Can we afford to ignore the patient risk resulting from multiple handovers across junior doctors shifts?:

Dataset from a real-time electronic handover solution (eHandover)

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Background

The implementation of the European Working Time Directive ( EWTD) has created an increase in shift-work rotas for junior doctors. This has resulted in an increase in the number of handovers between different teams out-of-hours. Experimental studies have shown information is poorly retained if verbal or handwritten handovers are transferred across multiple shifts. Some handovers may need to take place between teams that are not able to meet face-to-face with each other, more so in the weekends, resulting in “shift skipping”. This may pose an increased risk of handover failure for patients.

Aims

- To determine the “shift gap” for each handover task, defined as the number of changes in shifts that occurred from the time a task was created to the time it was requested to be completed.
- To compare the proportion of handover tasks generated on each shift of the general medical rota in our Trust between weekdays and weekends in relation to the size of the shift gap.
- To investigate pattern of work shifts at risk of potential handover failure and explore its impact on patient care.

Methods

- **eHandover methodology**
  - eHandover is a novel electronic handover system that logs handover tasks across clinical shifts. The methodology has 3 distinct phases.

  - **Phase I – Putting patients on the eHandover system for Handover**
    - This phase is done all over the hospital at any time and place from a server linked computer by a clinician with secure login access to the system. The baseline data originates from the admission patient list or routine patient list. If a patient needs handover, the clinical baseline data is transferred to a ‘date-time’ and ‘specialty’ specific handover list. The patient is put on electronically to the handover list before the next handover meeting. The handover information itself is in the form of a handover note.

  - **Phase II – The handover meeting**
    - After phase I is complete, there is a handover meeting (times of junior doctor shift change).
    - Doctors who have entered patients in Phase I can verbally re-enforce their patients to the junior doctors for the next shift. At the meeting, there is an opportunity to discuss and amend the handover note and allocate a clinician to the handover job.

  - **Phase III – Doing the handover work**
    - After the handover meeting, the doctors working out-of-hours will do the handover work they have been allocated to in Phase 2. The system is designed to run live. There is a handover task status box for each patient. It has options including ‘not allocated ’ ‘allocated in progress’ and ‘completed’. This enables the specialty out-of-hours team to track their work. All handover tasks are required to be changed to completed status by the end of the 24 hour period.

    The 3 phases are cycled over a 24 hour period and is illustrated in Figure 1.

![Figure 1](image1.png)

**Data analysis for shift gap on weekdays and weekends**

Clinical shifts (see Figure 1)

During a routine weekday there are 3 main clinical shifts in general medicine. The day time 9am-5pm shift (green team). The day time on-call 9am to 9pm (pink team) and the night time on-call 9pm-9am (yellow team).

On a weekend there are only 2 shifts, the daytime on-call and the night time on-call. This shift system is replicated in many acute trusts in the UK.

Data collection from ehandover

- Each handover task is automatically stored the patient details, clinical information, the date/time a handover task was logged on the system and the date/time a handover task was requested to be completed by the referring doctor.

  - The above data was extracted from ehandover database from two acute hospital sites for the following time period: Queen’s Hospital (March-October 2010, 158 weekdays and 32 weekends) and King George Hospital (June-October 2010, 94 weekdays and 19 weekends).

Calculating the shift gap

Each handover entry was analysed. The shift gap was manually calculated by the researchers. The shift gap was defined as the number of clinical shifts between the date/time a task was logged on the ehandover system to the date/time a handover task was requested to be completed by the referring doctor.

Results

A total of 7166 electronic handover entries were analysed. Of these;

- 3011 handover tasks were for the out-of-hours period for a routine weekday (Monday to Friday)
- 2307 of handover tasks were requested for Saturday.
- 1848 of handover tasks were requested for Sunday.

Figure 2a and Figure 2b show the complexity of handover for general medicine across weekdays and weekends respectively. The lines are colour coded to show the shift gap for each handover task on the system. Our data clearly shows many handover tasks on eHandover have a Shift Gap of greater than 1 (i.e. next consecutive shift). During weekends, a shift gap of 3 (Friday afternoon to Saturday morning) and a shift gap of 5 (Friday afternoon to Sunday morning) are common.

![Figure 2a](image2a.png)

**Monday to Friday Handover Work**

**Total Handovers = 3011**

- **Routine Day Shift 0900-1700:**
  - 1483 (48.7%) tasks

- **On Call Day Shift 0900-1700:**
  - 512 (17.0%) tasks

- **On Call Night Shift 2100-0900:**
  - 1045 (34.7%) tasks

![Figure 2b](image2b.png)

**Saturday and Sunday Handover Work**

**Total Handovers = 4555**

- **Routine Day Shift 0900-1700:**
  - 569 (23.5%) tasks

- **On Call Day Shift 0900-1700:**
  - 397 (17.4%) tasks

- **On Call Night Shift 2100-0900:**
  - 150 (6.6%) tasks

**Handover tasks <1% not shown. Friday handover task work not shown.**

Discussion

On routine weekdays, 513 (17.0%) of handover tasks will not be verbally communicated between teams (figure 2a). The potential handover failure significantly increases in the weekend, a total of 2672 (64.3%) of tasks cannot be directly communicated to the out-of-hours team (figure 2b). Many handover tasks will not be verbally communicated across shifts due to large shift gaps. Furthermore, handover tasks are commonly created by the out-of-hours on-call teams themselves, which are difficult to capture without an electronic tool. eHandover is the first solution to recognise and quantify the shift gap issue. Communication failure across shifts may be an important factor in the 7% higher mortality for acute admissions at weekends. Inadequate handovers due to a lack of a formal systematic handover process are related to poor medical record keeping, errors and incomplete patient information. Such communication failures at handover can lead to an increase in litigation cases and cause patient harm.

Conclusion

A large proportion of handover tasks cannot be verbally handed over to the out-of-hours teams, especially during weekends. We cannot afford to ignore the potential risks this may have on patient care. There is a need for a sound and reproducible handover methodology coupled with a ‘live’ IT solution that enable junior doctors to log, track and monitor patient information and handover tasks in real-time.

References