unstable and what your anticipated, or things you think could happen could occur." We don't have anything standardized that we actually refer to, so we just basically [each one of us] will discuss the pros and cons of an individual patient as we see them."MD-B*

Most physicians used anticipatory language when developing and describing *their* big picture.

"What else is on the radar?" The other ones that are even more peripherally on our radar are the travelers ['Snow Birds']. Handover [in theses cases] is always third party through mediators, insurance company Docs /Nurses mostly who've not laid eyes on the patient..."MD-D

Preparation is a learned skill and is reinforced by peers both when delivering handover and as preparing to receive handover

Delivering: *"When I'm handing over at night I'll say "the two sickest people in the unit are these two people and here is what is going on with them" MD-C*

Receiving: *"Preparatory time pre-signover is important for me... a tiny bit of scaffolding for each patient. For example, we had a guy that we thought had botulism. I remember thinking, man I'm glad I had ten seconds to have a look at what his trajectory was... to have some of that preparation, it gives you some expectations." MD-D*

Intuition and Foresight at CoSR handover – What Patient Care Coordinators tell us?

The three Patient Care Coordinators interviewed use face to face CoSR as an opportunity (away from the bedside) to seek clarity and synthesis about whole unit problems and progress and attempt to see the big picture to aid anticipation. Their retrospective focus (for the whole unit) is on what worked for the patients most proximally (vasoactive drugs/ ventilation strategy) while their prospective focus is on what might happen in the next few hours; such as ; anticipating workload and staffing , equipment needs, patient transfers and family dynamics on top of clinical dynamics.

"CoSR helps us in anticipation and predicting the future. I want to hear just the 'quick and dirty' as to how the person did, that also gives me information to approach the physician if necessary right away. Who do we have to deal with first?" PCC-C

Both the night shift charge nurse (in the morning) , and the PCC (in the evening) are expected to synthesize the clinical details on multiple patients into something that can help anticipate what might happen in the next few hours. Most PCCs trust report, but will also verify and update their view immediately after CoSR at the bedside.

"I have frequently been told that everything was fine, vital signs were stable, no issues.....and then I get into a room and find out that in fact; an hour before the blood pressure has crashed and they are back

on vasopressors (Levophed) which they'd previously been weaning off of . I trust report, but always verify myself." PCC-A

They take a holistic / dynamic view of the ICU(s) and the patients and staff within it. They seem to have what Westrum (2008) describes as a "Restless mind". PCCs cultivate their resilience (flexibility) by using others who are out there on the ward floor such as Respiratory therapists to gather 'intelligence'. PCCs monitor patient flow in and out of the ICU and others units such as the OR or Emergency Department which can impact on ICU. They continually refresh the "big picture" of demands vs. capacity vs. anticipation of the unknown. During handover, PCCs simultaneously listen, synthesize, prioritize and plan.

> *"While I'm receiving that (CoSR), I'm processing that in my head as to what my plans are for the day..... Probably at least 10 minutes (of that 30 minutes) is spent on sort of thinking, where are we going to go with this" PCC-C*
>
> *"….safety is our number one concern and from that what is required to be safe is staffing, so it's kind of a prioritization as to what is necessary to make things work, and then from that kind of flows everything else." "Understanding the big picture is about listening and watching what is going on. It depends on the doctor who is on and sometimes the RRTs "PCC-B*
>
> *…..You need to be familiar with what all your options are in the periphery and have sort of a tentative plan in your head as to things" PCC-A.*

For Patient Care Coordinators (like the ICU Physicians), preparation for change of shift report (CoSR) is a learned skill. This is reinforced by peers both when delivering handover and preparing to receive handover.

> *"I need get a complete picture but also the need to synthesize that picture vs. all the detail." "So that balance is clinical judgment based on experience...the complete (Big) picture vs. appropriate detail e' PCC-C*

PCC deals with multiple patients with multiple problems in multiple units with multiple professions. The PCC is the "go to" person for everybody such as; Physicians, other departments [Diagnostic imaging, surgery], technologists, therapists, specialists, bedside nurses, scheduling. A PCC often acts as traffic, resource and access controller... "*all things to all people*." PCC-A. Typically, s/he will be coordinating; patients awaiting ICU admission,

planning contingencies, matching scarce resources to highest needs, permission and access or admission to ICU, transfer out and inter facility / provincial /country transfers.

> ***"****As a PCC is it a lot of patient care traffic control….. Extremely. You're the go to person for everybody. Also somebody that the bedside nurses can go to with problems, somebody that the physician can go to… they are sort of the coordinator." PCC-A:*

> *"We have thought about those patients who are receiving intensive-like care outside of the Intensive Care Unit. We are making room for patients coming into ICU that require a higher level of care." PCC-A*

The PCC also acts as a communication conduit between units as a prelude to any actualized patient transfer in or out of ICU. They in brief help prepare the ground for incoming and outgoing patients.

> *"As a regional referral center, it's pretty rare that an ICU bed is empty. That's where I find I'm giving a little bit more advice or basically touching base with the people who are receiving the patient in order to give them a heads up as to what is going to be required." ….That's like 'air traffic control' , having a sense of who is in the rest of the hospital or emergency department who are likely to need intensive care services, but you have to have a plan if something happens." PCC-A*

<u>Intuition and Foresight at CoSR handover – What Respiratory Therapists tell us</u>

For the four Respiratory Therapists interviewed in ICU, the CoSR is a face: face opportunity (at the ICU desk) to review and anticipate therapeutic problems, to plan and coordinate work in anticipation of emergencies, and develop a synthesis of the patients to get <u>*a*</u> big picture (vs. *the big picture*) to aid anticipation and foresight. All RRTs reinforced the importance of face to face communication and having the opportunity to ask questions.

> *"One of the hospitals I used to work at, our report was done by tape recorder." Just telling me the end result doesn't necessarily tell me anything about the patient. So that is why I really disliked getting our report by tape recorder."* RRT-B

> *"I much prefer face-to-face , because sometimes you're missing things and maybe the person on the phone is somewhere else being distracted ...I just don't think it's as thorough as it could be and you forget things. "RRT-A*

CoSR handover is seen as a planning, preparatory and forecasting time. The more experienced RRTs required less detail but wanted more relevant data synthesis from their

more junior peers. *"I generally just limit it to what has happened [that is important] in the past 12 hours, what is going to help them know what to do for the next 12 hours." RRT-D*

Contextualization of CoSR for the recipient is important especially for less experienced RRTs and this creates some variation in CoSR format. The preference by most (3/4) is to give /receive report at the bedside vs. the current practice of doing so at the ICU desk area. Like their other ICU colleagues, preparation (for RRTs) is a learned skill, reinforced by peer pressure, that aids anticipation and foresight, and helps limit surprises.

> *"I think it definitely helps to forecast because the whole point is to make a [prediction], you don't need every bit of info." RRT-A*

RRTs were wary of downtime. "*When you're not busy things get left behind "RRT-B*

"It's easier to resuscitate a patient who is alive"

(P. Brindley in Hill 2005)

Anticipation of, [and preparation for] unexpected emergencies was the most common and recurrent theme among RRTs when discussing intuition and foresight at CoSR handover. This may not be surprising since RRTs are primary members of cardiac arrest / rapid response teams who often are called upon to respond (anywhere in hospital) to airway and cardio-respiratory emergencies. Critical care outreach teams (CCOT) are beginning to respond more preventatively to look for deteriorating patients prior to cardio-pulmonary arrest. (Hill 2005) RRTs learn through experience that both their preparation and anticipation pays off.

