

Medical decision making in critical illness

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Abstract

When a patient's condition deteriorates into critical illness they need referral to advanced clinical intervention to save their life. Adverse events in hospitals sometimes lead to death and some of these events are preventable if the diagnosis is accurate and timely and urgent action follows. However, the complexity of the decision making moment appears to overshadow the imperative for action. An action research project has been established in an urban general hospital with an ICU and HDU – nurses and doctors of different ranks are participating in the project with the aim of identifying factors that could contribute to improved decision making in the context of a patient's deteriorating condition in hospital. The early findings have shown up the complexity of mutual decision making between junior and senior doctors, the influence of professional relationships up and down the clinician hierarchy, and difficulties associated with information transfer during mutual decision making and action planning. These findings will inform the next action research cycle with nurses and senior doctors, and ultimately the mutual design of a possible intervention aimed at improving the process of determining if a patient is becoming critically ill and needing advanced clinical intervention.

1. Introduction

Critical illness, as defined by Oh [1], is thought of as a life threatening state involving failure of one or more vital organ systems. This acute state may or may not be associated with chronic organ impairment. Without adequate intervention it will usually lead to further deterioration, permanent organ damage and probably death within hours to days.

Within hospitals, care of critically ill patients occurs mostly in high acuity areas, such as intensive care units (ICU), high dependency units (HDU), and specialised areas like coronary care units. Someone who develops a critical illness in the community is usually referred to an emergency department or hospital admitting area for urgent care. Alternatively, a person may already be in hospital for an acute illness or exacerbation of chronic illness, and becomes critically ill. Critical illness seldom originates within a high acuity unit like ICU. This means that as an illness evolves into a critical illness, doctors working in non-specialised care areas have to recognise the transition and refer their patient to a high acuity area for advanced clinical management.

McQuillan, Allan, Taylor et al, [2] indicate that suboptimal care of severely ill patients prior to ICU admission commonly occurs, the causes including failure of recognition and need for urgency of action, plus failure to seek advice. This is supported by the findings of Briant, Buchanan, Lay-Yee et al [3] in New Zealand hospitals – they cited examples where people died because their condition was inadequately diagnosed or where diagnosis was accurate but action not timely. Acting upon a decision that a person's condition is deteriorating is associated with issues that range from broad organisational failures on one hand, to the knowledge of individual doctors on the other end of the spectrum. Supervision issues, failing to seek advice in a timely manner and lack of knowledge appear to compound this difficulty. Junior doctors in particular have been shown to have significant deficits in skills and knowledge [4, 5]. This is further compounded by the lack of undergraduate medical training in the care of the acutely ill patient [6].

Changes in medical education and hospital systems, as described by Devita, Bellomo, Hillman, et al. [7] have been initiated with a view to improving this situation. These changes include various forms of enabling early recognition of deleterious physiological change in patients and making it easier for nurses or allied clinical staff to request medical

review and action. It appears that postgraduate education in critical care leaves doctors feeling more confident and skilled following such courses[8]. However, a convincing link has not been made between improved doctor education and clinical outcome improvement. Tee et al [9] maintain that culture change is essential to change the healthcare culture in order to enable such improvements.

Nonanka and Toyama [10] place knowledge creation and utilisation firmly in the organisational context in which the emphasis is less on individual performance and more on organisational (including cultural) dynamics. This approach shifts the problem of enabling junior doctors to recognise and act upon deterioration in their patients from an individual to an organisational issue. The question then becomes, how does knowledge management contribute to developing an organisational enabler for clinicians collectively to respond appropriately to a patient's approaching need for advanced clinical care in a specialist unit?

2. Research method

Since this problem concerns a number of stakeholders (doctors, nurses and hospital managers and others), and it is a knowledge problem in more ways than one, and it's a complex problem, an action research approach was taken. The goal of this research was to gain a deeper understanding of the problem from those experiencing it and, in a collaborative fashion, look for possible solutions. The problem of preventable deaths and morbidity is of concern to doctors as evidenced by the extensive programmes undertaken to measure the problem and find ways of dealing with it [3, 11]. The approach in this research is to find pragmatic solutions in the organisational context, as explored and implemented by the doctors and others involved.

