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Appropriate use of pagers in a New Zealand tertiary hospital

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Abstract

Aims To identify the appropriateness of calls to on-call house officers in a major tertiary teaching hospital.

Methods A prospective observational study was conducted at Auckland City Hospital over the months of June, July, and August 2004. Fourteen house officers from a range of medical and surgical services categorised calls received while on-call after-hours into one of three groups: ‘appropriate and urgent’; ‘appropriate but not urgent’; and ‘inappropriate’.

Results 844 calls were recorded and categorised, with approximately even distribution between medical services (431 calls) and surgical services (413 calls); 30% of calls were deemed clinically appropriate and required a response within 1 hour; 53% of calls were deemed clinically appropriate but did not require a response within an hour; while 17% of calls were deemed inappropriate.

Conclusions The most important function an on-call house officer performs is responding to urgent medical situations. Frequent interruptions mean that house officers may become less efficient and more prone to making mistakes. The majority of calls received by on-call house officers did not need immediate responses and would have been better communicated via a less intrusive system such as text-messaging or the keeping of a non-urgent jobs list. If house officers were paged more appropriately then they would be interrupted less frequently and would be able to provide safer, more efficient, and timelier patient care.

One of a house officer’s main roles is the evaluation and management of medical problems on the ward. Never is this role more pressured than after-hours, when the number of doctors on duty may drop by a ratio of 6 or 7 to 1. Due to the increased patient load, it is necessary for on-call house officers to prioritise and it is neither appropriate nor safe for house officers to deal with administrative or minor tasks at the expense of more urgent medical problems.

The reality however, is that house officers are frequently called to sort out problems that are not urgent. A high call-frequency results in inefficiency, stress, and decreased availability to deal with genuinely urgent situations.

Several studies have examined the effect of “interruptions” on appropriate task management. Outside the medical area, these studies have looked at the psychological effects of interruptions;[1] while within the environment of patient care, the effects on training[2] and errors[3,4] have been studied. Results from these studies suggest that the work environment of house officers is crucial to the safety of patients in teaching hospitals. Specifically, they suggest that reducing the number of unnecessary calls and

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delaying non-urgent calls would result in less disruption to patient care and a decrease in medical errors.

Auckland City Hospital is a 570-bed adult inpatient hospital and is part of Auckland District Health Board, the largest public healthcare provider in New Zealand. Auckland District Health Board provides regional services for approximately 415,000 people along with some national specialty services. There are more than 7500 staff including approximately 500 junior doctors and nearly 3000 nurses.[5]

While text messaging and non-urgent job lists are utilised in some areas, their use is patchy and calling a pager remains the most common method of communication from nurses to house officers.

This study looked at the quality of calls made to on-call house officers across different specialities at Auckland City Hospital.

Methods

All on-call house officers are supplied with a Telecom New Zealand Ltd-operated electronic alphanumeric pager, which is capable of recording phone numbers as well as receiving text messages.

Fourteen house officers (either first, second, or third year postgraduation) from General Medicine, Medical Specialities, General Surgery, and Orthopaedics were involved in the study which ran for 3 months from June to August 2004. Evening (1600–2200) and night (2200–0800) shifts were kept separate, and the study aimed to categorise 100 calls in each time period for each service.

Calls were categorised according to their perceived appropriateness and urgency. The definitions of “appropriate” and “urgent” were agreed upon in advance following focus group discussions held with house officers, medical consultants, and nursing staff.

The three categories were:

- Appropriate and urgent (required a response within 1 hour);
- Appropriate but non-urgent (required a response during the shift);
- Inappropriate (call should not have been made).

The benchmark time of 1 hour for an ‘urgent’ call was based on a similar study by Katz and Schroeder.[6] It also seemed reasonable that house officers should be circulating through their wards at approximately 1-hour intervals to attend to routine jobs thereby removing the need to be paged for such jobs.

To maximise consistency, house officers involved in data recording had training sessions on how to categorise the calls they received, plus regular meetings were held throughout the study.

The medical services we studied consisted of nine wards including General and Medical Specialities (Oncology, Haematology, Gastroenterology, Renal, Respiratory, and Infectious Diseases). This nine wards were covered by two on-call house officers. Surgical services consisted of six wards covering Orthopaedics, Urology, Vascular and General Surgery, and were similarly covered by two on-call house officers.