> *"When I was a student, one [memorable] RRT had the seven Ps which he pounded into every student who came through. The seven Ps were;*
> *Proper Prior Preparation Prevents Piss-Poor Performance." I learned that the first week and its one thing I remember the most from him. I use it for everything, like ; bronchoscopy, percutaneous tracheostomy, ward patients or whatever…. it's a good little mindset of what's going to go wrong because it's likely going to happen if you're not ready for it." RRT-C:*

> *"It is vital to pay attention to anticipate what is going to happen in the future. If I know that a patient has had a whole bunch of problems ……then I know I am probably going to have something that I will have to deal with fairly quickly in my shift. I plan my shift during receipt of handover report. .....I know that we are going to formulate a plan at rounds, but that might not happen with that specific patient until say 12 or 1 o'clock if it's busy. ……..So I want to know what we're supposed to be doing so I can try to continue along that plan and keep the continuity going." RRT-B:*

RRTs reported that they keep their eyes and ears open to what is going on outside of ICU. For example, wards based RRTs will drop by ICU to communicate the pulse of the hospital. This was very useful to help the PCC maintain his/her big picture and create foresight. Like PCCs and bedside nurses, RRTs were consistent about passing on their gut feelings, occasionally calling in after they've left shift. All RRTs reported that are acutely aware of the potential for being blind sided and will check with the PCC or unit clerk for those transports or transfers that did not get communicated. The more experienced RRTs were clear that anticipation (and foresight) were skills that could /should be developed through a focus on

preparation and "what could possibly go wrong today". They actively train their students and new staff members to prepare for and anticipate the unexpected.

> *"…You're always thinking ahead of the worst case. So for the new grads I try to suggest they get their day planned early so you have at least something to follow. It's not going to last, but prioritize and figure out how to prioritize. The less you do, the less you get done..."* RRT-C:

> *"…Most RRTs are good at anticipation and knowing the pulse of the hospital. They could be in the ICU but they knew what was going on with a ward patient, in Emergency… they had a feeling and were just listening to conversations, or just seeing how everybody else's day was going. They just had a pulse on what was happening."*RRT-C

Intuition and Foresight at CoSR handover – What Critical Care Nurses tell us?

The two Critical Care Nurses interviewed conduct CoSR report in front of ,or immediately adjacent to the patient and so, [unlike Doctors, PCCs and RRTs], have immediate access to real time visual, auditory and ICU flowsheet data. They seemed less impacted by surprises, (vs. other ICU staff) because they are in front of 1 or 2 patients for their 12 hour shift. They began mentally preparing for CoSR about 3 hours prior to end of shift. Contextualization of CoSR for the recipient is less important. Like the RRTs, bedside RNs are acutely aware of the potential for being blind sided (by themselves and others). There seems to be a problem especially regarding transports of ventilated patients to CT/MRI, that may or may not get communicated.

> *"I've been pretty good at that [foresight]. I think its experience.* RN-A

> *"More experienced nurses don't necessarily need a lot of information, because there is sufficient detail and sufficient prompting in our flow sheet, it really functions are your checklist. I usually start preparing for CoSR four hours prior, 3:30 in the afternoon. I start thinking what is important and reviewing what has been going on through the shift."* RB-B

Analysis Phase 6; This analysis phase is a validation process which includes external validation and member re-checking with participants. The steps are to;

1) Re-evaluate the data as to its appropriateness to the interpretation so imposed upon it. The data must be conceptually and logically appropriate to the research question. This was accomplished through the first five analysis phases.

2) Reframing the analysis to assess the 'goodness of fit' of the analysis technique, by trying to use this same data to validate the interpretations made in the previous analysis sections.

3) Seeking external validation (group /member checking). In this last step, the qualitative interpretation is externally validated by;

i) Sharing the interpretation with the research subjects first (member checking). This was accomplished May 22 by sending the participants Tables 2 and 3 by email, see Appendix G: Member checking – follow up communication to participants.

ii) Sharing the interpretation with faculty and MSc student colleagues, May 24 and again June 6t by publishing drafts on Lund HF/SS Navigare site.

iii) Validation against the literature reviewed.

Chapter Five – Discussion and Conclusions

Intuition and Foresight at CoSR handover – What ICU Clinicians can tell us

Table 4 Major findings

1	The mechanics of both interdisciplinary and intra-disciplinary CoSR in ICU utilize high reliability principles including; i) two way face-to-face communication, ii) written support tools and iii) content in handover which captures intention. Intention was consistently communicated by all three professional groups, mostly by face to face verbal exchange.
2	There is a common interdisciplinary view of what an ideal CoSR looks like ; a balance of brevity, relevant clinical detail, and a synthesis [telling a brief, relevant and coherent story] aimed at seeing 'the big picture'.
3	Preparation for CoSR is a learned skill and preparation is reinforced by peers in each profession studied. Less experienced practitioners are more likely to tailor their report to the perceived expectations of their more senior peers.
4	Resilience principles and techniques are used in the development of intuition and foresight by all but especially by bedside critical care nurses.
5	Various morning CoSR handovers begin an interdisciplinary cascade of planning communication, toward formulating the elusive big picture (foresight) of what was going on for multiple patients, *prior to rounds* and the ICU disciplines which coordinate their care. There appears to be synergy in the way ICU teams actively update their; risk models, anticipation, intention and foresight both individually and collectively.

Meaning and importance of the findings

Finding 1) This group of ICU clinicians tell us they utilize ; i) Two way face-to-face communication, ii) written support tools and iii) content in CoSR handover which captures intention. (Although intention is primarily communicated by verbal exchange). These are the same best practices in another safety critical work such as shift handover communication in the Aerospace industry, specifically the Mars Explorer Rover Surface Operations. (Park and Mishkin 2005). This is important because it establishes that the technique this group of ICU clinicians use is also found in other high reliability organizations (HRO).

Finding 2) This group of Intensivists, Critical Care Nurses and Respiratory Therapists all reported that they want to receive the same three features in CoSR from their colleague's; i) brevity, ii) relevant clinical detail and iii) a synthesis telling a brief, relevant and coherent clinical story. The importance here is the consistency of the expectations of three different professional groups who train within their own circles, yet practice very closely in a multidisciplinary high stress ,'intense' environment where the margin for error is slim. This commonality will be a strength to build upon for further consistency.

> *"We train clinicians in profession specific groups by having them memorize algorithms (constraining variability) and pass tests, and then expect them to practice in teams where performance variability may be exactly what they need."* Robson (2010) Personal communication.

The multidisciplinary crucible of ICU may be a place to start standardizing an approach to rounds due to the apparent pre-existence (at least at this site) of a common view of what an effective CoSR looks like. A question that needs further research is to what extent there are similiarities in rhetoric each professional group uses in these handoffs.

Finding 3) the expectation of; consistent, brief, relevant and synthesized CoSR is reinforced in practice through real time feedback of peers, primarily by "doing unto others as you would have done to yourself". In return, less experienced peers consistently alter, or calibrate their CoSR technique to match expectations of their more experienced or influential colleagues. The consistency of the expectations of experts for ; brevity, relevance, coherent synthesis in CoSR, as well as the role peer pressure plays in creating meaningful CoSR may create an opportunity to improve communication within and between professions in ICU, since they are already quite literally on the same page.

Finding 4) Intuition and Foresight: What does Resilience in ICU practice look like?

Anticipation, monitoring, response and learning are four key components of resilience. It is the ability to see; *the potential* (to anticipate), *the critical* (to monitor), *the actual* (to respond) and the *factual* (to learn). (Hollnagel 2010) Recall that anticipation involves knowing what to expect, the ability to address the *potential.* ICU clinicians (Doctors, PCCs and RTs) told us in their responses to questions about CoSR, that they utilize resilience principles and techniques to develop their intuition and foresight.

For example, they **anticipate** (*potentials*) by asking questions such as; 'who are you worried about', or 'what else is on the radar?". RTs and others actively anticipate and prepare for unexpected emergencies…. "Proper prior preparation prevents piss poor performance – the 7 Ps" RRT-B. This is similar to planning expertise in anesthesiology in which experts searched for clues or warning signs that may indicate potential problems. (Xiao 1997) Of course, all clinicians respond to actual events, but some are more tuned to extrapolate significance from these events. Patient care coordinators, in particular, **monitor** and learn by digging for (*critical , relevant*) information, verified and updated their big picture using many data sources and by having "a restless mind" .They cultivate their resilience by utilizing others to gather 'intelligence', and continually monitoring , refreshing their "big picture" . They monitor demands vs. capacity vs. anticipation of the unknown. They simultaneously listen, synthesize , prioritize and plan.

Finding 5) ICU clinicians (particularly Doctors, PCCs and RTs) told us that the various morning CoSR handovers (Table 3) begin an interdisciplinary cascade of planning communication, toward formulating the big picture (a never really complete picture however)

of what was going on for multiple patients and the ICU disciplines which coordinate their care.