Action research is a cyclical, contextualised research approach in which the researcher and subjects are active participants [12]. The goal of action research is to identify and describe a problem that is important to a community; in this case the doctor and nurse community of an urban hospital. The researcher, as co-leader of the project, assists the community in finding an appropriate solution to improve the problematic situation. In this research project, the researcher is clinical director of an ICU in the urban hospital and is therefore well positioned to support the development of such a solution. The action research process of create a plan, act on it, observe the action, modify the plan and re-implement the plan, and so on, as described by Sankaran [13] lends itself to iterative cycles of discovering what works in the context of the problem described above. Ethics approval has been granted for this research. The hospital in which the research is being conducted has a process improvement project in place into which this research fits well – the alignment of the action research to organisational direction supports the research project and provides potential for long-term results.

The planned research cycle was to conduct a set of focus group discussions with junior doctors (house surgeons and registrars) and interview in more depth those who were willing and able to devote time from their heavy schedules. The purpose of these discussions was to uncover the perceptions and expectations of junior doctors regarding skills required for diagnosing and acting upon deterioration in their patients. The next set of focus groups and interviews will be held with senior doctors (consultants and medical officers of special scale) in order to get a different perspective of the problem, followed by a set of focus groups and interviews with nurses. The purpose of this paper is to report on the preliminary findings of the first round of focus groups and interviews and indicate how this influences the next round with senior doctors.

Other data included reflection notes of the researcher, observations by the researcher and others in conversation with the researcher, and a data journal held by the researcher (in which thinking notes are jotted in terms of what she has observed, learned, discussed). The preliminary data analysis was done using Thomas' general inductive approach [14] in which themes are identified and explored as a first pass analysis of the data. This is useful for action research as part of the reflect and modify steps of the cycle in that it allows for early analysis of the data to inform the next set of focus groups and interviews. More rigorous data analysis will be conducted as the project progresses, making use of NVIVO for detailed grounded theory-based coding and analysis. Once the problem has been explored in these focus groups and interviews, the doctors and nurses will be invited to participate in identifying knowledge creation and utilisation solutions that they can implement in order to improve the recognition and treatment of patients whose condition deteriorates.

The next section of this paper will provide an outline of the early findings of this research project in which junior doctors have been given an opportunity to describe their perspective on the problem of the difficulty of recognising deterioration in their patients and acting on the decisions they make.

3. Clinical decision making in hospitals

Within New Zealand acute hospitals junior doctors carry the biggest burden for detection and initial management of critically ill patients, especially after hours. Nurses may be most likely to first see a patient deteriorating and they notify the junior doctor responsible for that patient. Junior doctors then examine the patient, make a diagnosis, and initiate

management. The senior doctor ultimately responsible for the patient's care is almost always dependent their junior doctors notifying them that the patient has become critically ill. In a similar way, patient referral to the ICU is dependent on junior doctors, unless the patient should deteriorate to the point of cardiac arrest in which case an ICU team is automatically called. Cardiac arrest in this context has a very high mortality rate[3]. It appears that this burden is worsened by complexities inherent in the organisational hierarchies of hospitals and difficulties inherent in information transfer between doctors.

Organisational hierarchies and professional relationships

The junior doctors felt that their team registrar was their most important source of help, even while simultaneously admitting that the team consultant held ultimate responsibility for patient care. The focus group discussions revealed a strong adherence to medical hierarchy. Direct house surgeon contact with their own team consultant by phone was usually avoided, and in most instances not considered as an appropriate avenue for accessing knowledge or decision-making assistance. There appears to be a tension between this avoidance and consultants inviting (and sometimes demanding) contact from house surgeons when a patient's condition deteriorates. This perception was expressed thus by one of the house surgeons in the focus group.