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Auckland City Hospital has a phlebotomy and intravenous (IV) cannulation service which operates from 1600–2300 Monday to Friday as well as 1000–2200 Saturday, Sunday, and public holidays. However, with only a single staff member they are frequently overloaded.

Results

A total of 844 calls were received and categorised; 256 (30%) were deemed appropriate and urgent (Category 1); 445 (53%) were appropriate but did not need an urgent response (Category 2); and 143 (17%) were inappropriate (Category 3) (Table 1).

Table 1. Calls made to on-call house officers' pagers at Auckland City Hospital (June–August 2004)

Medical Services		Surgical Services	
Reason for call	**% (n = 431)**	**Reason for call**	**% (n= 413)**
Category 1 (appropriate and urgent calls)			
Changes in vital signs*	8.6% (37)	Changes in vital signs*	9.7% (40)
Pain	3.5% (15)	↓ Urine Output	3.4% (14)
↑ or ↓ Blood sugar level	3.3% (14)	Pain	2.9% (12)
↓ Urine Output	1.6% (7)	Chest Pain	1.7% (7)
Chest Pain	1.0% (4)	Collapse	1.0% (4)
Collapse	0.7% (3)	↑ or ↓ Blood sugar level	0.7% (3)
↓ Level of consciousness	0.7% (3)	↓ Level of consciousness	0.2% (1)
Other	12.3% (53)	Other	9.4% (39)
Sub-total (Medicine)	31.6% (136)	Sub-total (Surgery)	29.1% (120)
TOTAL = 30.3% (256)			
Category 2 (appropriate calls but urgent response not needed)			
Re-charting medications	7.0% (30)	Fluid charting / re-charting	15.0% (62)
Sleeping Tablet	6.5% (28)	Re-siting IV cannula	6.8% (28)
Warfarin/Insulin	6.0% (26)	Re-charting medications	5.6% (23)
Fluid charting / re-charting	5.1% (22)	Sleeping Tablet	4.4% (18)
Re-siting IV cannula	4.2% (18)	Warfarin/Insulin	3.9% (16)
Query drug dose	0.7% (3)	Query drug dose	3.6% (15)
No urine output post trial removal of catheter	0.2% (1)	No urine output post trial removal of catheter	0.7% (3)
Death Certification	0.2% (1)	Indwelling Catheter Insertion	0.5% (2)
Indwelling Catheter Insertion	0.0% (0)	Death Certification	0.2% (1)
Other	15.6% (67)	Other	19.6% (81)
Sub-total (Medicine)	45.5% (196)	Sub-total (Surgery)	60.3% (249)
TOTAL = 52.7% (445)			
Category 3 (inappropriate calls)			
Mistake call	7.4% (32)	Questioning Instructions	2.4% (10)
Ongoing Issues	5.1% (22)	Ongoing Issues	1.9% (8)
Questioning Instructions	4.0% (17)	Mistake call	1.7% (7)
Nurses Concerned	3.0% (13)	Nurses Concerned	1.7% (7)
Other	3.5% (15)	Other	2.9% (12)
Sub-total (Medicine)	23.0% (99)	Sub-total (Surgery)	10.7% (44)
TOTAL = 16.9% (143)			

*Including changes in blood pressure, heart rate, respiratory rate, or fever; ↑Increased; ↓Decreased.