There appears to be an active synergy in the way ICU teams update their; risk models, anticipation, intention and foresight both individually and collectively. The role of the PCC seems crucial. This has important implications for reducing redundancy (perhaps by combining PCC and RRT reports) and for enhancing interdisciplinary communication, since it is already clear that all three professions prefer similar content and format in CoSR. (Finding 2).

Relation to findings of similar studies

Horwitz (2009) studied internal medicine doctors and followed up his 2007 study of a 1 hr curriculum program for medical residents to improve verbal sign-out, Horwitz (2009), ``*What covering Doctors are told about their patients*``. Like (Singal 2010) he called for a Standardized CoSR (sign-out) format, minimum data sets with training, minimizing sign-outs that do not involve the primary team, and fostering a sense of direct responsibility for patients among covering staff. Unlike our multidisciplinary ICU group, only 41% of his staff had asked clarification questions at sign-out.

Philibert (2009) studied sign-outs (CoSR handover) among 116 Physicians and found the impact of physician cross coverage of other services was the most problematic; resulting in some uncomfortable trade-offs between more frequent hand offs. A patient`s risk of an adverse event increased by an odds ratio of 6.30 , CI 95% (3.1-12.30) if the physician on call was also cross covering from another service. This was not an issue in our multidisciplinary ICU group. Albolino (2007) found that the ICU round was crucial in collective sensemaking and this shared [collective] sense was a precondition to accomplish the actions that followed.

Our multidisciplinary ICU group found this as well. Our multidisciplinary group also seems to embody the features described below in the 2005 Australian study.

"The *strongest evidence of reducing incidents was when multi-professional groups of clinicians were involved in clinical decision-making during ward rounds and continuity of care was provided and treatment was not prescribed by the on-call clinician but the patients' allocated care team."* ASQHC 2005

Relation to identified gaps in the CoSR research

The purpose of this work is to discover what clinicians can tell us, not to advocate for one solution over another. This study identified five emergent themes (findings) about "What techniques do ICU clinicians (nurses, physicians & respiratory therapists) report that they use to develop their intuition and foresight at change of shift report in ICU?"

The following questions and answers begin to address some of the identified gaps in the CoSR literature review:

Q1) Do ICU clinicians use any formal mechanisms for Change of shift report (CoSR)?
A1) Yes, Singal 2010 developed a formal mechanism very recently, our group did not

Q2) How do ICU clinicians actually "handover" responsibility and accountability for care?
A2) Through two way face-to-face communication, written support tools and verbal discussion which captures intention.

Q3) Is this skill taught or evaluated in this multi-disciplinary ICU setting?
A3) Yes but only through recurrent individualized, iterative 'on the job training'. Preparation for CoSR is a learned skill and preparation is reinforced by peers in each profession studied.

Q4) What techniques do ICU practitioners use to develop their intuition and foresight?
A4) ICU Clinicians used primarily Anticipation and Monitoring components of resilience.

Q5) How (if at all) do ICU clinicians create; i) foresight ii) coping strategies, iii) recovery strategies? If so, are more able to manage efficiency and thoroughness tradeoffs?
A5) ICU Clinicians used primarily Anticipation and Monitoring components of resilience.

Clinical relevance of the findings

Does Reliability equate to Quality at Rounds?

Quality, or more precisely quality control (QC) is about enhancing; reproducibility, accuracy and consistency of products or services. It was estimated by (Singal 2010) that patient care rounds in a 15 bed ICU created over 82,000 information transfers per year. From a reliability or QC perspective *dampening the variability* of a very routine and frequent CoSR format (brevity, relevance, coherent synthesis) through both process and peer pressure may serve to improve the consistency of CoSR communication by increasing the predictability of the CoSR format and reducing time and information redundancy . If the KGH ICU team were to also try to emulate the BC Children's PICU technique (Singal 2010) of further structuring the clinical rounds to include ;a daily goals , patient safety checklist and read back of orders ,it is possible that multidisciplinary communication could be made more reliable, and consistent. A more consistent process may, or may not add to safety.

Can intuition, expertise and foresight be learned in ICU?

It seems that resilience relies partially upon the creation of individual intuition and foresight before, after and during CoSR. "Intuition depends on the use of personal experience to recognize key patterns that indicate the dynamics of the situation……Expertise is learning how to perceive" Klein 1999 Based on Klein's "*Sources of Power, how people make decisions*" (), experts see their world differently. Perhapsthese expert nurses, doctors and RTs use the repetitive teachable moments in those thousands of handovers per year, in CoSR, to help train themselves and their more junior colleagues how to both ; *filter out* irrelevant information

and *tune* their detective powers , (what seems obvious to them)….effectively transferring their *power to see the invisible*. (Klein 1999 p. 147)

Perhaps, it is within these CoSR interactions, that less experienced staff are coached by their more expert colleagues how to recognize and enhance what Klein describes as his eight aspects of expertise; i) patterns, ii) anomalies, iii) the big picture, iv) the way things work, v) opportunities and improvisations, vi) past or future events (anticipation), vii) subtle cues and viii) their own limitations. These aspects of expertise are related to what Klein calls primary "Sources of Power"; Pattern Matching (Intuition) and Mental Simulation.

Pattern matching is the ability to detect typicality, and to notice events that did not happen or other anomalies that violate a pattern, based on their experience. In short, perhaps they are taught, through this CoSR interaction "how to hunt" for things and patterns normally invisible to novices.

Recall that cognitive psychological characteristics of experts include having greater skill in;

i. Producing inferences when monitoring ambiguous cues, by making meaning and assessing implications of actions.
ii. Anticipation and processing cues preventatively to make better predictions,
iii. Taking a wide range of global and local data into account in diagnosis,
iv. Encoding new information quickly and completely and
v. Assessing and applying strategies.

Farrington-Darby & Wilson 2006

Klein's model of mental simulation stresses the ability experts have to see events that happened previously and events that are likely to happen in the future, using experience to frame the current perception and future pre-conception. Other sources of expertise are the ability to make fine discriminations [judgments] involving perceptual learning and to see and manage one's own limitations. (Klein 1999)

Perhaps the repetition and peer pressure common in CoSR creates a routine forum to *learn how to perceive differently,* and this makes some clinical knowledge and rules more relevant than others at that point in time incidental. (Klein 1999 p 168)

This may have important implications for training in healthcare, if expertise is interpreted as learning *how to perceive*. The fields of technical training in healthcare are dominated by knowledge, rules, facts, procedures and clinical guidelines. Skills and knowledge are typically imparted and believed to take the form of linear, decomposable segments of procedural tasks. (Klein p.168)

While this strategy may be useful with workers in less skilled, demanding contexts, it is not sufficient to teach highly educated people how to apply their knowledge *in context* to gain higher levels of expertise and make better judgments and decisions. *"Confidence dissipates when novices realize that applying procedures depends upon context, and no one can tell them what that context is. Judgment and decision making in natural settings are rarely straightforward.* (Klein p. 169)

To complete the bicycle metaphor, most people as they become experts outgrow the need for training wheels, and develop a sense if bicycle dynamics. *"Novices follow rules whereas experts do not"* (Dreyfus 1986)

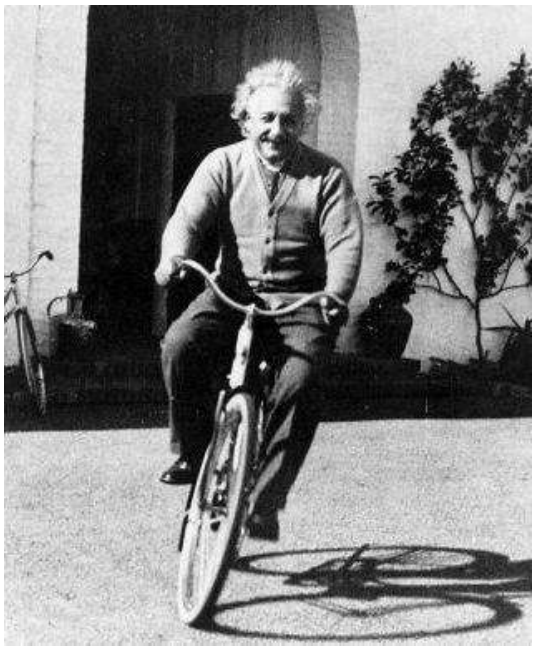


Fig 4. Einstein on bicycle (nd)

So if we want clinicians to think like experts, it makes sense that we should understand how experts are thinking, *or at least ask them about this,* which of course is the point of this work. Expertise can be divided into three broad categories; Social, Cognitive and Physical. Cognition is described as macro-cognition (planning & detection) and micro-cognition (puzzle solving). Both forms of cognition are usually tested in real world settings, such as Intensive care units or OR theaters. (Klein 1999)

"Macro-cognition tends to focus on cognitive functions such as decision making embedded in several tasks, sense-making and situational assessment, and problem detection, and on the processes that support these phenomena such as attention management, mental stimulation and storyboarding, and developing mental models."

