The reality of nursing time: How nurses spend their shifts. A Time Motion analysis of nursing duties in an acute general hospital in West Wales.

Alexandra Walsby, RN, BSc, M.Sc. - alex.walsby@wales.nhs.uk
Professor Sharon Williams – Sharon.j.williams@swansea.ac.uk
Professor John Gammon – j.gammon@swansea.ac.uk
Professor Stephanie Best - stephanie.best@unimelb.edu.au

Corresponding author: Alexandra Walsby, alex.walsby@wales.nhs.uk

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Abstract
Background: Nurse staffing levels are increasingly challenged while pressures on healthcare systems are rising. The need to optimise efficiency in healthcare delivery is essential in order to deliver safe, effective and quality healthcare.
Aim: To understand how nurses spend time and explore opportunities to improve efficiency in care delivery.
Method: A time-motion study was conducted on three acute care wards in a district general hospital in West Wales, United Kingdom. 13 nurses were observed over 14 shifts. Each activity undertaken was recorded in real-time.
Findings: 109 hours of time were observed. Approximately half of nurses' time is spent delivering direct patient care, with medications administration taking the majority of time.
Conclusion: A number of recommendations are made involving processes and workforce modelling which are hypothesized to improve efficiency and safety. Further research would be required to assess the impact of their introduction.
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Introduction

In the next decade, the UK's National Health Service (NHS), and others, are expected to face significant challenges in delivering quality healthcare associated workforce challenges. It is predicted that patient outcomes and staff experiences will be affected (Beech et al, 2019). Nurse vacancy rates have reached record levels, whilst nursing absences have increased (RCNa, 2022). Also, demands on the system have increased (Royal College of Nursing (RCN)) Wales, 2022), such as waiting times in Emergency Departments, for diagnostic testing, and

routine treatments. In Wales, the RCN$_C$ (2022) estimated 2900 nursing vacancies in September 2022, and increasing reliance on agency nurses. Providing safe, effective patient care, depends on adequate staffing levels, and is not always achieved when deploying temporary nursing solutions which are associated with patient mortality (Dall'Ora et al, 2019). To achieve good quality efficient care, nursing roles must be carefully balanced to avoid either overstaffing or understaffing wards and consequent inefficacies, staff burnout (van den Oetelaar et al, 2018) and poor patient care.

To inform decisions concerning efficiency, an in-depth understanding of how nursing time is spent during shifts is useful. It can identify opportunities to eliminate tasks with questionable value (Lim and Ang 2019), and to focus nursing time on activities that contribute to patient care and improve safety (Smeds Alenius et al, 2014). Time-motion studies enable the collection of reliable and detailed field data (Michel et al, 2021), thereby making this an appropriate methodology for this study.

Background

Time-motion studies have been used in healthcare since 1914. They are a blended methodology of two approaches: one focusing on time and the other on motion. The aim of time-motion studies is to determine the amount of time taken on a task (time) and the desire to make processes more efficient by reducing the movement of healthcare staff (motion) (Lopetegui et al, 2014). Finkler et al (1993) described the time-motion process as an observation which records the exact amount of time spent on each task by continuously following a person for a predetermined amount of time. Time-motion methodology has been used by hospital managers and researchers to assess inefficiencies in health care delivery, which now includes a focus on the safety and quality of patient care (Lopetegui et al, 2014). The process was further refined (Kalne and Mehendale, 2022) to ascertain the time taken by skilled workers to complete specific tasks to specific standards, without assessing the quality of the outcome (Michel et al, 2021).

The study: Aim

The aim of this study was to investigate and document the duties, tasks and time spent by nurses working shifts on acute care wards in a district general hospital in West Wales, United Kingdom. The primary objective was to identify if there were any opportunities for improvement in care delivery and to assess whether any change which might include the reallocation of staff within the bounds of financial and resource allocations (Michel et al, 2021). We sought to gather baseline data on which to formulate recommendations, applicable to clinical areas, of potential workforce models designed to improve efficiency of care delivery.

