All in a day's work: an observational study to quantify how and with whom doctors on hospital wards spend their time

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ABSTRACT

Objective: To quantify time doctors in hospital wards spend on specific work tasks, and with health professionals and patients.

Design: Observational time and motion study.

Setting: 400-bed teaching hospital in Sydney.

Participants: 19 doctors (seven registrars, five residents, seven interns) in four wards were observed between 08:30 and 19:00 for a total of 151 hours between July and December 2006.

Main outcome measures: Proportions of time in categories of work; proportions of tasks performed with health professionals and patients; proportions of tasks using specific information tools; rates of multitasking and interruptions.

Results: The greatest proportions of doctors' time were in professional communication (33%; 95% CI, 29%–38%); social activities, such as non-work communication and meal breaks (17%; 95% CI, 13%–21%), and indirect care, such as planning care (17%; 95% CI, 15%–19%). Multitasking involved 20% of time, and on average, doctors were interrupted every 21 minutes. Most tasks were completed with another doctor (56%; 95% CI, 55%–57%), while 24% (95% CI, 23%–25%) were undertaken alone and 15% (95% CI, 15%–16%) with a patient. Interns spent more time completing documentation and administrative tasks, and less time in direct care than residents and registrars. The time interns spent documenting (22%) was almost double the time they were engaged in direct patient care.

Conclusions: Two-thirds of doctors' time was consumed by three work categories: professional communication, social activities and indirect care. Doctors on wards are interrupted at considerably lower rates than those in emergency and intensive care units. The results confirm interns' previously reported dissatisfaction with their level of administrative work and documentation.

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An average hospital doctor's working day is one long series of heroic events — saving lives of grateful patients — intermingled with meaningful interchanges with colleagues and occasionally interrupted by infuriating exchanges with an administrator who never has patients' interests at heart. Well, that's how it is depicted in popular television shows. In reality, as all doctors know, an average working day is far removed from such portrayals.

Research into hospital doctors' work has largely focused on the hours they work,[1-3] rather than on what they do. A review of MEDLINE revealed few quantitative data describing how hospital doctors actually spend their time. Few hospitals know, for example, how much time their doctors spend in critical areas, such as direct patient care, versus searching for missing records.

Obtaining baseline data about current patterns of work is important for assessing the effects of interventions designed to improve care delivery models. A good example is the increased investment in and implementation of computerised clinical information systems, which are expected to improve the safety and efficiency of health care delivery.[4] While such systems are promoted as reducing administrative tasks of clinicians,[5] concerns have been raised that many tasks, such as ordering medication and tests, may take longer with new systems than paper-based systems.[6,7] Further, introducing new systems may change communication patterns, with doctors spending more time alone,[7] and less time in face-to-face communication with nurses.[8,9] Without data reflecting current task time distributions, the accuracy of such claims cannot be tested, nor can we measure the extent to which any time costs are offset by safety gains.[10]

We conducted a time and motion study to quantify how much time doctors on wards spend in various activities, and with whom, and what information tools they use. In addition, we quantified the number of interruptions to work and the extent of multitasking.

METHODS

Setting and sample

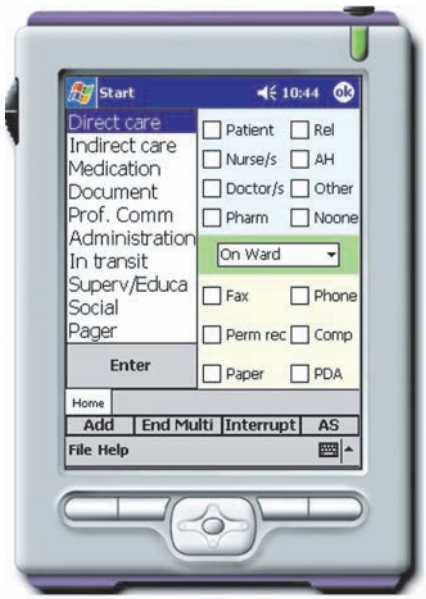
The study was undertaken in a 400-bed teaching hospital in Sydney. The hospital has a computerised test-ordering and results-viewing system and an electronic discharge summary system, but relies on paper medical records for other functions. Forty-four doctors, comprising registrars, residents and interns allocated to four wards (respiratory, renal–vascular and two geriatric), were invited to participate via information sessions and letters of invitation. A major challenge for recruitment was the transitory nature of the medical workforce. Twenty-eight doctors agreed, but nine were transferred from the study wards before observation, leaving 19 who participated. Of those who did not respond to the invitation, seven were rostered to other wards and became ineligible. Nine refused. The reasons for refusal were: temporary allocation to the study wards (two doctors); overseas-trained doctors on a special induction program (two); resignation pending (one); and four doctors who did not wish to be observed.