(Klein 1999)

Clinical implications for team coordination in ICU

Finding 5 described an interdisciplinary cascade of planning communication. (Table 3)
It became obvious that various morning CoSR handovers created a sequentially increasing focus toward formulating the big picture (foresight) of what was going on for multiple patients and the ICU disciplines which coordinate their care up to about 11 am. There appears to be synergy in the way ICU teams update their; risk models, anticipation, intention and foresight both individually and collectively. The role of the PCC seems crucial. This is similar to what Albolino, Cook and O'Conner found in 2007 in their work in sensemaking in the ICU. Their study was conducted on ICU attending & resident physicians only. The ICU round was crucial in collective sensemaking and this shared [collective] sense was a necessary precondition to accomplish the actions that followed. "Following each [rounds] presentation, the case discussion undergoes a change as attention shifts from; what has happened in the past to what is likely to happen in the future and what actions need to be undertaken" (Albolino 2007 p.134) "Once rounds are complete, the remainder of the day is handled on the fly. Sense-making takes place in real time and the success of rounds is measured, in part,

by how well that picture painted at rounds (sense-making at intervals) anticipated the needs of patients through the day. "(Albolino 2007 p.134)

Limitations of this research

This is qualitative research and its findings are limited to the population studied. The sample size was small n= 13, in a medium sized closed intensive care unit. The participants of the study are all practicing clinicians in three different disciplines in the same ICU setting, (Physicians, Nurses and Respiratory Therapists). Care must be taken not to extrapolate much if generalizability of these findings outside of these professions and study sample. "The notion of collaborative construction of knowledge positions the interview as a social interaction where the respondent and interviewer share interest in the topic." (Warren and Karner 2010).This is certainly the case here, because participants volunteered an hour to be interviewed on the topic. "Interviews can tell us about the social interactions of the interview, but they can also provide accounts of circumstances outside of it." Warren and Karner (2010) p.173

Suggestions for further research

Research should be directed to evaluate the effectiveness of more formal mechanisms for templates for rounds in ICU. It would be worth looking at how how the conventions and rhetorics associated with CoSR are learned, to map disciplinary/professional differences in these conventions and rhetoric and to learn how novices become expert in their use. It would also be interesting to confirm whether or not other settings use face to face CoSR and capture intention. Of course, it would be interesting to examine the implications to patient safety

(using global trigger tool) of having more structured ICU rounds such as the BC Children's PICU group has done.

Conclusion

Clinicians experience successes far more than failures, while using essentially the same tactics to get through their day. This study demonstrates that ICU Doctors, Nurses and Respiratory Therapists believe face to face communication at change of shift report is crucially important and that they already share a mental model and expectations (between professions) about what an ideal change of shift report (CoSR) is composed of. Planning expertise (anticipation) can be transferred within and across disciplines through cascading CoSR. This may have important implications about learning *how to perceive like an expert.* Expert nurses, doctors and RTs may use the repetitive teachable moments [in those thousands of handovers per year] to help train themselves and others how to both ; *filter out* irrelevant information and *tune* their detective powers ….honing their *sources power* to look ahead and 'see what for others is invisible'.

Both reliability and resilience perspectives are important in healthcare. A high reliability (HR) perspective limits variation and may be helpful in creating structure to ICU rounds that could improve the accuracy and clarity of information (Singal 2010). "HR characteristics such as redundancy and extensive training are simply not achievable. `` (Jeffcott 2009a p.257). Resilience is manifest as clinical agility where clinicians modify their tactics to match and accommodate constantly evolving clinical situations. Tactics that improve expertise and adaptive capacity should be incorporated into interdisciplinary communication training. This

is one of a very few studies to ask an interdisciplinary group of ICU clinicians (nurses, physicians & respiratory therapists) what they do, within and across disciplines in Intensive care, during CoSR to anticipate and forestall problems .

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Appendix A_1 Information Brochure

Interior Health

Leonardo da Vinci Center for Complexity and Systems Thinking

Lund University, Sweden

Information Brochure for KGH ICU Staff

Title of Research Project: **Intuition and foresight during change of shift report (CoSR)**

Principle Investigator ;

Wrae Hill BSc, RRT, MSc (candidate) University of Lund , Human Factors & Systems Safety , IH Corporate Director Quality Improvement & Patient Safety

Academic Supervisor ; James M. Nyce PhD – Professor , University of Lund , Sweden.

University of Lund Sponsor : Professor Sidney Dekker PhD

Interior Health Sponsor : Thomas Fulton MSc

What Is This Study About?

This study seeks to determine what techniques clinicians use to aid their anticipation and foresight (to create patient safety), during receipt of change of shift report (CoSR) when overseeing or providing direct care to a group of hospitalized patients.

Who Can Participate?

To participate in this study you must be either a Registered nurse functioning as a Patient Care Coordinator (PCC) / Registered Respiratory Therapist / Intensivist Physician at Kelowna General Hospital in a full-time position. We will seek voluntary participation from 3-4 members of each of these three professions, in ICU.

What Will I Be Asked To Do?

- Participate in a one face-to-face interview with the researcher (Wrae Hill).
- Answer questions about your experiences of both providing and receiving change of shift report (CoSR) and commit about 1 hour of your time for the interview with Wrae.
- Review a brief summary of our interview at a later date to confirm themes discussed.
- Agree to have your personal interview audio recorded and later transcribed by Wrae for analysis.
- Answer questions about your degree of experience.
- Sign a consent form

How Will Confidentiality be Maintained?

All the information that you give will be held in private, except when professional codes of ethics or the law requires reporting. I will keep recordings and written material in separate locked compartments. Only I will have access to the data. I will delete all identifiable participant data (except profession) from all records. I will assign a number to each recording and transcript, and to any other material that results from your participation in this study. I will destroy the recordings once they are transcribed, and I will destroy the transcriptions and consent forms after seven years.

What Do I Do If I Am Interested in Participating?

If you agree to take part in this study, please contact me, Wrae Hill at 250-870-5893 or Wrae.Hill@interiorhealth.ca and I will take your detailed consent.

For additional information or information any time during the study, please contact Wrae Hill. If you have any concerns, you may contact the Chair of the Interior Health Research Ethics Board at 250-870-4649.

Appendix A_2 – Consent

Interior Health

Leonardo da Vinci Center for Complexity and Systems Thinking

Lund University, Sweden

CONSENT AND INFORMATION FORM

Title of Research Project: **Intuition and foresight during change of shift report (CoSR)**

Principle Investigator ; Wrae Hill BSc, RRT

- MSc (candidate) University of Lund , Human Factors & Systems Safety ,
- IH Corporate Director Quality Improvement & Patient Safety

Supervisor ; James M. Nyce PhD – Professor , University of Lund , Sweden.

University of Lund Sponsor : Professor Sidney Dekker PhD

Interior Health Sponsor : Thomas Fulton MSc

Study Information and Purpose

Change of shift report (CoSR) is ubiquitous in healthcare. Hospital inpatient care practitioners such as resident Physicians, Nurses and Respiratory therapists do this every shift, (sometimes several times a 'shift') yet it is exceedingly rare that this skill is even taught or evaluated in any of the health professions, much less evaluated (in situ) in multi-disciplinary care settings. The research is clear that patient care `handovers` are risky for patients. What is still unclear is what varied techniques practitioners already use to prospectively manage this challenge. This small qualitative study seeks to understand what techniques ICU clinicians use to aid their anticipation and foresight during receipt of change of shift report (CoSR). This study is part

of Wrae's MSc studies in the School of Aviation , Human Factors and Systems Safety at the University of Lund, Sweden.

Who Can Participate?

I am recruiting 3-4 Critical Care RNs , 3-4 Registered Respiratory Therapists (ICU) and 3-4 Intensive care Physicians at Kelowna General Hospital for this study. The number of participants required for this study is no less than 9 and no more than 12.