"I think if I was asked, if I hear that statement from the consultant, I would ask him 'Do you want me to inform the registrar, and the registrar will cope or do you want me to call you directly?' Because sometimes it's really hard if you step over someone's shoes..."

This avoidance could also be explained by the relationship between the house surgeon and their registrar – they know one another for the purpose of the current rotation period and are uncomfortable dealing with other, more senior clinicians who do not know them. Once they got to know their registrar and trust had been established they appeared unwilling to breach the boundary of that trust and consult with the registrar's senior without initially talking to their registrar.

"... I think that's the trust in being a registrar... if the registrar knows that normally you're pretty sensible, and you wouldn't call them for small, tiny things as well, when you actually ask them for help they know that it's because you have gone through the motions, you've gone through all the investigations, the history, you've actually sussed out yourself what you think is wrong with the patient, they're... they're generally pretty good in coming to at least assess, or tell you what the next step should be."

However, that relationship itself is fragile, depending on the confidence of the house surgeon in their ability to make clinical judgements, especially if their assessment of the patient contradicts that of their registrar or consultant. When this kind of contradiction arises, the house surgeon appears uncertain about communicating their assessment. This contradiction seems hardest to deal with when the house surgeon and consultant see the patient together and the junior doctor decides not to express their concern about the patient.

"I recently had one incident where doing post acute rounds the patient had been seen and diagnosis etc. I had that transient 'ok seen by the boss', absolute trust and you go against your own better judgement of that pattern recognition that that person is unwell because the boss said they are not..."

This is further exacerbated by the uncertainty introduced when doctors who don't know one another are on call together. They have not had the opportunity yet to build a relationship, establish the information requirements of one another for active mutual decision making or to trust one another without being able to validate the information given by the other regarding action plans for the patient.

"Some are really good, some are really unhelpful. You're left with more doubt than you can believe with some questions..."

Weaknesses in information requirements about the patient's condition, and validation and transfer of information between doctors seem to be heightened at a time when a patient is becoming critically ill.

Information transfer

The junior doctors felt that they did have enough knowledge to be able to recognise a deteriorating patient, although they had different definitions of what constitutes critical illness. These differences included both chronic organ failure states and acute deterioration while others felt that critical illness was not necessarily life threatening but that time was critical in addressing it. This differs from Oh's definition [1] of critical illness being a life threatening condition involving failure of one or more vital organs. The focus group junior doctors also talked about instances when they had an intuitive sense that the patient was deteriorating and needed advanced care but were unable to articulate why or provide evidence to their registrar for this intuitive conclusion. They described these instances of inability to translate their tacit knowledge into explicit knowledge for the patient's benefit in the following way:

"... you look at them and know that something is wrong..."

Conveying the impression that a patient was critically ill to registrars or consultants was never described as easy and occasionally said to be very difficult. This may be because there is no clear understanding by the referrer of what factors the recipient considers important. Junior doctors could not understand why this was so, but noted that when consulting another medical or surgical speciality, it paid to have patient information close by to answer unexpected questions.

“...sometimes you -you get the impression from the phone that the patient has chest pain, 7 out of 10, and give them oxygen, give them GTN spray, the pain is not relieved, that sounds like a major infarction?? You have to go and see the patient. You go to see the patient and the story is completely different when go there, and you, you wish that I had went to see the other patient before I came to see this patient. So sometimes, we don't get the clear picture on the page or on the phone ... which makes it hard.”

This difficulty could be result of a complexity inherent in working in hospitals. The hierarchy described above is part of this complexity, as well as the difficulties posed by information transfer over the phone. Even in a trusted relationship between junior doctor and senior doctor the differing perceptions about information meaning and priorities could lead each doctor to different conclusions about the patient, resulting in the senior doctor having to come and see the patient to verify their joint decision about the patient.