Design and Methodology

Simply, time-motion studies measure time taken by skilled people to complete tasks (Kalne and Mehendale, 2022). They may be applied to different tasks and result in assessing the number of staff required to carry out tasks efficiently. The methodology on which this study was designed aligned with a study conducted by Lim and Ang (2019) whereby nurses were observed throughout their shifts by a registered nurse. Observations were undertaken across 24 hours in an assessment ward, a medical ward and a surgical ward. All shifts were observed

at five-minute intervals. Ideally a different nurse would have been observed on each shift, however one nurse on the medical ward was shadowed twice due to the small pool of nurses available. The researcher decided not to participate in the delivery of patient care, nor listen to information being discussed during the handover processes both of which were, however, timed. Table 1 shows when the observations were conducted.

Table 1: Time period of observations

Ward	Observations commenced	Observations finished
Admission Ward	15th July 2022	27th August 2022
Medical Ward	28th September 2022	11th October 2022
Surgical Ward	5th April 2023	19th April 2023

Participants

Typically, time motion studies have a small number of participants, but the time spent observing is large relative to the number of participants (Finkler et al, 1993). In this study, three clinical specialties were observed to identify nuances between clinical specialties. Minimal inclusion criteria applied to nurses included those in permanent employment in the clinical area and those who agreed to being observed. Nurses working in temporary roles were excluded to ensure that all nurses observed were familiar with the policies and processes of the health board, and the specifics of the ward (culture, routines, specialties, processes). The ideal would have been to observe experienced nurses who had been registered for more than 12 months, however this was not always possible.

Data Collection

Bryman (2016) explains that researchers conducting observational studies must follow explicitly formulated rules in order to observe systematically the direct behaviour of individuals. Observation schedules inform what should be observed, and the mechanisms for recording observations. When conducting time-motion studies, the researcher may video record subjects and analyse the recordings either concurrently or at a later point. This approach may reduce the potential impact of researcher influence, known as the Hawthorne effect (Lopetegui et al, 2014), but in this study there were too many factors outside the researcher's control which made it impossible. They included the environment layout and available resources, therefore, direct observation was undertaken.

A pre-populated data collection tool was designed listing the common nursing duties. It allowed one task to be recorded at a time and the amount of time it took. When nurses were observed to be multitasking, the researcher recorded only the main task in accordance with Michel et al's (2021) research. The lead researcher's nursing knowledge and experience was used to compile the task list, and it was intentionally basic so that additional tasks could be added as observed. This allowed for flexibility in the clinical areas observed.

Ethical considerations

Based on the UK policy framework for health and social care research (NHS Health Research Authority, 2023), this study was accessed to be a service evaluation as it was designed to observe the existing delivery of care and to assess whether there were areas for improvement. The evaluation also looked to understand what standard of care was being

achieved (NHS Health Research Authority, 2023). For internal purposes, the study was also registered with the health board as a service evaluation study.

The study was commissioned by the Director of Nursing for the health board, and permission was given by the senior nursing team for each area in which observations were conducted. An overview of the research aims was emailed to each ward manager, explaining the process and requirements from the ward. The observer described the process and intent of the study to the nurses before asking for their verbal consent. No patient information was collected, nor information of any professionals, and all ward data were anonymised. Patient confidentiality, privacy and dignity was protected as the researcher did not directly observe episodes of care (for example, hygiene care), or participate in patient handovers to avoid hearing patient information.

Data Analysis

Descriptive statistical analysis, which was used to evaluate the data collected, provide an orgnaised summary of data by explaining the relationship between the variables within the sample (Kaur et al, 2018). The time-motion studies conducted were a starting point from which to develop an understanding of the roles and tasks undertaken by nurses daily, and therefore each of the clinical area was analysed independently to produce results reflecting that area. In line with Lim and Ang (2019), the results were calculated in percentages of time and presented in graphs, as recognised by Holcomb (2017) as a common means of organising and displaying data. The average time spent on each task for each area was calculated using the total minutes spent on the ward and the total number of minutes spent on each task across all shifts.

