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### Managing Healthcare from the Desktop

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**It's hopefully a very non-controversial statement to a healthcare audience to state that healthcare internationally – especially what is often highly specialised and costly hospital care – is progressing at a rapid rate, arguably at an exponential rate. The dimensions of that progress include its technical detail, the volume of services provided and the complexity and speed of the clinical decisions that must be made.**

#### What Direction are we Being Driven in?

The question must be asked: What does this mean for those trying to managing these facilities and their performance.? This is an equally valid question for both clinical and non-clinical managers. Would it indeed be a dream come true or an 'ideal' state, to be able to manage hospital care from the desktop, or a case of the 'grass always looking greener' on the other side?

This article will examine this question, drawing on relevant research and a recent health informatics seminar organised to address this question.

At this seminar, a range of professionals relevant to this area – senior healthcare managers, informaticians, developers and analysts, and operations researchers - spoke on this topic so each could understand the others perspectives, and an interactive discussion had on whether this was a worthwhile or even an achievable aim.

#### Analogy with Other Industries

Interesting background raised in the seminar was of the analogy with other industries – and there have been many such analogies made in recent years in relation to healthcare and its management, some good and some bad.

One of the speakers at the seminar was an international expert in queueing theory and an operations researcher who has undertaken many industry-consulting projects. They have significant experience in telecommunications, and the application of queueing theory and 'service provision' to telecommunications networks.

Things have moved forward in that industry to such an extent that humans no longer monitor the ability of the systems to perform – in an immediate sense – it is now all driven by computing.

Arguably this is a step beyond the issue we are looking at in this article, and one of questionable applicability to healthcare. The observation of the current state in telecommunications however, just goes to highlight how far behind we are, coming from as an industry in examining issues such as managing hospital care from the desktop.

#### Diversity of the Hospital Setting

One important context in relation to this issue is the diverse nature of hospitals, both in Australia and internationally, and hence the diverse roles of people who would identify themselves as managers. In addition, organisations may be public or privately funded, ranging from 50 or fewer beds to hundreds of beds, providing niche services such as elective surgery only, or the full range of tertiary-quaternary services.

The management imperatives in this diverse range of settings have some commonalities, but the day-to-day decision making required may vary substantially.

#### **Health-Mic**

Health-mic (healthcare management informatics and computing) has evolved as a special knowledge area to attempt to address issues such as these. Health-mic can be considered as “that subset of health informatics dedicated to the study, design and implementation of information technology solutions in support of the practice of healthcare management in all its forms - including, but not limited to, primary care and general practice, sub acute and rehabilitation care, and hospital care.” Furthermore, health-mic involves the study of the needs of healthcare management practitioners, including information presentation and decision support. It can be thought of as sitting at the intersection of health management, computing and the relevant sciences – including management science (operations research), mathematics, statistics and – as well as being informed by the clinical sciences.

#### **Is Managing from the Desktop a Good Thing?**

This is a difficult question to answer - and the answer to this question is, in many ways, dependent on one's point of view or role in managing hospitals.

If a manager's role involves actively being on the floor of a hospital, for example in the case of a nurse unit manager (NUM), then that is probably a bad thing by way of interfering with the need to speak with nurses on the floor, or to trouble – shoot active operational problems and so forth.

This is certainly a point of view supported by one of the managerial speakers at the seminar who made the very clear point that in order for many operational managers in hospitals to do their jobs properly, they need to be supported by mobile information technology (IT) solutions, rather than be tied to their desks by information available only at that physical location.

A quick walk around any modern hospital supports such perspectives, with even many non - clinical staff carrying mobile phones and regularly using them in order to have, and provide, up to the minute information on issues such as patient flow.

If the manager is a more senior executive with an oversight function in relation to hospital operations – then our ‘ideal state’ may be a good thing by streamlining workflows and allowing the manager to have all the information required by them available in an electronic format at their fingertips.

Arguably also, another key factor in addressing this question is what information and functionality is available at the desktop. There are now increasing numbers of new and useful applications (eg – Cap Plan) that can assist dramatically in managing patient flow as an example. The evolution of such systems, and their availability on a desktop, could be a driver towards workflow that is more desktop based.