Estimates of the required sample size suggested that each of the groups would need to be observed for at least 51 hours to detect a difference in proportions of time spent in main tasks between clinician groups of at least 20% under standard statistical assumptions. The participants (seven registrars, five residents and seven interns) were observed on weekdays between 08:30 and 19:00 for 151 hours between July and December 2006. Observation sessions were timetabled across the groups and times of the day.

Data collection tool

A multidimensional work task classification system was designed and incorporated into a handheld computer (a personal digital assistant).[10,11] Pilot testing occurred at the study site, with 7 hours' observation and review by seven doctors. On the basis of feedback, three subtask categories were

1 Work measurement tool



Personal digital assistant used to collect data, showing main work tasks, and people and information tools involved in tasks. ◆

2 Work tasks, subtasks and associated definitions

Work task	Definition
Direct care	All tasks directly related to patient care, including direct communication with patient or family or both
Indirect care	All tasks indirectly related to patient care
Find medical record	Searching for a patient's medical record
Find x-ray or scan	Searching for a patient's x-ray or scan
Other indirect	All other indirect tasks (eg, reviewing results, planning care)
Medication	All tasks associated with medication, including preparation, administration, documentation, discussion and clarification
Find order	Searching for medication charts or medical records with drug order
Prescribe drug	Ordering a drug (including discharge prescriptions, verbal orders)
Transcribe order	Copying medication orders from one medical chart to another
Prepare drug	All activity concerning drug preparation and clean-up
Clarify	Clarifying a drug order (with other people or other sources)
Check drug	Checking and cosigning for a drug given by another staff member
Administration	Giving medication to a patient
Chart	Documenting drug administration details
Discussion	Talking about a drug with health professional, patient, or relative
Review	Looking over drug orders as part of planning care
Documentation	Any recording of patient information on paper or computer, excluding medication documentation
Discharge summaries	Specifically documenting discharge summaries using an electronic discharge summary system at this site
Other documentation	All documentation not related to medication
Professional communication	All communication with another health professional not related to medication, including meetings, requests for medical consultations and discussion about planning care
Administrative	Any administrative activity not related to direct or indirect individual patient care (eg, employment issues, bed allocations)
In transit	Time between tasks and between patients
Supervision or education	Supervising others, including students, and attending education sessions
Social activities	All non-work activity or communication, and tea and meal breaks
Pager	A pager alert is recorded as an interruption ◆

added — searching for x-rays, searching for missing medical records and writing discharge summaries — which doctors reported consumed "all our time" or "wasted" their time. A category to identify interruptions by a pager was also added.

The interface design included 10 broad mutually exclusive work categories (Box 1). Some categories had drop-down menus for greater detail (Box 2). Each task was automatically time-stamped. For each task, the data collector recorded whom the doctor was with, information tools used in the task, whether the doctor was on or off his or her allocated ward and officially on or off duty (eg, continuing or completing tasks after a designated shift end).

Interruptions (resulting in the cessation of a current task), and multitasking (conducting two tasks at the same time) were also recorded. Pending tasks that followed an interruption were stored as tabs on the screen to allow recording of these tasks if they were resumed. This permitted, for example, measurement of the proportion of interrupted tasks recommenced.

Procedures

After signed consent had been obtained, an observer shadowed each doctor on multiple occasions, at different times of the day, for periods of one hour, recording all tasks performed. Times of observation were determined according to a predefined schedule ensuring coverage of each clinician group and times between 08:30 and 19:00. The doctor was asked to introduce the observer and seek permission to continue when he or she was engaged with patients or visitors. Alternatively, the observers would identify themselves. Several dummy sessions were undertaken as part of the observer training process. This also allowed doctors to become accustomed to being observed.

