# The Neurosurgical Registrar – Are We Still as Busy as We Were? A Quality Improvement Study

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| ARTICLE INFO | ABSTRACT |
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| *Article type:*<br>*Original article*<br><br>*Article History:*<br>Received: 01-Jan-2019<br>Accepted: 23-Apr-2019<br><br>*Key words:*<br>Bleep frequency<br>Neurosurgical registrar<br>Quality improvement | ***Introduction:*** Bleeps represent an important element of the on-call neurosurgical registrar's workday. They provide instant contact between healthcare staff, while allowing doctors to perform tasks across the hospital. However the paging system causes interruptions and can interfere with patient care. We aim to develop and implement strategies to improve paging patterns and ultimately reduce unnecessary calls.<br>***Materials and Methods:*** we conducted a retrospective analysis of electronic hospital bleep records over a 7-months period (March-September-2015) in which bleep logs were retrieved from the hospital paging system at University Hospital of Wales. The first cycle was followed by a set of interventions followed by a second data-collection cycle 12 months later.<br>***Results:*** The first cycle showed that on average the neurosurgical registrar received 57 bleeps per 24hrs. Almost a third of on-call bleeps were new referrals received from the local accident & emergency department or from other district hospitals. Other calls were received from our own hospital's wards and Intensive Therapeutic Unit (10%), the paediatric ward (5%), neurosurgical theatres (5%) and emergency theatre (5%). The second cycle showed a 23% drop in the total number of bleeps compared to first cycle. The difference in bleep numbers was evident during the day shift, and no difference was noted during the night shift. No difference in the number of new referrals was noted.<br>***Conclusion:*** This project has shown that a simple change can result in a significant improvement. It also confirmed the value of team work and communication in improving quality of care. |

## Introduction

The on-call neurosurgical registrar at University Hospital of Wales covers emergency referral-calls from South and Mid-Wales with an estimated catchment population of 2.5 million. Answering bleeps is an important element of the on-call neurosurgical registrar's workday (1). Being the main method of contact for neurosurgical emergencies, bleeps provide instant contact between healthcare staff, while allowing doctors to perform tasks across the hospital (2). However the paging system causes interruptions and can interfere with patient care (3,4). This method of communication suffers from a number of problems not restricted to waiting long times for an answer (5), bottlenecks at the ward phone (6), lengthy time to complete or return to tasks (7) and finally inability to identify the location or identity of the caller and relative urgency of the required task (7).

A great deal of the on-call neurosurgical

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registrar time is often spent taking potentially avoidable calls (8). This can distract the on-call registrar from dealing with genuine emergencies and contribute to a stressful and frustrating experience (9). A previous study in Ireland (6) found that 40% of bleeps were inappropriate in a large teaching hospital. This approximately wastes one hour per week for both junior doctors and other health care professionals. Such bleeps can waste up to 18% of nurse's time while awaiting a response (7). This is significant especially under the current time-pressures facing the health care system (7). Another study found that about half of bleeps interrupted patient care in a paediatric ward (8).

It is widely understood that poor communication between medical staff can lead to a variety of adverse outcomes including poor resource utilisation, increased patient length of stay and stressful work experience (5, 10-14). To tackle these shortcomings in healthcare communication, Medic Bleep, an app-centred messaging system was designed by Medic Creations (9), and has been shown to be more efficient than traditional bleep system (9). This system has not been implemented in our centre. Other studies have evaluated the use of smartphones to improve communication on internal medicine wards (15-17). Mobile phone usage is very common among doctors, and is the preferred method of communication by many doctors (18). Mobile technology has the potential to revolutionise communication and clinical care (19-21).

Published studies on this topic are scarce and the authors could not find any in the field of neurosurgery. Some of the above studies are concerned with medical wards, but are likely to apply to neurosurgery and other surgical specialities.

We aim to quantify the number of bleeps the on-call neurosurgical registrar receives during a 24hr on-call period. Subsequently we aim to develop and implement strategies to improve paging patterns and ultimately reduce unnecessary calls. Finally we aim to re-audit neurosurgical bleeps completing the audit cycle.

## Methods

We conducted a retrospective analysis of electronic hospital bleep records (switch) over a 7 months period (March-September 2015) in which bleep logs were retrieved from the hospital paging system at University Hospital of Wales. Data were also analysed to ascertain neurosurgical on-call bleep frequency and source each day. On-call bleeps for other specialties in our tertiary centre were also included. The first cycle was followed by a set of interventions. Finally, a second data-collection cycle was conducted 12 months later (March-September 2016). No ethical approval was required to perform this survey as no patient data was used. Z test was used for statistical analysis.