What Does the Study Involve?

Methods will include face to face , semi structured interviews. These interviews will be conducted away from the 'bedside'. I will ask you a series of open-ended questions, and some probative questions regarding how you give and receive change of shift report with your professional colleagues. This interview will also be digitally recorded for transcription and analysis. (1 hour) I will later make available to you a personal email summary of the themes from your responses (only) so you can confirm or edit the meaning of these to ensure I have an accurate understanding. By signing this consent form you agree to ; have the interviews digitally recorded and later transcribed for analysis, and answer a few questions about your clinical experience. Within the interview, participants are reminded that their participation in the study is confidential/anonymous and that anything they say in the interview is in confidence. Only aggregate ,de-identified themes will be used in the analysis and results. At no time in the future will anyone be able to determine "who said what".

Risks

The Lund University researcher also holds a position as IH Director of Quality & Patient Safety. I have no reporting or formal authority relationship with ICU Physicians or Staff . There is no jeopardy to you if you choose to participate in this study or not. Any potential

coercion is addressed first by having the ICU Director /Manager simply send a group email asking for voluntary participation. Managers will not know who the subjects are, or are not.

Benefits

One of the benefits of participating in the study is gaining deeper insight into your own inter /intra-professional communication style and it's potential affect of patient safety

Confidentiality

A number of measures will be used to keep your identity confidential. The recordings and printed discussions will be kept in separate locked cabinets in the researcher's home office. Once the digital recordings are transcribed, the recordings will be double deleted from the digital recorder. The transcriptions will be stored in a password-protected format and will be backed up by a hard drive in the researcher's home office, where they will remain for the expected standard time frame of seven years. In June 2017 they will be erased and destroyed by the researcher. This data will be destroyed by shredding the paper data, double deleting data from electronic data bases. The printed discussions will use code numbers so no participant can be identified. All documents will be identified only by code number and kept in a locked filing The code book will be kept in a separate locked drawer in a desk in the researcher's home office. The analysis of data (not the data itself) will be shared with others who study and work with Healthcare human factors , health system resilience and reliability, and will be communicated in written papers or oral presentations. We are asking your permission to communicate your information in this way without personally identifying you. It is anticipated that results from the study will be used to guide future research in this area. If you would like a report of the findings please include your mailing address in the space provided at the bottom of this form. You will also be provided with a copy of the signed consent form.

Contact for information about the study:

If you have any concerns, questions or would like further information about the study, you may contact Wrae Hill at 250-870-5893. Signing this consent form in no way limits your legal rights against the investigators.

Contact for concerns about the rights of research subjects:

If you have any concerns about your treatment or rights as a research subject, you may contact the Chair of the Research Ethics Board through the Research Office at 250 870-4649.

Withdrawal from the study

Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time during the course of this study. There is no jeopardy if you choose not to participate in the study, or if you withdraw from the study. If you choose to withdraw, the data that you give prior to withdrawing will be not be used in the study.

Consent

Your signature below indicates that you have received a copy of this consent form for your own records. Your signature indicates that you consent to participate in this study

_____

Participant Signature _____

Date _____

Permission to record interviews_____(Initial)

Printed Name of the Participant _____

Witness Signature Date_____

Email Address of Participant (For Sending Study Results)

_____

Appendix B

Interview Process Guide:

Suggested preliminary interview questions (1 hr) *audio taped, later transcribed*

Receiving Report at beginning of your shift:

1) How you participate in CoSR

- How do you learn about important clinical occurrences?
- What information at CoSR is important to you (example).
- What information at CoSR is NOT important to you (example)

2) In what ways does CoSR help you in your work ?

- [Prompt] Is your view through the "rear view mirror or windscreen" , or both ?

3) Please describe an example of an excellent CoSR you recently received.

4) Is there anything else about receiving change of shift report you"d like to describe ?

Giving Report at end of your shift :

1) How you participate in CoSR at the end of your shift in ICU.

2) Do you change your approach to giving CoSR depending on the person ?

[Prompt] If so, how and based on what ?

3) How important is it to plan CoSR for your colleague coming on?

[Prompt] Do you offer advice ? How are your offers of advice generally received ?

4) Tell me about an example where you wished you had passed along a clinical „gut feeling" ,

and later heard that your gut feeling was validated.

5) Is there anything else about giving change of shift report you'd like to describe ?

Appendix C - REB Approval certificate

Interior Health

Research Office
Research Ethics Board
Suite 104 - 1815 Kirschner Road
Kelowna, B.C.,V1Y 4N7

Certificate of Research Ethics Board Delegated Approval

Principal Investigator: Wrae Hill	**Institution of Primary Association** University of Lund	**IH Research File Identifier** 2010-016
Research Study Title: Intuition and foresight during change of shift report (CoSR). "What techniques do ICU clinicians (nurses, physicians & respiratory therapists) report they use		
IH Administrative Contact Mary Jane Cullen, Tom Fulton		**Co-Investigators** Dr. James Nyce Dr. Sidney Dekker
Sponsoring/Funding Agencies Unfunded		**IH Departments Involved in Research Study** KGH ICU
Documents Covered by this Approval Research Proposal Version 10 dated 23 Mar 2010 Sample Questions Version 10 dated 23 Mar 2010 Information Brochure Version 10 dated 23 Mar 2010 Consent and Information Form Verson 10 dated 23 Mar 2010 E-mail Script Version 10 dated Mar 23, 2010		**Certificate of Approval from Primary REB** Not required

Certification

It is the assessment of IH that this research study poses minimal risk to human subjects and therefore qualifies for delegated review.

The above named documents have been reviewed according to Interior Health Research Ethics Board policy and the procedures were found to be acceptable on ethical grounds for research involving human subjects.

This Certificate of Approval is valid for the term specified below provided there are no changes in the study procedures.

The Interior Health Research Ethics Board is in compliance with the ethical principles presented in the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans

Conditions for Approval

It is the responsibility of the principal investigator to inform the IH Research Office if there are changes to consents or other materials used with human subjects – these must be submitted to the IH Research Office for review and approval prior to implementation.

It is the responsibility of the Principal Investigator to inform the IH Research Office if human subjects experience serious or unexpected events.

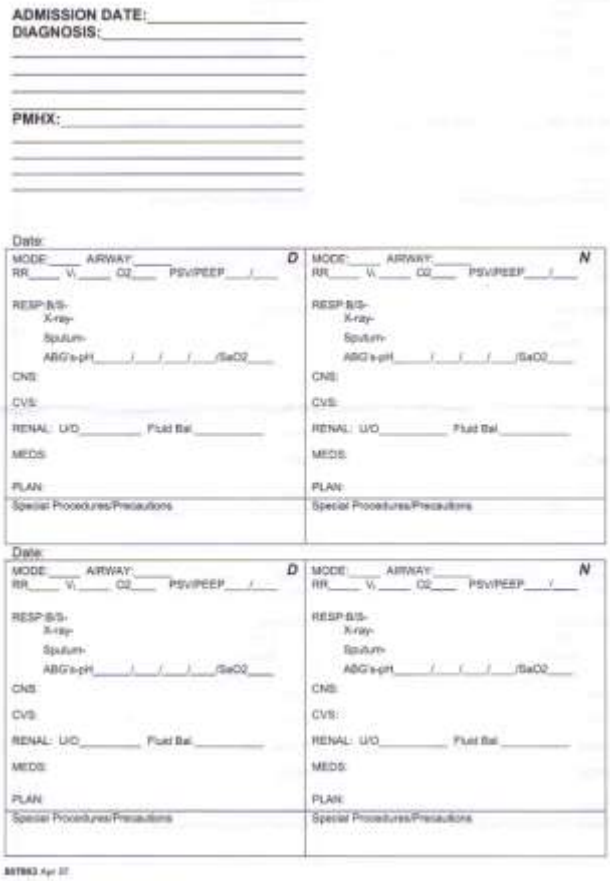
Approval Date	**Approval Term**
March 24, 2010	1 year

IH Authorized Signature

Blair Ferguson — Mar 24 2010

B. Ann Ferguson, Chair, Interior Health Research Ethics Board — Date

Appendix D – RRT CoSR report "Kardex" per patient



ADMISSION DATE:_____
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Date:

D	N
MODE:____ AIRWAY:____ RR____ Vt____ O2____ PSV/PEEP____/____ RESP B/S- X-ray- Sputum- ABG's-pH____/____/____/____/SaO2____ CNS: CVS: RENAL: U/O_____ Fluid Bal_____ MEDS: PLAN:	MODE:____ AIRWAY:____ RR____ Vt____ O2____ PSV/PEEP____/____ RESP B/S- X-ray- Sputum- ABG's-pH____/____/____/____/SaO2____ CNS: CVS: RENAL: U/O_____ Fluid Bal_____ MEDS: PLAN:
Special Procedures/Precautions	Special Procedures/Precautions

Date:

D	N
MODE:____ AIRWAY:____ RR____ Vt____ O2____ PSV/PEEP____/____ RESP B/S- X-ray- Sputum- ABG's-pH____/____/____/____/SaO2____ CNS: CVS: RENAL: U/O_____ Fluid Bal_____ MEDS: PLAN:	MODE:____ AIRWAY:____ RR____ Vt____ O2____ PSV/PEEP____/____ RESP B/S- X-ray- Sputum- ABG's-pH____/____/____/____/SaO2____ CNS: CVS: RENAL: U/O_____ Fluid Bal_____ MEDS: PLAN:
Special Procedures/Precautions	Special Procedures/Precautions

Appendix E- Collated Themes (Phase 5 Analysis)

This collated themes by profession were inventoried to look for common patterns among these sub groups. An ideal Change of Shift Report (CoSR) is described by all as a balance of ; brevity, relevance of clinical detail (data) and rhetoric as well as synthesis (telling a brief, relevant and coherent story). Preparation is a learned mind set and is reinforced by peers

Techniques ICU Physicians report they use to develop intuition and foresight at CoSR

Intensivists (n=4) may develop their intuition and foresight at change of shift report by; i) Looking at the unit quickly before handover rounds, ii) Preparatory time pre-handover , iii) Asking RN/RT staff who *they* are worried about, iv) Asking an open ended question such as 'what else is on the radar ?" and v) Reading their colleague's notes : Goals, problem list, what we've done with each one and what we expect.

MD-B: " I personally go in before those rounds and see the patients that may be unstable, or I will ask the staff who they are worried about. ……. I find that that is where most of the information is gleaned from what has happened last week and anticipation of what might happen today and then next day."

MD-B: ...This is an area where you can get a lot more bang for your buck if you actually are focusing on those patients who could get sick or are unstable and what your anticipated, or things you think could happen could occur." We don't have anything standardized that we actually refer to, so we just basically [each one of us] will discuss the pros and cons of an individual patient as we see them."

MD-D: " Our term we use is "what else is on the radar?" The other ones that are even more peripherally on our radar are the travelers ['Snow Birds' in Mexico]…usually as sick as dogs. Handover is always third party through mediators, insurance company Docs /Nurses mostly who've not laid eyes on the patient.."

MD-D: "… it's harder to anticipate the little bumps in the road that are going to come. You can often anticipate the bigger things and say "look this guy has arrested three times in the last four days…

MD-C: "When I'm handing over at night I'll say "here are the two people I'm worried about and here is why, here is what is going on". .. I'll say "the two sickest people in the unit are these two people and here is what is going on with them"

MD-D: Preparatory time pre-signover is important for me... a tiny bit of scaffolding for each patient. for example, we had a guy that we thought had botulism. I remember thinking, man I'm glad I had ten seconds to have a look at what his trajectory was... to have some of that preparation, it gives you some expectations.

MD-C : Sometimes …… I will phone the PCC before they go off shift and give report because they have just done their thing…I get a condensed version from them, from their perspective. That is how I help to create that foresight by knowing what they've handed over to their evening nurses so that I can then anticipate.

Techniques ICU PCCs report they use to develop intuition and foresight at CoSR

Patient Care Coordinators (n=3) use face: face CoSR as an opportunity (away from the bedside) to seek clarity and synthesis about histories and the big picture to aid anticipation. It focuses on; what worked for the patient most proximally (vasoactive drugs/ ventilation strategy). The night shift charge nurse is expected to synthesize the minutia down to something that is meaningful to guide anticipation of what might happen in the next few hours; such as ; anticipating workload , staffing , equipment, transfers and family dynamics on top of clinical dynamics. Most PCCs trust report, but as well verify/update their view immediately after CoSR at the bedside. They take a holistic / dynamic view of the ICU(s) and the patients and staff within it. They seem to have what Westrum (2008) describes as a "Restless mind".

"I ask pointed questions, I'm a real digger and like to know stuff…… (PCC-A). PCCs also use the Respiratory therapists to gather 'intelligence' sine RRTs have a much broader hospital view..". The PCCs seem to cultivate their resilience by using others who are out there seeing. During CoSR, PCCs simultaneously listen, synthesize , prioritize and plan. They monitor patient flow in and out of the ICU and units affected or effecting such as ; Emerg / Wards, Surgical cases, Diagnostic Imaging (CT/MRI), Echocardiography. . PCCs seem to continually refresh the "big picture" of demands vs. capacity vs. anticipation of the unknown.

PCC-A: "I think CoSR is to get or give as much information as you can in a concise sort of format that you can go out there and anticipate any of those things that are going to happen or be prepared for things you know are going to happen……..It's a really holistic kind of view [Living conditions, acquaintances, drug related, alcoholism, communities, organ donation.]

PCC-A: " I'm a real digger and like to know stuff, so I would either ask pointed questions or probably at the end of every patient I would ask "is there anything else?" " A lot of that information didn't come so much from the charge nurses as from the RTs because they do have a much broader hospital view. They're just really good at coming in and saying "just so you know there is somebody on 3 East who is not looking so hot." They're very good at that actually. So you get your big picture from the rovers, the people who are out there seeing. "

PCC-C: "While I'm receiving that (CoSR) information, I'm processing that in my head as to what my plans are for the day..... probably at least 10 minutes (of that 30 minutes) is spent on sort of thinking, where are we going to go with this"

PCC-B: " If we keep in mind that safety is our number one concern and from that what is required to be safe is staffing, so it's kind of a prioritization as to what is necessary to make things work, and then from that kind of flows everything else."

PCC-B: " To help manage uncertainty you need to be familiar with what all your options are in the periphery and have sort of a tentative plan in your head as to things…"

PCC-B: " Understanding the big picture is about listening and watching what is going on. It depends on the doctor who is on and sometimes the RTs "

PCC-C: CoSR helps us in; anticipation and predicting the future. Initially it's of tremendous help because I want to hear basically system by system ; CNS,CVS,RESP.RENAL, GI/GU and anything else that may come into it. I want to hear just the quick and dirty as to how the person did, but that also gives me information to approach the physician if necessary right away. Who do we have to deal with first?"

PCC-C: " In trying to balance detail versus efficiency, with a half an hour to do my report and limited time and tons of interruptions through my day , I need get a complete picture but also the need to synthesize that picture vs. all the detail." " So that balance is basically kind of clinical judgment based on experience...the complete (Big picture) vs. appropriate detail based on experience'

PCC-A: I have frequently been told that everything was fine, vital signs were stable, no issues.....and then I get into a room and find out that in fact; an hour before the blood pressure has crashed and they are back on vasopressors (Levophed) which they'd previously been weaning off of . " I trust report, but always verify myself.

PCCs as Traffic Controller

The PCC deals with; multiple patients with multiple problems in multiple units with multiple professions. The PCC is the "go to" person for everybody; Physicians, any other departments , Diagnostic imaging, surgery, technologists, therapists specialists, bedside nurses, scheduling. A PCC is a traffic, resource and access controller.. <u>*all things to all people*</u>. Typically, s/he will be coordinating; patients awaiting ICU admission, planning

contingencies, matching scarce resources to highest needs, Permission and access or admission to ICU, transfer out and inter facility / provincial /country transfers.

PCC-A: "As a PCC is it a lot of patient care traffic control….. Extremely. You're the go to person for everybody ; Physicians, any other departments that are dealing with ICU… Diagnostic imaging, surgery, technologists, therapists specialists, bedside nurses, scheduling… Physio, OT, anybody that you're calling in to deal with a patient at all? Also somebody that the bedside nurses can go to with problems, somebody that the physician can go to… they are sort of the coordinator."