Observer training

All observers were clinically experienced registered nurses. Inter-rater reliability was tested with two data collectors simultaneously, but independently, observing a doctor. Observers did not start collecting data until an inter-rater reliability of 85% had been obtained. All data collectors maintained this level of agreement throughout the study (range, 85%–98%).

Statistical analysis

Descriptive statistics, with 95% confidence intervals, were calculated to identify the proportions of time spent in work tasks and multitasking, and the rate of interruptions. Interns, residents and registrars were com-

3 Percentage of doctors' observed work time spent on particular tasks*

	Registrars	Residents	Interns	All
Number of individuals (total time observed)	7 (43.5 h)	5 (60.25 h)	7 (47.25 h)	19 (151 h)
Percentage of time (95% CI) spent on:				
Professional communication	37 (28–47)	30 (22–37)	34 (26–41)	33 (29–38)
Social activities	17 (11–24)	18 (12–24)	15 (8–23)	17 (13–21)
Indirect care	14 (11–17)	17 (14–20)	19 (17–22)	17 (15–19)
Direct care	18 (13–22)	16 (12–20)	11 (8–15)	15 (13–17)
Documentation†	7 (5–9)	8 (7–9)	13 (8–17)	9 (8–11)
Combined medication tasks	5 (5–6)	7 (6–8)	8 (7–9)	7 (6–8)
Supervision or education	11 (4–17)	7 (1–12)	5 (0–10)	7 (6–8)
In transit	5 (4–7)	7 (5–8)	5 (4–6)	6 (5–6)
Discharge summary documentation	0.1 (0.0–0.1)	4 (2–5)	10 (7–13)	5 (3–6)
Administrative tasks	1 (0.4–3)	0.8 (0.0–2)	4 (0–7)	2 (0.4–3)
Answering pager‡	0.4 (0.1–0.8)	0.7 (0.4–1.0)	1 (0.3–3)	0.8 (0.5–1.2)
Searching for medical record	0.6 (0.4–0.7)	0.8 (0.3–1.3)	1 (0.9–1)	0.8 (0.6–1.1)
Searching for x-ray or scan	0.1 (0.1–0.2)	0.2 (0.0–0.4)	0.6 (0.4–0.8)	0.3 (0.2–0.4)

* Percentages do not add to 100 as some tasks were undertaken at the same time (ie, when doctors were multitasking).
† Excludes medication documentation. ‡ Time taken to look at and turn off pager. ◆

pared by using χ^2 analysis, with significance set at $P < 0.05$.

Ethical approval

The study was approved by the research ethics committees of the University of New South Wales and the Sydney South West Area Health Service.

RESULTS

We observed the five registrars for a total of 43.5 hours, the seven residents for 60.25 hours, and the five interns for 47.25 hours. During 151 hours of observation, 6243 tasks were recorded. Individual task times ranged from one second (eg, signing a form) to 90.6 minutes (eg, attending a meeting), with a median of 38 seconds. Twenty per cent of doctors' time was spent multitasking.

For all groups, professional communication consumed the greatest proportion of time (Box 3). Registrars spent proportionally more time in professional communication, and in supervision and education than either residents or interns ($\chi^2 = 145.5$; $P < 0.001$). On average, interns spent less time in direct care and considerably more time completing documentation and in general administrative tasks ($\chi^2 = 599.7$; $P < 0.001$). The proportion of observed time interns spent documenting (22%) was almost double that engaged in direct care.

4 Percentage of all work tasks ($n = 6243$) performed by doctors alone or with other people, and percentage undertaken using specific information tools*

	Registrars	Residents	Interns	All (95% CI)
With whom				
Doctor	62.0	52.3	55.2	55.8 (54.6–57.0)
No-one	18.4	26.1	26.1	24.1 (23.0–25.2)
Patient	14.9	17.1	13.8	15.4 (14.5–16.3)
Nurse	10.4	13.0	10.9	11.6 (10.8–12.4)
Relative	3.3	3.2	2.6	3.0 (2.6–3.4)
Allied health professional	1.3	1.0	1.5	1.2 (0.9–1.5)
With what				
Permanent record†	16.9	19.8	24.8	20.7 (19.6–21.7)
Phone	7.1	5.7	5.3	6.0 (5.4–6.6)
Computer	5.9	7.6	8.8	7.6 (6.9–8.3)
Temporary paper (eg, patient list)	1.8	3.5	2.8	2.8 (2.4–3.2)
Fax or laboratory chute	0.0	0.2	0.5	0.2 (0.1–0.3)
Personal digital assistant	0.2	0.2	0.3	0.2 (0.1–0.3)

