

## How long do nurses take to measure patients' vital signs, and does it matter?

Patients in hospital may be at risk of unexpected deterioration. Monitoring patients' vital signs, for example blood pressure and heart rate, ensures that any deterioration can be spotted early. This means that monitoring patients' vital signs is an important part of safe patient care, and, if carried out effectively, has the potential to save many patients' lives. However, previous studies have been unable to specify the workload this monitoring activity generates for nursing staff. This makes it difficult to plan how many staff are needed to monitor patients.

Researchers at the University Of Southampton, University of Portsmouth and University of Oxford have teamed up to measure and estimate the time and workload associated with measuring patients' vital signs, and this evidence brief reports what they found.

### Background

This evidence brief is a summary of our recent study on the nursing time and workload associated with monitoring and recording vital signs observations [1]. Monitoring patients' vital signs is an important care activity, because it allows nurses to spot potential deterioration early [2, 3]. This has clear implications for patient safety and survival, and has led many to advocate for an increased frequency of patient monitoring [4].

Nonetheless, if any current monitoring protocols are to be changed, it is imperative to understand the workload implications for nurses. Registered nurses report their workload is too high and they miss or delay around 35% of vital signs sets [5]. Increasing the amount and frequency of vital signs activities without understanding the associated workload might lead to nurses missing even more vital signs sets.

Prior to our study, we did not find any robust estimates of how long nurses take to measure and record vital signs observations [6]. Existing studies have significant limitations as they are either conducted on small samples, or they do not report how vital signs were measured and recorded, or who was measuring vital signs.

Traditionally, registered nurses have been in charge of monitoring and recording patients' vital signs. More recently, due to registered nurse staffing shortages and increasing patient acuity, this monitoring activity has been also delegated to nursing assistants (or healthcare assistants). So far, there is no evidence around the efficiency of different staff in undertaking monitoring activities.

In addition, many of the existing studies were before-and-after studies aiming to evaluate the introduction of electronic systems. These were implemented because studies found electronic systems speed up the recording of vital signs and calculation of Early Warning Scores, and hence had the potential to free up nursing time [7]. We do not know if such systems held their time-saving promise after having become the norm for some years.

Moreover, the existing evidence did not consider the influence of interruptions to work, and the time required

to prepare equipment. The aim of this study was to estimate how much time nursing staff take on average to measure and record a set of vital signs. We also aimed to identify factors influencing the time involved with measuring and recording vital signs.

### Methods

This was a time-and-motion study, which involves the direct observation of a task (i.e. vital signs monitoring), using a timekeeping device to record the time taken to accomplish a task. The study was conducted in 16 inpatient adult general wards within four acute NHS hospitals in the south of England.

All hospitals used the National Early Warning Score 2 (NEWS2) to guide the frequency of patient monitoring [8]. According to NEWS2, patients with more worrying vital signs are observed more frequently than those whose vital signs are within the norm. NEWS2 requires that the following vital signs are measured: respiration rate, oxygen saturation, systolic blood pressure, pulse rate, temperature and level of consciousness or new confusion.

Three hospitals used electronic systems to record vital signs, while, in the other hospital, nursing staff used pen and paper to record vital signs and calculate Early Warning Scores.

We collected data using a software application called *Quality of Interactions Tool* on a tablet [9]. Before observing nursing staff in hospitals, we developed and tested a protocol in a simulated environment to guide our practice [10]. This was to ensure the two observers applied the same criteria to press "start" and "stop" when observing vital signs activities and interruptions.

Nursing staff often monitored patients' vital signs in rounds, rather than on an individual basis. Each round also included preparation time and interruptions. We were interested in both vital-signs-related interruptions (e.g. having to replace a broken vital-signs-machine) and non-vital-signs interruptions (e.g. talking to relatives or colleagues).

We estimated the time taken to perform a set of vital signs in three ways:

- 1) Dividing the length of the round by the number of vital signs sets.
- 2) Recording only the time spent at the patient's bedside, between when the nurse entered and left the bed space.
- 3) Removing from 1) and 2) time associated with some or all interruptions.

We used mixed-effects models to account for the hierarchical structure of the data (patients stay on wards "nested" within hospitals), and we added variables to our models to control for the effect of different staff members (registered nurses, assistants and student nurses).

## Results

Two observers undertook 64 observation sessions for a total of 715 vital signs sets. We found variation in how vital signs activities are carried out across hospitals: some hospitals had 85% of vital signs measured by registered nurses, while in one hospital only 13% were measured by registered nurses.

We found that time estimates varied considerably depending on how interruptions were treated, and that preparation time at the beginning and end of rounds increases nurses' workload. When considering estimates from rounds, the mean time per vital signs set excluding non-vital-signs-related interruptions was 5min 1sec. When looking at the patient bedside time estimates only, the mean excluding non-vital-signs-related interruptions was 3min 45sec. Including all interruptions meant that a set of vital signs took on average 6min 26sec from rounds and 4min 24sec when considering only time at the patient bedside.

There were small and negligible differences between hospitals and staff groups – no staff group took longer than the other. We found that there are potential time savings when including more than one patient in a round. This happens because preparatory time such as sourcing equipment and travel to the patient area is divided across more than one patient. For example, a round where two patients are observed takes 7% less time per patient observed than a single patient. When five patients are observed within the same round, it takes 12% less time per patient compared to observing a single patient. However, these efficiency gains stop after more than five patients, with rounds of 10 patients giving a time saving of 13% per patient.

Lastly, we did not find any time savings associated with using electronic systems compared to pen and paper recording. We think that this is because previous studies aiming to verify whether using electronic vital signs recording systems were more effective than pen and paper collected data shortly after implementation. Instead, we collected data in settings where monitoring

processes had been in place for years and had become the norm for staff. This means that any promised time savings resulting from adopting electronic systems might attenuate over time.

## Conclusions

Our study found that nursing staff take a considerable amount of time to complete vital signs activities. In particular, time estimates go up by more than one minute per set if considering vital-signs-related interruptions and preparation time at the beginning of each round. Therefore increasing the frequency of patients' vital signs monitoring would lead to non-negligible increases in nurses' workload.

Moreover, our study found that introducing electronic monitoring technology does not free up nurses' time in the long run.

We encourage managers to consider vital signs rounds in the interest of efficiency, as considerable time can be saved in terms of equipment sourcing and preparation. However, this could be conflicting with guidance around the safety of bundling vital signs activities into rounds, since current protocols demand that patients are observed based on their risk of deterioration.[8] Nonetheless, we found that grouping vital signs in rounds is the norm in all settings we observed.

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## References

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