Results

Observations were carried out on a general medical ward with a focus on frailty; a surgical ward specialising in trauma and orthopaedics; and a mixed specialty admissions and assessment ward. Thirteen nurses were observed over 14 shifts. Five of the nurses were in charge of the ward alongside their allocated patients. It was common for nurses on the medical and surgical wards to undertake the dual responsibilities of nurse in charge and caring for patients, whereas the assessment ward had a designated nurse in charge role. The nurses cared for between seven and ten patients per shift. They worked eleven and a half hour shifts (either 07:00-19:30 or 19:00-07:30), however the observer split the day shifts to observe either between 07:00-14:00 or 13:30-19:30. The rationale was to observe as many nurses as possible, and to appreciate the variation in activity levels on a daily basis. All nurses had gained significant nursing experience in Wales, apart from one who was newly registered with the Nursing and Midwifery Council, but had significant experience as a registered nurse overseas. In total 109 hours, or 6540 minutes, of observations were done between July 2022 to March 2023 as presented in table 2.

Table 2: Clinical areas and staff sample sizes

Clinical area	Early shifts	Late shifts	Night shifts	Total minutes	No. of nurses

	No. of shifts	Minutes spent	No. of shifts	Minutes spent	No. of shifts	Minutes spent		shadowed per area
Assessment ward	2	840	2	780	1	750	2370	5
Medical ward	2	840	1	330	1	750	1920	3
Surgical ward	2	780	2	720	1	750	2250	5
Overall Total							6540 mins / 109 hours	13 nurses / 14 shifts

Medication administration consistently took the majority of nursing time which averaged 30.1% of time per shift. Time spent administering medication was between 13% to 57.14% per shift, depending on the time of day. Morning medication rounds were typically longer. Another variable was the type of medication prescribed, with more injectable medications occurring on the admissions ward. An anomaly observed on the surgical ward during one shift involved a nurse new in post who was not trained to administer injectable medications resulting in a lower percentage for that shift. The health board's relevant organisational policy stipulates that two registered nurses must check all controlled and injectable medications prior to administration. As a result, the data shows a significant amount of nursing time was spent checking the procedure (9.1% average). Table 3 shows all the tasks undertaken and the time spent on each.

The tasks were classed as direct patient care and non-direct patient care (table 4). There were 12 tasks in the direct care category e.g., hygiene care and 11 in non-direct care category e.g., documentation. The results show nurses spent more time delivering direct care, however, this was only by a margin of approximately 10%, with the remaining time spent on non-direct care duties. Some non-direct care tasks took nurses away from the patients' bedsides for a significant amount of time, for example, handover processes (12.5% average) and documentation (10.6% average).

The data relating to admissions and discharges of patients showed variation between the areas, but all showed relatively low time spent on admitting and discharging patients. Most time spent on admitting patients was, predictably, on the admissions ward (1.2%), and the medical ward spent the most amount of time discharging patients (4.4%).

Table 3: Activities undertaken by nurses and the time taken in minutes and percentage of shift

Ward Area	Admission Ward	Medical Ward	Surgical Ward	
TOTAL MINUTES ON EACH WARD	**2370**	**1920**	**2250**	