“You know- I just thought ‘oh my god’, it would have been so easy for me to say ‘just call the anaesthetic reg’ and then I’d get a triple – I’d get a call and it would be horrible. So like it was actually better, because I went to assess the patient and rang up Jonathan and I said ‘look, she’s in cardiogenic shock, she’s had a right infarct, a failed PCI and our docs aren’t going to do anything more for her so we made her not for resus but it could have been a really ugly...”

There appears to be contradictions about how junior doctors make decisions, how they communicate them, how their relationship with other members of the clinician hierarchy influences their decisions and subsequent actions and how they prioritise information transfer up the hierarchy.

4. Discussion

This first stage of an action research project attempted to gain insight into how junior doctors perceive their decision-making capacity for patients deteriorating into critical illness. The results of the first set of focus group discussions and interviews show that such decision-making is complex. Although the doctors felt that they knew enough to be able to detect deterioration requiring action, they indicated that their training had inadequately prepared them for this kind of situation and their definition of critical illness was imprecise. This is supported by the findings of Smith [6], who indicate that undergraduate training of doctors does not cover advanced clinical care of critically ill people. On the contrary, most of this kind of training is provided in postgraduate courses, which contradicts the situation in which junior doctors find themselves as the first port of call when a patient’s condition deteriorates in hospital [8].

It appears from the focus groups and interviews thus far that appropriate, timely decisions about the need for advanced clinical intervention, such as admission into ICU, are dependent upon consultation with registrars. This is made more difficult when the referring house surgeon or registrar is uncertain or unable to articulate why they feel the patient has deteriorated sufficiently for transfer to ICU. The relationship between a house surgeon and their registrar further influences the capacity to make decisions and act on them.

Nonaka and Toyama [10] provide a different perspective on the difficulties expressed regarding the relationships between doctors of different ranks and information transfer. They would say that the registrar’s context is different from that of the house surgeon in that the registrar appears to have a more experienced approach to the information presented by their house surgeon and therefore applies different meaning to it. In this way, contradictions arise and what was clear to the house surgeon before the conversation with the registrar loses clarity – different people have different perspectives on the meaning of information and therefore construct knowledge differently. How is this useful in a knowledge organisation like a hospital? These contradictions, according to Nonaka and Toyama [10], form the basis of knowledge creation in an organisation. Different viewpoints on the same situation are essential for the development and growth of both individuals and the organisation. In this way, junior doctors learn new skills, are able to increasingly articulate tacit knowledge with the purpose of acting on decisions, conclude mutually created decisions for the benefit of their patients and further enlarge knowledge. This latter form of learning from learning, or double-loop learning as described by Argyris [15], although not overt in the focus groups and interviews to date, deserves deeper exploration in future data gathering in this research project.

It appears, from the findings about information transfer, that technology, e.g. the phone, is not as much a part of the problem as the capacity of each person on the ends of the phone to deal with the information being transferred, used and requiring action. Snowden [16] maintains that the technological containment of content belongs to the first and second ages of knowledge management and has therefore lost its lustre in the knowledge community. What has become a priority now, according to Snowden, is to understand the mutual creation of knowledge as people in an organisation

work together to solve problems and develop new understanding and insight. This is supported by Nonaka and Toyama [10] in their thesis that a growing organisation contains people who co-create and use knowledge together. How is this useful in solving the problem of appropriate and timely diagnosis and action for patients who are deteriorating into critical illness? It may be useful for the problem solution cycle of this research project to look at how mutual decision making can be facilitated in terms of organisational strategy, policy, structures and technology support.

5. Conclusion

This paper is an early report on the first action research cycle of a project looking at the problem of appropriate and timely diagnosis and subsequent action regarding patients deteriorating into critical illness. The following conclusions have been drawn from the focus group discussions and interviews with junior doctors.