#### **What are the Barriers if we Tried to go that way?**

There are a number of key barriers to managing hospital care from the desktop. If we consider professional cultures – certainly in some professional groups, computers are still a scary proposition – especially in relation to the concept of routine use. We can reasonably expect, however, that looking forward, more recent generations of managers who have been raised on computers in everyday life, will have a higher levels of comfort with a dominant role for them in the workplace.

That higher level of comfort may in fact be more like a basic level of expectation and a demand for them.

Currently, there remain many paper based processes in many organisations. Whilst these can be supplemented to some extent with automation (for example scanning software, archiving solutions and other software tools) – thus facilitating management from the desktop – the ‘ideal’ of managing from the desktop would be much more easily achieved, and a much more worthwhile goal, if these existing paper processes could be fully automated.

#### **Decision Making – the Specific Challenges**

Another key dimension of the workload of managers is decision making. Hence, a barrier to achieving the ‘ideal’ state is the need for a better series of tools to assist in management

In 1999, Adrian Bagust, Michael Place and John W Posnett from the Health Economics Consortium at the University of York in Britain, sought to

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examine daily bed requirements arising from the inflow of emergency admissions to an acute hospital, to identify the implications of fluctuating and unpredictable demands on hospital bed capacity for emergency admission, and to quantify the risks of insufficient capacity for patients requiring immediate admission.

The dynamics of the hospital were modelled on the basis of discrete-event stochastic simulation (which reflects the relation between demand and available bed capacity).

Their research objectives were to identify and quantify: The risk of having no bed available for any patient requiring immediate admission; The daily risk that there is no bed available for at least one patient requiring immediate admission, and The mean bed occupancy rate.

Their findings, published in the 'British Medical Journal'\*, identified discernible risks when average bed occupancy rates exceed about 85%, and that an acute hospital could expect regular bed shortages and periodic bed crises if average bed occupancy rises to 90% or more. [Note: These numbers are still widely used for planning capacity, especially those 'traditionalists' who resist cutbacks in hospital bed capacity as part of ongoing reforms across Europe.]

As a result, the York researchers concluded that there were limits to the occupancy rates which could be achieved safely without considerable risk to patients and to the efficient delivery of emergency care. Spare bed capacity, they suggested, was thus essential for the effective management of emergency admissions. The costs of this, according to them, should be borne by purchasers as an essential element of an acute hospital service.

decision making. There is significant scope, for example, in areas like expert systems to provide guidance around key financial, access or quality decisions... Or even, more simply, in the establishment of electronic decision support pathways around standard management scenarios.

In many systems and facilities – not so much cost – but competing priorities for scarce resources is a key issue.

When profit is a driver, and the workforce is unskilled or less educated, having managers and management receive significant amounts of funding in order to set up electronic solutions to improve systems performance and monitoring is arguably a relatively easy sell.

This is not the case in not-for-profit hospital facilities, where many educated clinicians have senior and influential roles, and themselves struggle to deliver care in a under-funded environment. If management from the desktop is seen as a positive thing to aim for, the key challenge here is making a case regarding the benefits, and doing so in terms that all relevant parties can understand and support. Such factors would include improvements in cost containment, patient and healthcare worker satisfaction, equity of decision making and access, and improved quality of care.

### **The Need for Clarity**

Arguably, one of the key things that needs to happen if we are to go this way is that there needs to be much greater clarity established around (although there are some excellent organisations that are clear) on what information managers need to track, measure and act on and why. Whilst some measures are well known and have been used for some time, there are many relevant measures (eg – hospital occupancy) that are not well understood or do not have agreed definitions.

Let us contemplate this issue further. There has been much written about hospital occupancy, and the work by Bagust and colleagues in the UK ten years ago, is still often cited in reference to this issue.

The message that many people have taken away from this work is that for optimal performance (itself an ill-defined concept), hospitals should run at no more than 85% occupancy.

Let us ignore many of the potential discussion points around this take away message, and focus just on the concept of hospital occupancy as a metric.

If we had a system to monitor occupancy in real time – and they do exist but are not that common – what aspects of hospital occupancy should be measured and acted upon? And what would the numerator and denominator be to make up this metric?