Task	minutes	%	minutes	%	minutes	%	Avg minutes	Overall avg %
Medication Administration	810	34.2	580	30.2	585	26	658.3	30.1
Handover	320	13.5	255	13.3	240	10.6	271.6	12.5
Documentation	320	13.5	135	7	260	11.5	238.3	10.6
Fundamentals of care / moving and handling / hygiene	155	6.5	100	5.2	390	17.3	215	9.6
2nd check of medications	195	8.2	190	9.9	210	9.3	198.3	9.1
Breaks	160	6.75	190	9.9	180	8	176.7	8.2
Clinical procedures / clinical reviews / End of Life care	150	6.3	130	6.7	140	6.2	140	6.4
Liaison with Multi-Disciplinary Team (including site manager)	40	1.7	120	6.25	100	4.4	86.6	4.1
Admin / Clerical duties	55	2.3	35	1.8	125	5.5	71.6	3.2
Liaison with Doctor / Advanced Nurse Practitioner	95	4	40	2	50	2.2	61.6	2.7
Liaison with patients' families	50	2.1	60	3.1	35	1.5	48.3	2.2
Liaison with patients	55	2.3	20	1	70	3.1	48.3	2.1
Covering breaks	65	2.7	60	3.1	0	0	41.6	1.9
Discharge planning / discharging patients	0	0	85	4.4	20	0.8	35	1.7
Cleaning / stocking / bed making	85	3.5	30	1.5	0	0	38.3	1.6
Clinical Referrals	0	0	10	0.5	85	3.7	31.6	1.4
Sourcing of stock / equipment	20	0.8	25	1.3	30	1.3	25	1.1
Admitting new patients	30	1.2	10	0.5	25	1.1	21.6	0.9
Ward management / Patient flow	30	1.2	25	1.3	5	0.2	20	0.9

Physical observations	45	1.9	0	0	10	0.4	18.3	0.8
Ward / Board rounds	15	0.6	35	1.8	5	0.2	18.3	0.8
Nutrition and hydration for patients	20	0.8	0	0	20	0.8	13.3	0.5
Night checks	0	0	15	0.8	0	0	5	0.2

Table 4: Clinical and Non-clinical tasks

	Clinical Tasks	**Avg mins**	**Avg %**	**Non-clinical tasks**	**Avg mins**	**Avg %**
1	Medication Administration	658.3	30.1	Handover	271.6	12.5
2	Fundamentals of care / moving and handling / hygiene	215	9.6	Documentation	238.3	10.6
3	Clinical procedures / clinical reviews / End of Life care	140	6.4	2nd check of medications	198.3	9.1
4	Liaise with Multi-Disciplinary Team (including site manager)	86.6	4.1	Breaks	176.7	8.2
5	Liaise with Doctor / Advanced Nurse Practitioner	61.6	2.7	Admin / Clerical duties	71.6	3.2
6	Liaise with patients' families	48.3	2.2	Covering breaks	41.6	1.9
7	Liaising with patients	48.3	2.1	Discharge planning / discharging patients	35	1.7
8	Clinical Referrals	31.6	1.4	Cleaning / stocking / bed making	38.3	1.6
9	Admitting new patients	21.6	0.9	Sourcing of stock / equipment	25	1.1
10	Physical observations	18.3	0.8	Ward management / Patient flow	20	0.9
11	Ward / Board rounds	18.3	0.8	Night checks	5	0.2
12	Nutrition and hydration for patients	13.3	0.5			
	TOTALS	**1361.2 mins**	**61.6%**		**1121.4 mins**	**51%**

Discussion

We aimed to investigate and document the duties, tasks and time spent by nurses working shifts on acute care wards in a district general hospital in West Wales, United Kingdom. The primary objective was to identify whether there were any opportunities for improvements in care delivery and efficiency.

A number of nurses were observed and timed carrying out a range of duties in acute ward settings during their shifts. A degree of fluctuation was seen across the wards relating to tasks undertaken by nurses, but, overall, nursing roles and duties were comparable. The data shows a differentiation between time given to tasks delivering direct patient care and non-direct patient care as shown in table 4. Slightly more time was given to activities contributing directly to patient care, however, the amount of time spent on non-direct care was notable. This finding is inconsistent with Michel et al's (2021) literature review findings in which 20-38% of nursing time was spent delivering direct care, however opportunities can be identified to improve efficiency and productivity on the wards studied. The importance of improving efficiency and productivity on the morale of nurses explored by Lindqvuist et al (2014), suggest that a direct correlation exists between the delivery of direct care and job satisfaction. Smeds et al (2014) also found a link, perceived by staff, between the ability of nurses to provide direct patient care and improved patient safety. However, patient safety and quality of care indicators were not assessed as part of this study.