## Results

### First Cycle

Results of the first audit cycle showed that on average the neurosurgical registrar received 57 bleeps per 24hrs with a 40–17 dayshift–nightshift split (Figure 1a).

When compared to all registrars across our tertiary centre, the neurosurgical registrar received more bleeps than registrars covering other specialities over the study period (Figure 1b). The number of bleeps received by each registrar were as follows: neurosurgical registrar:10172 bleeps, the trauma registrar: 8393 bleeps, general surgical registrar:6823 bleeps, renal registrar:5092 bleeps, general medicine registrar:3020 bleeps and anaesthetic registrar: 2893 bleeps.

Almost a third of on-call bleeps were new referrals received from the local A&E (Accident & Emergency) department or from other district hospitals. Other calls were received from our own hospital's wards and ITU (Intensive Therapeutic Unit) (10%), the paediatric ward (5%), neurosurgical theatres (5%) and CEPOD/ emergency theatre (5%) (Figure 2). The results
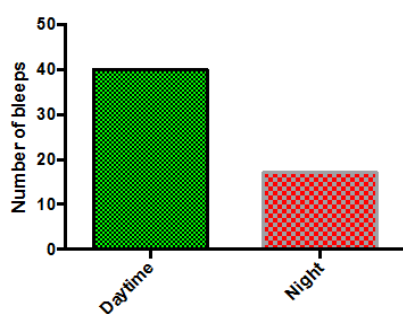
1a
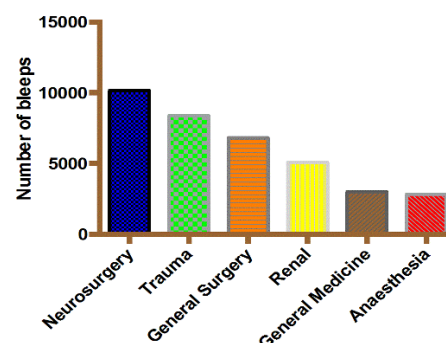
2a

**Figure 1.** 1a: Average number of bleeps received by neurosurgical registrar on call per shift. 1b: Number of bleeps received by on-call registrar across different specialities at our centre.
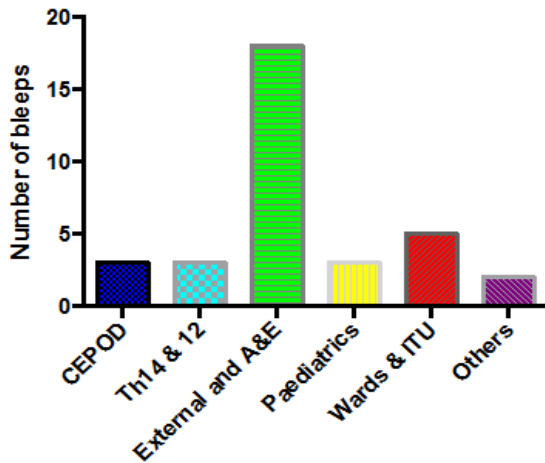
**Figure 2.** source of neurosurgical on-call bleep

of our audit were disseminated at our departmental quality improvement meeting. An intervention in the form of providing the different departments and wards in our hospital with the bleep numbers of respective registrars covering those units was taken. This involved providing a leaflet illustrating bleep numbers for neurosurgical registrars covering different

departments and highlighted according to each department. A re-audit was then planned.

### Second cycle

On average the neurosurgical registrar on-call received 44 bleeps in a 24hr period over the second-cycle period. Which represents a 23% drop in the total number of bleeps compared to first audit (Figure 3a).

The difference in bleep numbers was evident during the day shift, and no difference was noted during the night shift (Figure 3b). This is expected as the registrar on-call covers the entire unit out of hours. A significant drop in bleep frequency was noted from CEPOD/emergency ($p < 0.0001$), theatre ($p < 0.0001$), elective neurosurgical theatres ($p < 0.0001$), ITU and wards (neurosurgical wards and high dependency unit- $p < 0.0001$)). No difference was noted in bleep frequency from local (Accident and Emergency) A&E and External bleeps which represents new referrals.