- There is a paradox between junior doctors being the first port of call for a decision about a patient deteriorating into critical illness and the doctors' educational preparation for using the required skills.
- The task of making such a decision and acting on it appropriately is complex. This complexity lies in the relationships between the junior doctor and their seniors, their position in the clinical hierarchy, their capacity to transfer information meaningfully, and their capacity to deal with complex relationships.
- Information transfer is complex and may be confused with lack of knowledge. House surgeons appear to be more likely to struggle with articulating tacit knowledge in a situation where they are justifying to a registrar that the patient's condition has deteriorated and requires action.

The next stage of this research project is to find out from the registrars what their perceptions and concerns are about the decision making for patients whose condition is deteriorating into critical illness. The focus group questions will be modified to tease out more about information transfer and the effect of the senior doctors' relationships with others in the hierarchy and how this influences their capacity to participate in mutual decision making requiring action. Snowden [16] states that human knowledge is contextual - how we respond to the combined context and our own knowledge is what makes an organisation dynamic and growing. It would be interesting to see how communities of practice are perceived by the senior doctors and how these communities informally deal with the problem of mutual decision making in the context of patients on the brink of critical illness.

6. References

1. Oh, T.E., ed. *Intensive Care Manual*. 4th ed. 1996, Butterworth Heinemann: Boston.
2. McQuillan, P., et al., *Confidential inquiry into quality of care before admission to intensive care*. British Medical Journal, 1998. **316**: p. 1853-1858.
3. Briant, R., et al. *Representative cases series from New Zealand public hospital admissions in 1998 - III: adverse events and death*. The New Zealand Medical Journal 2006 31 July 2008 [cited 119 1231]; 1 - 16]. Available from: <http://www.nzma.org.nz/journal/119-1231/1909/>.
4. Smith, G.B. and N. Poplett, *Knowledge of aspects of acute care in trainee doctors*. Postgraduate Medical Journal, 2002. **78**: p. 335-338.
5. Franklin, C. and J. Mathew, *Developing strategies to prevent in-hospital cardiac arrest: analyzing responses of physicians and nurses in the hours before the event*. Critical Care Medicine, 1994. **22**(2): p. 244-247.
6. Smith, C.M., et al., *Undergraduate training in the care of the acutely ill patient: a literature review*. Intensive Care Medicine, 2007. **33**: p. 901-907.
7. Devita, M.A., et al., *Findings of the first consensus conference on medical emergency teams*. Critical Care Medicine, 2006. **34**(9): p. 2463-2478.
8. Cave, J., et al., *DR WHO: a workshop for house officer preparation*. Postgraduate Medical Journal, 2007. **83**(4 - 7).
9. Tee, A., et al. *Bench-to-bedside review: The MET syndrome – the challenges of researching and adopting medical emergency teams*. Critical Care Forum 2008 15 May 2008 [cited; Available from: <http://ccforum.com/content/12/1/205>].
10. Nonaka, I. and R. Toyama, *The knowledge-creating theory revisited: knowledge creation as a synthesizing process*. Knowledge Management Research & Practice, 2003. **1**: p. 2 - 10.
11. Leape, L.L. and D.M. Berwick, *Five years after To Err is Human. What have we learned?* Journal of the American Medical Association, 2005. **293**(19): p. 2384 - 2390.
12. Day, K., et al., *The reflexive employee: action research immortalised?* Action Learning and Action Research Journal, 2006. **11**(2).
13. Sankaran, S. *Methodology for and organisational action research thesis*. Action Research International 2001 [cited 30/10/2006]; Available from: <http://www.scu.edu.au.ezproxy.auckland.ac.nz/schools/gcm/ar/ari/p-ssankaran01.html>.

14. Thomas, D.R., *A general inductive approach for analysing qualitative evaluation data*. American Journal of Evaluation, 2006. **27**(2): p. 237 - 246.
15. Argyris, C., *Leadership, learning and changing the status quo*. Organizational Dynamics, 1976. **4**(3): p. 29-43.
16. Snowden, D., *Complex acts of knowing: paradox and descriptive self-awareness*. Bulletin of the American Society for Information Science and Technology, 2003. **29**(4): p. 23-28.