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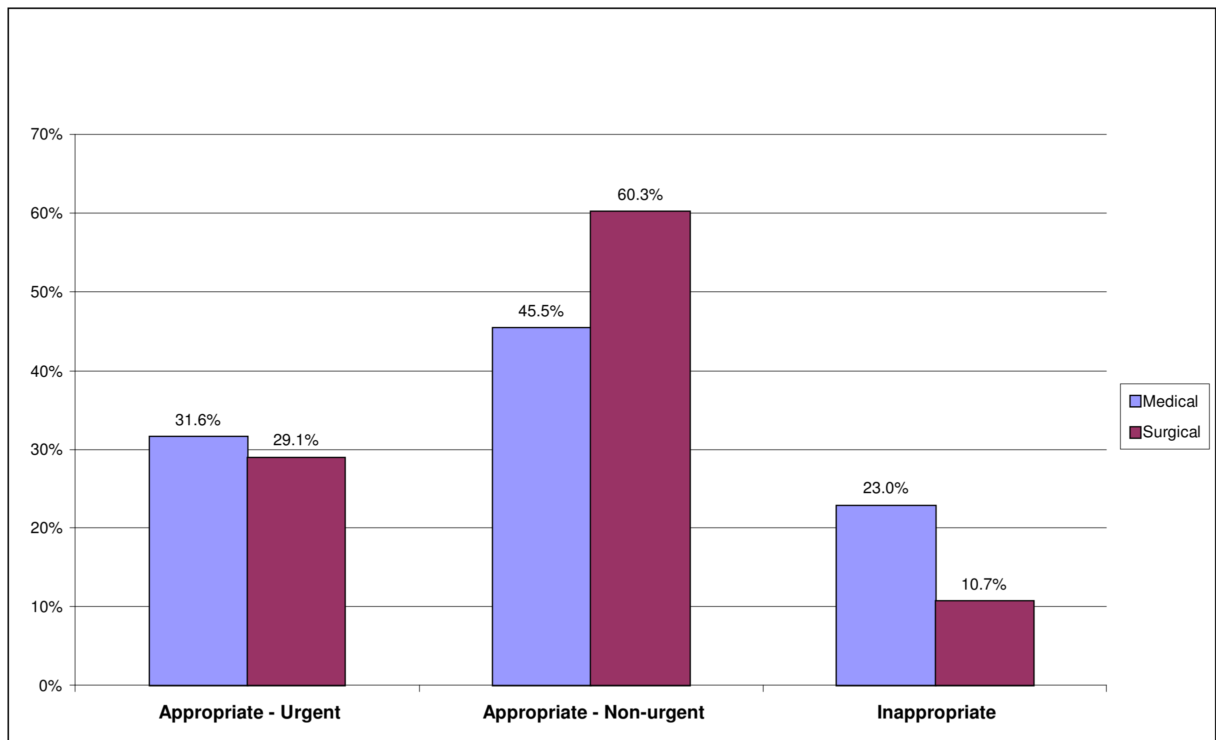
The absolute numbers of calls are shown in Table 1 along with the reason for the call. Charting of fluids was the most common reason identified for surgical calls (15%), while 'changes to vital signs' (8.6%) was the most common reason for medical calls. It is interesting to note that across all three categories, 'other' calls accounted for 31% and 32% of calls for medicine and surgery respectively, thus highlighting the breadth of issues that lead to ward staff paging house officers (Table 1).

Interesting differences between medical and surgical services were also observed. While the percentage of appropriate and urgent calls (30%) was comparable, the percentage of calls which were inappropriate was markedly different, with the medical services having twice as many inappropriate calls (23% vs 11%) (Table 1, Figure 1).

Figure 1. Appropriateness of calls to pagers compared: medical versus surgical services



Discussion

Frequent interruptions have been shown to have a profound psychological impact, causing distraction and forgetfulness, resulting in both increased production of errors and compromised patient care.[3] Frequent paging also directly interrupts patient care and is an important cause of workplace stress.[1–4,7,8]

When an extension number is received on a pager, the house officer has no way of prioritising the interruption without dialling the extension to speak with the person

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making the call. While systems exist to identify emergency calls (e.g. cardiac arrest), as yet there is no way of distinguishing between routine and more urgent calls received on a standard pager. Previously it has been suggested that if calls were able to be designated as such it would allow house officers to prioritise those calls and therefore improve the service they were able to provide.[4]

A parallel study performed at our institution looking at the average time between calls found that on an evening shift; surgical on-call house officers had an average of just 16 minutes between each call, whilst in medical services, the average was 23 minutes.[9]

Looking more closely at our results, the potential for improvement is immediately obvious. The most common reason for calls in surgical services was re-charting of IV fluids (15%); while in medical services, re-charting of medications (7%) was second only to changes in vital signs. Both of these tasks could be foreseen and dealt with by the patient's primary team during normal hours. Indeed, if we combine the reasons of re-charting fluids or medications with charting regular insulin/warfarin, we can see that approximately 18% of calls made in medical services and 25% made in surgical services could be avoided by better team management during normal hours. Even if these tasks were not attended to during the day, they are prime candidates for notification via less disruptive means such as job sheets or text messaging.