### **Hospital Occupancy: Getting a Grip on the Metrics**

Drilling down further, what are the possible dimensions of hospital occupancy that could be valuable to measure. The trouble is that we have no universal understanding or evidence around which of these is most relevant currently. Let us just assume that keeping the hospital at 85% occupancy is a good thing in most circumstances, but the question remains – should we monitor, say the following:

Current (real time occupancy) every 5 minutes, every 2 hours or somewhere in between. Average occupancy in the last x minutes, hours or days – and if so is it a moving or static average? Recent changes in occupancy. For example, if the occupancy has risen from 75 % to 85 % in the last 24 hours, arguably this would be more cause for alarm than if it were now 85 % having fallen from 90%. This would be all the more a cause for concern if it had remained at a 90 % level for the previous 3 days, and there were associated adverse effects on hospital performance such as longer than usual queues for admission from the Emergency Department. Weekend occupancy versus weekday occupancy. For example, one could argue that an occupancy of 85% on a Friday evening in a mixed emergency-elective hospital is a much more concerning figure than an occupancy of 85% on a Monday morning – as many more staff are likely to be available to facilitate the discharge of patients on a Monday morning. In addition, 'downstream' resources to facilitate discharge are much more likely to be available (for example, patient transport mechanisms, aged care facilities ready to receive hospital discharges, community nurses and so forth). In contrast, on a Friday evening, in many settings, such facilitation mechanisms close for the weekend, and whilst elective admissions may not occur over the weekend- emergency patients will continue to present and require admission. Predicted future occupancy. This is an even more radical thought, although there already are software applications in use that work on this premise – that future occupancy is the most useful expression of the hospital occupancy concept. This would allow pre-emptive decisions about patient flow, discharges, elective admissions and staffing to be made prior to occupancy reaching unacceptable levels.

#### **Other Factors**

Other things that need to happen include the sustained collaboration of multiple relevant skill sets to achieve this 'ideal state'. Managing from the desktop around a difficult decision, requires numerous skill sets to come together for a sustained period of time.

Let us consider the example of an operational manager who an elective surgery waiting list target to achieve before the end of the month. The target is achievable provided they can ensure access to care for the right numbers and mix of patients prior to the end of the time period. In one sense this is a simple problem to solve, but in reality the manager needs to balance the following parameters and constraints, as well as many others:

How many patients need to be treated for their elective surgery needs if the target is to be met? What capacity is there to treat these patients, or in other words, what competition is there for operating theatre, inpatient bed and other resources required to treat these patients – for example, from emergency patients likely to require treatment in the given time frame? Who needs to be communicated to with regard to the devised management plan in order to achieve the desired outcome - for example, operating theatre managers and staff, the responsible surgeons and others? What are the financial implications of the operationalisation of the established management plan – and are these implications palatable to the manager and the organisation? If the management plan established to deliver the desired outcome is ineffective – what contingency plans are in place, and what actions need to be performed in light of the inability to achieve the desired outcome?

Another facet to this example is that in an automated environment, it is not unreasonable to expect that the manager may want to be able to choose one preferred option to manage the situation from a range of plausible but competing options. This, in turn, could require the following key elements of functionality:

Access to archived information on similar decisions made previously and their outcomes, and Access to predictive information about the likely outcome in this case given various decision scenarios (or at least some automated guidance about possible decision options – akin to clinical decision support).

We know from our own experience that there are lessons learned in the area of clinical decision support which need to be heeded in order to provide effective management decision support in healthcare.

In turn, the existence of these systems implies that managers, IT architects and developers, experts in optimisation and decision science, graphical user interface (GUI) designers as well as economic and financial experts, have to collaborate closely. Only then can the business knowledge and IT requirements of such systems be aligned to support management decisions by a desktop- based workflow, rather than traditional paper based systems.

#### **So What's the Answer – a Dream Come True?**

This article is not intended to be an exhaustive examination of such issues, which would ideally be the topic of a major research programme, an entire journal and much debate. Rather, I have attempted to highlight some of the issues to be considered and dealt with, if one has to seriously broach the possibility of managing hospitals from the desktop.

Irrespective of the necessary advances in management thinking and knowledge, technology, skills, collaboration and organisational cultures highlighted above, whilst this proposition is an attractive one, I think the undeniable truth is that like other areas of IT usage and uptake in healthcare – we are still a long way still from an ideal state.

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