PCC-A: "We have think about those patients who are receiving intensive-like care outside of the Intensive Care Unit. We are transferring a patient out of ICU, because we're making room for patients coming into ICU that require a higher level of care. As a regional referral center, it's pretty rare that an ICU bed is empty. That's where I find I'm giving a little bit more advice or basically touching base with the people who are receiving the patient in order to give them a heads up as to what is going to be required." The Hospitalists (a physician group who deal exclusively with hospital inpatients) are a key point of contact along with the Intensivist. Surgical Coronary Care Unit (SCCU) beds are always very much in demand for monitoring overnight. So we need to have a pretty good idea if there are transfer orders, who is the first to go, and if not who would you call about to see if they could go. That's like 'air traffic control' , having a sense of who is in the rest of the hospital or emergency department who are likely to need intensive care services, but you have to have a plan if something happens."

Techniques ICU RRTs report they use to develop intuition and foresight at CoSR

For Respiratory Therapists (n=4) in ICU the CoSR is a face: face (at the ICU desk) an opportunity to review therapeutic problems and synthesis patient and get a big picture (vs. *the big picture*) to aid anticipation. Contextualization of CoSR for the recipient is important especially for less experienced RRTs and creates variation in CoSR content, format. Less experienced practitioners (all) seem to be more aware (or concerned) about how they are perceived by their more Sr. peers. The preference by most (3/4) is to give /receive report at the bedside vs. the current practice of doing so at the ICU desk area.

RRT-B: "One of the hospitals I used to work at, our report was done by tape recorder." You had no chance to ask a question if something was missed …..often you were told something like "we tried weaning the patient, we tried dropping our pressure support for this patient and it didn't work". …….But that doesn't mean anything to me. I want to know clinical detail ; work of breathing / cardiac output , there are multiple reasons why something may not have worked. Just telling me the end result doesn't necessarily tell me anything about the patient. So that is why I really disliked getting our report by tape recorder."

RRT-A: "Sometimes I've had to receive report on the phone. I much prefer face-to-face , because sometimes you're missing things and maybe the person on the phone is somewhere else being distracted ....." " I just don't think it's as thorough as it could be and you forget things. Especially if you don't have a Kardex in front of you with your little reminders and things like that. You may just be skipping over some stuff."

More experienced RRTs use CoSR as preparatory time to plan their day in anticipation of the unexpected emergencies…*"when you're not busy things get left behind and you'll probably get that from every one of us".(RRT-B)* RRTs tend to keep their " eyes and ears open to what is going on outside of ICU "– wards RRTs will drop by ICU to communicate the pulse of the hospital. RRTs tended to pass on their gut feelings, calling in after they've left shift…They are acutely aware of the potential for being blind sided and will check with the PCC or unit clerk for those transports that did not get communicated.

RRT-B: "It is vital to pay attention to anticipate what is going to happen in the future. If I know that a patient has had a whole bunch of problems ……then I know I am probably going to have something I will have to deal with fairly quickly in my shift." " I plan my shift during receipt of handover report. .....I know that we are going to formulate a plan at rounds, but that might not happen with that specific patient until say 12 or 1 o'clock if it's busy. ……..So I want to know what we're supposed to be doing so I can try to continue along that plan and keep the continuity going."

RRT-C: "In bigger ICUs, you are always on your toes, you're always thinking about the next calamity that's going to happen because you're always busy, you're always running. So you're always thinking ahead of the worst case. Here it's quite a bit slower so the pace is slower" " So for the new grads I try to suggest they get their day planned early so you have at least something to follow. It's not going to last, but prioritize and figure out how to prioritize. "The less you do, the less you get done.."

RRT-C: "RRTs are rovers, most are good at anticipation and knowing the pulse of the hospital. They could be in the ICU but they knew what was going on with a ward patient. They knew what was going on in Emergency, they had a feeling and were just listening to conversation, or just seeing how everybody else's day was going. They just had a pulse on what was happening."

RRT-B:" I pass on a clinical gut feelings. I have no problem calling back and saying hey you know what, I listened to this guy and blood pressure was fine and breathing was fine but he had a lot more crackles this afternoon than he did this morning and he's not showing anything else but I wouldn't be surprised if you were going to have to go up on the PEEP or the oxygen in some point in time and maybe need an xray. I've certainly have had to do that. "

<u>Importance of preparation for CoSR</u>

Preparation is a learned skill, reinforced by peer pressure, that aids anticipation and foresight, and helps limit surprises. RRT-A: " I usually actually start preparing from the beginning of shift"

RRT-C: " I try to keep a record of important facts that happen along the day. "

RRT-D: "I generally just limit it to what has happened that is important in the past 12 hours, what is going to help them know what to do for the next 12 hours."

RRT-A: I think it definitely helps to forecast because the whole point is sort of to make a [prediction] you don't need every bit of info."

RRT-C: " When I was a student, one [memorable] RT had the seven Ps which he pounded into every student who came through. "The seven Ps were ; Proper Prior Preparation Prevents Piss-Poor Performance.*" I learned that the first week at [teaching hospital]and it's one thing I remember the most from him. I use it for everything, like ; bronchoscopy, percutaneous tracheostomy, ward patients or whatever…. it's a good little mindset of what's going to go wrong because it's likely going to happen if you're not ready for it."*

*RRT-C: **"**I'd like more detail ,structure @ CoSR, because this I find quite a small report box. If there could be more information to be selected from as in a checklist, then I'd be all for that. It takes longer but there is more detail. It forces people to do it instead of having the option to do it. At the last place I worked, it was a peer group thing. ..all of the RTs were massively experienced and it was just a different scene ….. It was a Big teaching hospital …changes the game completely because accountability is much higher."*

Techniques ICU RNs report they use to develop intuition and foresight at CoSR

Critical Care Nurses (n=2) conduct CoSR report in front of ,[or immediately] adjacent to the patient and so, [unlike Doctors, PCCs and RRTs], have immediate access to real time visual, auditory (and olfactory) data, and of course the ICU flowsheet. They seemed less impacted by surprises, (vs. other ICU staff) because they are in front of 1 or 2 patients for their 12 hour shift. They begin mentally preparing for CoSR about 3 hours prior to end of shift.. Contextualization of CoSR for the recipient is less important. Like the RRTs, bedside RNs are acutely aware of the potential for being blind sided (by themselves and others) especially there seems to be a problem regarding transports of ventilated patients to CT/MRI, that may not get communicated.

RN-A: " I know what the other nurse would expect me to say regardless of the patient."

RB-B: "More experienced nurses don't necessarily need a lot of information,because there is sufficient detail and sufficient prompting in our flow sheet, it really functions are your checklist . I usually start preparing for CoSR four hours prior , 3:30 in the afternoon. I start thinking what is important and reviewing what has been going on through the shift."

RN-A: I've been working within five different countries, and I can say very confidently that here we have a very, very good flow sheet. It gives a lot of information but that definitely doesn't replace a person giving you a report. "

RN-B ;" Intentions are communicated simply by what has happened throughout the day. You can see what your patient's reactions are like to the interventions"

RN-A: "I think it's experience. In critical care you learn a lot mostly everyday if not every day". "I usually ask the RT what is the plan with the patient, and where are we going here, if I don't know. sometimes they ask me, I ask about transports.

RN-A: "I've been pretty good at that [foresight]. I think it's experience. Just pure experience and when I say experience it's also you learn everyday. In critical care you learn a lot, mostly everyday. Everybody is totally different.... So it's a learning process. I think in critical care or in nursing in general, I think your whole career involves learning. I usually ask the RRT what is the plan with the patient, and where are we going here, if I don't know. Sometimes they ask me. In the rounds as well we see the doctor one to one, so we have the opportunity to ask lots of questions to the doctors."