Medication administration took most nursing time per shift (30.1%), and the checking process for injectable medications was also significant (9.1%). The second checking procedure did, in the majority of cases, result in interruptions to medication administration processes and can be linked with increased medication errors (Chang, 2010). A key recommendation of this study is the consideration of single-nurse checking and administration processes for injectable medications, excluding controlled drugs. Speight and Dixon (2021) support this recommendation as it reduces interruptions associated with errors, and improves efficiency, autonomy and empowerment of nurses. Chua et al (2019) also found a reduction in medication errors and improved job satisfaction for nurses who administered medications independently. Controlled drugs are excluded due to the specific considerations that need to be applied as per the Misuse of Drugs Act (1971) and the Department of Health recommendations: Controlled Drugs (Supervision of management and use) Regulations (2013).

Nursing handovers transfer patient information from one shift, or one nurse, to the next. A significant amount of time was spent undertaking this critical task on all shifts (12.5% average per shift). Patient safety may be threatened by a failure to transfer key information which becomes lost or forgotten (Smeulers et al, 2016), but handover processes could be improved and should result in increased efficiency. While there is an absence of standardised tools or processes to guide handovers (Smeulers et al, 2014), many researchers recommend using a structured tool (McFetridge et al, 2007; Croos, 2014; Anderson et al, 2015). Taped handovers, followed by a bedside review, have the benefit of maintaining patient confidentiality (Anderson et al, 2015), while allowing for a joint review of bedside documentation and the opportunity for questions (Sullivan, 2007; Liu et al, 2012). If this practice were to be adopted, its evaluation would be advisable.

This study reveals potential opportunities to implement a workforce modelling approach which uses other staff groups and roles to support the delivery of direct and non-direct care. One such role could be the assistant practitioner, introduced into the NHS in 2002 to work under the delegation of registered health professionals. The scope of the role covers the management of patient caseloads, and clinical decision making within their scope of practice and competence (RCN, 2019), and the administration of medications (O'Flanagan, 2014). Another role with the potential to support medications administration is that of pharmacy technicians. Their introduction could release nursing time, optimise medication administration, and support the education of patients (Woodward et al, 2019). Additionally, administrative staff may reduce the amount of time spent on non-direct care duties. The benefits of administrative support include improvements in staff well-being; in leadership; in human resources processes; and in developing future nurse managers (El Haddad et al, 2019). Previous research showed that increased use of administrative staff impacted the wider ward team by enabling the ward manager to be more clinically visible (Somerville and Morrison, 2018). Furthermore, non-clinical ward housekeeper roles whose duties include cleaning, stocking, food services, and maintenance (May and Smith, 2003) could be considered a valuable asset to the ward team. Hurst's (2010) evaluation of the housekeeper role found that it allowed nurses more time with patients, had a positive effect on quality standards, and increased job satisfaction and morale (Tye et al, 2012). Research undertaken to date has shown all of the roles discussed contribute positively to patient care. However, no research has yet been done on the building of a team with the addition of more than one additional role.

Limitations

This service evaluation has a number of methodological and study specific limitations.

1. Methodological limitations: Observational studies provide a method of assessing the effectiveness of many aspects of healthcare, while acknowledging there are a number of challenges when undertaking observational research, most notably the risk of bias (Thomas, 2020). One challenge is the need to abide by the boundaries necessary to collect accurate data which forbid interference in the processes being undertaken, and allows for recording only (Cochran, 2015). In addition, time-motion studies are recognised as being extremely labour intensive due to the one-to-one process of observations (Finkler et al, 1993) and are therefore often limited to a small number of participants (Kalne and Mehendale, 2022). Nevertheless, the information gained from this observational study could not have been gathered by other means, and has highlighted areas and processes which could be improved and lead to greater efficiency, job satisfaction, and patient safety.