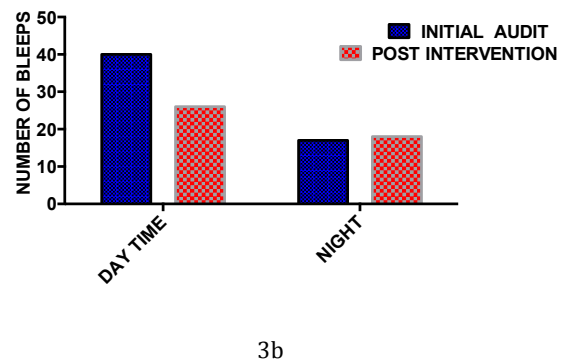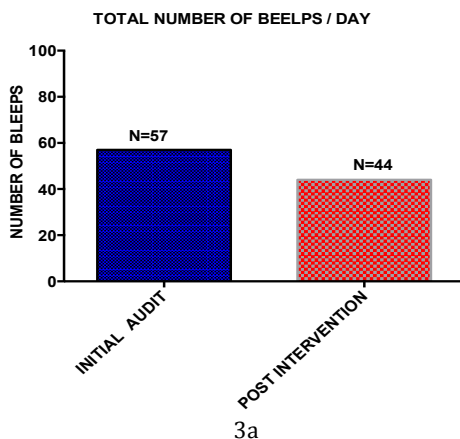No difference was found in bleep frequency from the paediatric ward (Figure 4).



3a



3b

**Figure 3.** 3a: The average number of bleeps in the initial audit and post intervention. 3b: Comparison of bleep frequency between the initial audit and post intervention in the day and the night shift.
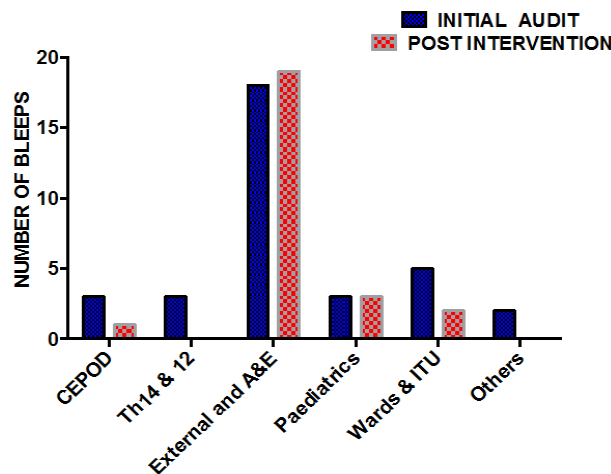


**Figure 4.** source of neurosurgical on-call bleep in both initial and post intervention.

## Discussion

The nature of work of the neurosurgical on-call registrar involves dealing with new referrals and providing advice and opinion over referred cases. Only 30% of bleeps were related to new referrals. Other registrars usually cover neurosurgical wards, CEPOD theatre and elective neurosurgical theatres. Bleeps from these sources should be directed to relevant registrars rather than to the registrar on-call. It could be argued that these bleeps are unnecessary. It is the on-call registrar duty to respond to all bleep calls in an appropriate and timely manner. However, ward staff should be advised on how to contact the right person at the right time.

The first cycle highlighted the nature and size of the problem. Results of the first-cycle were presented locally to various stakeholders including quality improvement staff, nursing staff, junior and senior medical staff. Brainstorming sessions generated a number of potential solutions. One potential solution to this problem is to channel bleeps from wards/ITU/CEPOD/theatres to relevant registrars. This solution was implemented via informing staff of relevant registrar cover and providing the correct contact information. Information can be disseminated in the form of posters or email communications. Posters of relevant registrar cover and appropriate bleep numbers were disseminated to ward staff, ITU and neurosurgical theatres but not to the paediatric ward. Following this intervention, neurosurgical registers reported having more time for training and completing administrative work load. The second-cycle confirmed the validity of these reports.

We conducted a survey amongst neurosurgical trainees to ascertain their views on the effects of this audit on day-to-day activities. One participant stated "the new system has allowed for delegation of tasks to relevant team members reducing calls on the on-call bleep. I think is more important for junior trainees as they are stepping up, giving them more time to focus on training and dealing with calls comfortably".

Another participant reported, "This audit highlighted exceptional number of calls the neurosurgical register receive". This new system significantly enhances patient safety and frees the registrar to concentrate on training". All surveyed registrars reported having more time for training and administrative workload after and that the changes did not also have unwanted results.

The neurosurgical registrar remains in high demand compared to peers in other specialties - when bleep frequency is used as a surrogate for demand. This is of little surprise as the nature of the neurosurgical work involves providing advice and opinion, in addition to the fact that around half of neurosurgical workload is unscheduled. A Simple intervention of improving communication among teams involved produced a significant improvement[22] and reduced the number of bleeps by 23%. The intervention has now also been applied to our paediatric ward with a further reduction in unnecessary calls to the on-call registrar.

## Conclusion

In conclusion, this project has shown that a simple change can result in a significant improvement. It also confirmed that team work, effective communication, engagement and feedback from stakeholders are vital for planning and execution of quality improvement projects.

## Acknowledgements

## Financial Support

## Conflicts of Interest

None.

## Abbreviations

A& E: Accident and Emergency.
ITU: Intensive Therapeutic Unit.
CEPOD: Confidential Enquiry into Perioperative Deaths (Emergency Theatre).

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