* Percentages do not add to 100 as some tasks were undertaken at the same time (ie, when doctors were multitasking). † A permanent record (as on the list in Box 2) is a part of the patient's medical record. ◆

Interruptions

Overall, doctors were interrupted 2.9 times each hour, or had one interruption every 21 minutes. Interns had the highest rate of interruptions (one per 18 minutes) compared with registrars (one per 21 minutes) and residents (one per 24 minutes). Seventy-four percent of all interrupted tasks were resumed within the observation period.

With whom, with what and where do doctors spend their time?

For all groups, most work was undertaken with another person, most often another doctor (Box 4). On average, nearly a quarter of tasks were performed alone. Registrars

undertook a significantly smaller percentage of work alone than the other doctors ($\chi^2 = 38.7$; $P < 0.001$). Fifteen per cent of tasks were undertaken with a patient. These tasks consumed an average of 21% of doctors' time. Most work tasks (75.1%) were completed in the doctor's allocated ward, with registrars less likely to do this (70.2%) than interns (76.0%) and residents (77.6%; $\chi^2 = 29.85$; $P < 0.001$). Two per cent of tasks were identified as occurring while the doctor was not officially on duty.

Social activities, which included all social discussions, as well as meal and toilet breaks, consumed the third highest proportion of time. The frequency of this task was low (156), compared with indirect (1100) and professional communication (2021) tasks. However, the average time per social task was considerably longer, at a mean of 9.9 minutes per task (median 1.8 minutes), versus 1.4 minutes (median 39 seconds) and 1.5 minutes (median 35 seconds), respectively.

DISCUSSION

Hospital doctors spent two-thirds of their time on three broad categories of tasks: professional communication, social activities and indirect care. The work of interns differed significantly from that of residents and registrars and was characterised by considerably more time spent in documentation and administrative activities, and less on direct care. This is consistent with reports of interns' dissatisfaction with the high level of indirect care and administrative tasks they are required to undertake.[12,13]

Over half of these doctors' work was carried out in the presence of another doctor and about a quarter was undertaken alone. On average, doctors spent more time with patients than they did with nurses or any other non-medical health professional. The rate of interruptions to these ward doctors (2.9 per hour) was less than half of the reported rates for doctors in emergency departments (6 to 15 per hour).[14-18]

We observed doctors only in the wards during weekdays from 08:30 until 19:00, so results may not be generalisable to weekends, evenings or early morning shifts. Direct, close observation lends itself to the Hawthorne effect, whereby participants improve their performance while being observed. In this study, the effect might be expected for time spent in social activities. Yet social activities were observed to take more time than most of the other types of task. We did not have the power to examine differences between wards, but have previously found few differences between nurses' patterns of work across wards, despite beliefs that these existed before measurement.[10]

The study represents one of the few, and largest, time and motion studies of hospital doctors identified, and as such, provides a useful baseline for future studies. Our results support previous survey data of junior doctors' experiences,[1,12] and debunk commonly held perceptions about the time consumed by specific tasks. For example, doctors had asked us to measure the time spent searching for x-rays and records, because these tasks occupied "all of our time". Yet they consumed less than 1% of their time. The greater weight given to these tasks in discussions clearly reflects the frustration these tasks generate. We have reported a similar situation among nurses, who complained of time wasted following up illegible medication orders, yet when this was measured, we found nurses spent, on average, less than 2 minutes per shift on this task.[19]

This study provides a basis for comparing changes in doctors' patterns of time distribution after the introduction of interventions such as computerised electronic medical record systems. Further, the results raise questions such as: Should junior clinicians spend more time in direct care? How much time, on average, should doctors spend on specific categories of work? Would more time in some tasks produce better patient outcomes?

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COMPETING INTERESTS

None identified.

AUTHOR DETAILS

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