2. Study specific limitations: First the decision to use a data collection tool recording 5-minute intervals. The data would be more accurate and would allow for the tracking of fragmented tasks and the quick turnaround from one task to another if smaller time intervals were applied (Lopetegui et al, 2014). Second, despite conducting the study on wards with different clinical specialties, the results are still limited in the extent to which they can be generalised due to different clinical practices between health boards, hospitals and wards, all of which limits their external validity. Finally, there was a risk of subjectivity and bias in this evaluation introduced by the use of a researcher integral to the organisation (Greene, 2014). In particular, the research team were aware of the potential for confirmation (observer) bias

where there is a tendency to seek out information that supports our existing beliefs. Confirmation bias can also result from being overconfident and missing or ignoring contradictory results (Althubaiti, 2018). The potential for confirmation bias was recognised, regularly discussed and attempts to mitigate its impact on the study were taken through regular team meetings. The diverse backgrounds and professions of the team provided differing opinions and encouraged the objective analysis of the data (Althubaiti, 2018). The iterative nature of the study design also minimized the possibility and effects of bias along with the recognition for its potential as reported here.

Conclusions

Improvements could be made in existing processes and through changes to the workforce modelling. Table 5 highlights the challenges experienced by registered nursing staff during this study, with suggested solutions and potential outcomes.

Table 5: Challenges, Solutions and Anticipated Outcomes

Challenges	Solutions for consideration	Potential Outcomes
Time spent on the handover process	Consider the use of taped handovers	• Less interruptions experience • More focus on the handover information and not distractions
Time spent administering medications	Implement a single nurse administration process for injectable medications Delegate medications administrations to pharmacy technicians	• Reduce interruptions to medications administration • Release nursing time • Release of nursing time • Use of professionals with expert knowledge to increase medications safety
Vacancies in registered nursing workforces	Implement assistant practitioners into ward staffing models	• Delegate the care of cohorts of patients to the assistant practitioner • Use staff to the top of their competence • Release of registered nursing time
Ward managers time commitment to administrative tasks	Implement ward administrators in the ward staffing model	• Release ward manager time to the clinical environment
Tiem spent by staff seeking resources	Implement housekeepers into the ward staffing model	• Ensure staff have the required resources to deliver patient care • Release staff time from sourcing resources

As suggested in table 5, consideration could be given to changes in workforce models. Various pieces of research have looked at the addition of various roles, but there has been no comprehensive study of building a team around the patient in clinical settings. This evaluation makes four potential workforce recommendations, however, it is important to recognise that differences between health boards, hospitals and wards means that there must be a degree of flexibility in planning appropriate workforce models.

In the UK, nurse staffing levels have been under increasing public scrutiny since the Francis Report (Francis, 2013) exposed staffing deficits as a prominent cause of failings in health care (Ball, 2020). Critically, it is recognised that suboptimal nurse staffing models result in sub-optimal care delivery to patients (Nickitas and Mensik, 2015). This study has identified a number of opportunities to improve efficiency, both in workforce modelling and productivity. We recommend further research to evaluate a team of staff groups working collaboratively and providing a mix of direct and non-direct patient care.

(word count excluding abstract and table: 2987)

Key points

- Nurses spend a significant amount of time on tasks that do not contribute to direct clinical care, including administrative and co-ordination processes.
- There are a number of opportunities to improve efficiency to nursing care by reviewing clinical processes and workforce modelling.
- A multiprofessional approach to workforce planning will result in the deployment of staff with the right skills and competence to contribute to patient care, while releasing registered nursing time.
- Further research is required into the impact of multi-professional approach to workforce modelling, and the impact on patient safety, quality and experience

Reflective questions

- Can you think of an occasion when other health care professionals could have supported you in the delivery of patient care?
- Can you reflect on an occasion where you were you worked as part of a multi-professional team to meet the needs of patients?
- What do you envisage to being the enablers and barriers in developing a multi-professional team in your area of work?

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