This situation is not unique to New Zealand. Similarly to our findings, a study conducted at the University of California[6] found that just 34% of calls required a response within 1 hour and resulted in a change in patient care, while 26% of calls were deemed unnecessary as they neither resulted in a change in clinical management nor were clinically indicated.

Furthermore, they found that the majority of calls (65%) were received while interns (house officers) were engaged in patient care, hence they concluded that reducing the number of unnecessary calls and postponing non-urgent ones could result in a 42% decrease in disruptions, with a resulting increase in time for patient care or rest for the interns.

Similar results were also observed in a Canadian study of overnight calls where 19% of calls interrupted direct patient contact, with the most common calls being for prescribing of medications (42%), patient assessment (25%), and reporting of laboratory results (18%). Thirty-nine percent of the calls in that study did not lead to a change in management.[8]

A 1992 study by Blum et al in paediatric residents found that almost 50% of calls interrupted patient care, 24% interrupted ward rounds or teaching conferences, 34% changed management, and 25% were "unimportant."[7]

A different way of looking at the issue is to observe what junior doctors spend their time doing when on call. One study, looking at overnight calls, found that residents spent about 70% more time on charting and documentation than they did in direct patient care.[10] This is consistent with our study that found a significant proportion of calls were related to documentation (Table 1).

While it is encouraging that 83% of calls in our study were appropriate, only 36% of those calls required an urgent response from the house officer. These urgent calls were appropriately sent as an extension number requesting that the house officer

immediately phone back to the caller. The remaining 64% of calls could have been sent either as a text-page or added to a job list held on the ward. Although our study didn't measure what house officers were doing when paged, evidence from similar studies suggests that anything up to 65% of calls may interrupt patient care.[6,8]

Reducing interruptions would clearly help in reducing stress levels while at the same time improving efficiency and enhancing house officers' ability to make appropriate and timely decisions.

The authors acknowledge that the definitions of what constitute an 'appropriate' and 'urgent' call are arbitrary, and were dependent on subjective application by the house officers at the time the call was recorded. However, the definitions were agreed in consultation with house officers, medical consultants, and nurses; and house officers were educated in their use. Therefore we consider that the definitions appropriately describe the situation at Auckland City Hospital.

Internationally, various interventions have been trialed in an attempt to relieve the 'pager burden.' One that was shown to be effective was based on an English surgical service and involved delegation of paging duties to the nurse in charge and establishment of 'task boards' on the house officers' wards. Inappropriate calls fell from a rate of 58% pre-intervention to just 15% following implementation. There was also a fall in the number of calls that interrupted patient care from 46% to 28%.[11] Important in the success of this innovation was that the policy had buy-in from both medical and nursing staff and, encouragingly, the results were reproducible when trialed on a medical service. Such a system would produce similar benefits in the New Zealand setting we believe.

Advances in technology are likely to provide further options in the future. Examples such as multifunction mobile phones that are already widely used in Japan.[12] and "smart pagers" capable of integration directly with hospital information systems,[13,14] have the potential to decrease the number of calls made to house officers. In fact, proper use of readily available technologies, such as intranet-based paging, has already been shown to decrease costs and improve efficiency.[15]

Of concern when considering a reduction in paging to house officers, is the observation that nurses' and house officers' perceptions of urgency differ markedly. One study found that only 45% of calls judged by nurses to be an emergency resulted in assessment of the patient by the 'physician,' whereas 43% of calls that had been judged 'routine,' resulted in the same assessment.[16]

Indeed, any move to reduce inappropriate calls may mean that appropriate calls are also reduced, with the potential for poor patient outcomes. Hence, this observation lends strength to suggestions that more integration of nursing and medical education has the potential to bolster mutual respect and understanding and improve communication.

Further study into house officers' response times to calls (along with more research into nurse perception of calls to house officers to investigate factors that make calls to house officers more or less likely to be made) is needed.

Finally, disagreement between medical and nursing staff on appropriate use of the house officer pager is a frequent source of friction and ill-feeling. The nurse-physician relationship and its direct effect on patient care has been widely studied,[17] and it is in

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everyone’s interests (nurses, doctors, but most importantly patients) to do everything possible to ensure as harmonious and constructive a relationship as possible.

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