Appendix F- Member checking – follow up communication to participants

Change of Shift Report - Intuition and Foresight - Summary of themes (2 pages) - final member checking for participants
Hill, Wrae

Sent: May 23, 2010 7:34 PM
Cc: jnyce@rocketmail.com
Bcc: Participants email addresses deleted
Attachments: Multidisciplinary CoSR Int~1.pdf (785 KB)[Open as Web Page]; Summary of themes - Techni~1.pdf (171 KB)[Open as Web Page]

May 23. 2010 Change of Shift Report - Intuition and Foresight - Summary of themes (2 pages) - final member checking for participants

Thank you again for participating in my research project, and thank you again for your time. The rational for this study in this setting was ; i) The limited literature on CoSR in ICU settings, ii) The lack of clinician perspectives on what they feel is important , and iii) No CoSR research had been done including multiple professions in same setting (Physicians, Nurses and Respiratory Therapists) conducting interdisciplinary ICU care. Your data will certainly address some of these gaps in the literature (after the MSc thesis o' course), entitled : INTUITION AND FORESIGHT AT CHANGE OF SHIFT IN ICU – WHAT CLINICIANS TELL US

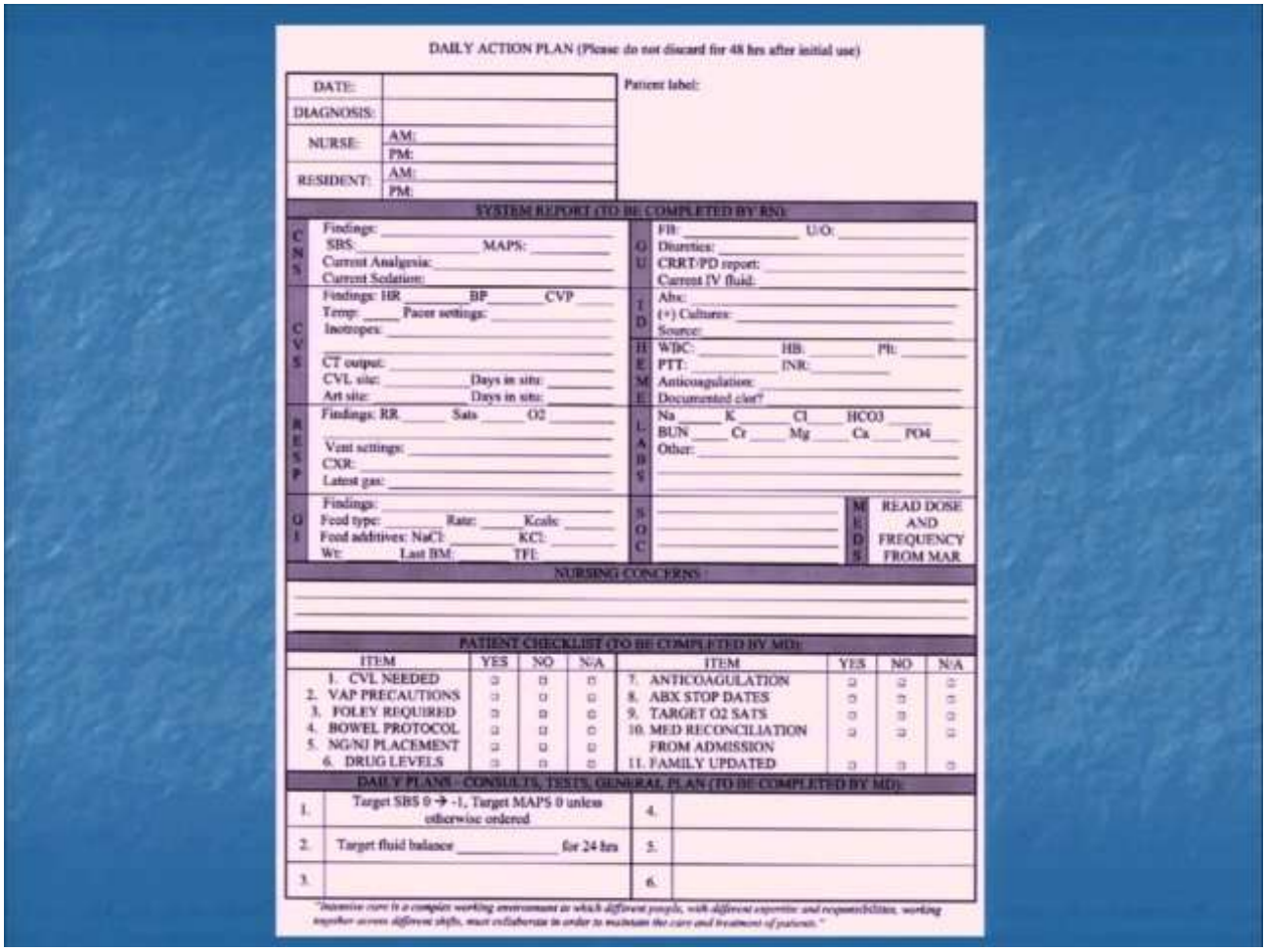
You were one of thirteen (13) participants recruited and interviewed over a period of 2 months. These included four (4) subgroups of clinicians specializing in Intensive care medicine comprised of ; four Medical Doctors , four Respiratory Therapists, five Critical care nurses, three of whom had roles as Patient Care Coordinators (PCC). Your data generated 132 pgs transcribed pages (single spaced). I have attached two brief (2 pg) documents for your review. It is of course impossible to distill all of this data down to a few pages, but I wanted to share the general themes particularly related to my thesis topic. This is the final step in the research design.

"Member checking is important because it shows the participants that their valuable time has been put to productive effort. After they have had time to reflect, they are able to look at either ; their individual responses or, more practically, the de-identified aggregate responses of the group of participants. The participants should be the first to read and make comments on these early interpretations. One researcher included his participants' alternative interpretations as footnotes in the final manuscript." "If your goal is to understand the meaning of the life-world of your subjects, then asking them if you have it correct is one way to verify your approach". (Warren and Karner 2010 p. 243)

If you have any comments at this point, as I'm writing / editing the thesis, please feel free to contact me by email at ; wrae.hill@interiorhealth.ca or by phone @ 250-764-5344

Once again, thank you ! Wrae Hill

Appendix (G) BC Children's Hospital ICU Rounds Handover checklist & daily goals
"Improving Communication at Morning Rounds: Strategies and Pitfalls"
Dr. Mona Singal, Critical Care Fellow, BC Children's Hospital
http://phsa.mediasite.com/mediasite/Viewer/?peid=c24802bd9a9644319a3672a46dc1eb201d



DAILY ACTION PLAN (Please do not discard for 48 hrs after initial use)

DATE:
DIAGNOSIS:
NURSE: AM: PM:
RESIDENT: AM: PM:
Patient label:

SYSTEM REPORT (TO BE COMPLETED BY RN):

CNS: Findings: SBS: MAPS: Current Analgesia: Current Sedation:

CVS: Findings: HR BP CVP Temp: Pacer settings: Inotropes: CT output: CVL site: Days in situ: Art site: Days in situ:

RESP: Findings: RR Sats O2 Vent settings: CXR: Latest gas:

GI: Findings: Feed type: Rate: Kcals: Feed additives: NaCl: KCl: Wt: Last BM: TFI:

GU: FB: U/O: Diuretics: CRRT/PD report: Current IV fluid:

ID: Abx: (+) Cultures: Source:

HEME: WBC: HB: Plt: PTT: INR: Anticoagulation: Documented clot?

LABS: Na K Cl HCO3 BUN Cr Mg Ca PO4 Other:

SOC:

MEDS: READ DOSE AND FREQUENCY FROM MAR

NURSING CONCERNS:

PATIENT CHECKLIST (TO BE COMPLETED BY MD):

ITEM	YES	NO	N/A	ITEM	YES	NO	N/A
1. CVL NEEDED	☐	☐	☐	7. ANTICOAGULATION	☐	☐	☐
2. VAP PRECAUTIONS	☐	☐	☐	8. ABX STOP DATES	☐	☐	☐
3. FOLEY REQUIRED	☐	☐	☐	9. TARGET O2 SATS	☐	☐	☐
4. BOWEL PROTOCOL	☐	☐	☐	10. MED RECONCILIATION	☐	☐	☐
5. NG/NJ PLACEMENT	☐	☐	☐	FROM ADMISSION			
6. DRUG LEVELS	☐	☐	☐	11. FAMILY UPDATED	☐	☐	☐

DAILY PLANS - CONSULTS, TESTS, GENERAL PLAN (TO BE COMPLETED BY MD):

1. Target SBS 0 → -1, Target MAPS 0 unless otherwise ordered
2. Target fluid balance _____ for 24 hrs
3.
4.
5.
6.

"Intensive care is a complex working environment in which different people, with different expertise and responsibilities, working together across different shifts, must collaborate in order to maintain the care and treatment of patients."