Considering pharmacy workflow in the context of Australian community pharmacy: A pilot time and motion study

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ABSTRACT

Background: Given time pressures on primary care physicians, utilising pharmacists for chronic disease management is of great interest. However, limited data are available on the current workflow in community pharmacies to guide these discussions.

Objective: This study aimed to test the feasibility of collecting workflow data from Australian community pharmacies using the Work Observation Method By Activity Timing (WOMBAT) software and provide preliminary data on Australian pharmacy workflow.

Methods: Data were collected from three pharmacies and four variables were recorded: what the pharmacist did, with whom, where and how. All tasks were timed and data were analysed to identify total number of tasks, median time per task, proportion of time per task, and common task combinations.

Results: Pharmacists' main tasks consisted of counselling, dispensing and management activities (27%, 21% and 17% respectively of the overall number of tasks) and these tasks also took the majority of their time. Tasks were frequent but short, with the average time per task ranging from 0.55 to 8.46 min and most time was spent in areas without the capacity for patient interaction (51% in the dispensing/compounding area and 6% in the back office).

Conclusions: Pharmacies are dynamic environments with the average task taking 1–2 min. Longer interventions may not be easily integrated into current pharmacy workflow.

1. Introduction

Community pharmacists are a set of highly trained healthcare professionals with unique patient interactions that are potentially under-utilised in the management of patients with complex chronic conditions.[1] Given the increasing time pressures on primary care physicians,[1] utilising pharmacists in a model of care is being currently proposed for chronic diseases such as asthma, cardiovascular disease, and HIV, through novel interventions implemented at the pharmacy level.[2–4] Such interventions can improve patient understanding, adherence to medications, and ultimately clinical outcomes with collaborative pharmacy interventions already showing improvements in lipid levels and blood pressure for cardiovascular disease.

In the Australian context, community pharmacists can be business owners or employees and traditionally dispense and/or give advice about prescriptions as well as provide primary care.[5] Because of the product-oriented remuneration model in Australia, implementation of patient-centred services that are typically recommended for chronic disease has proved challenging. Current remuneration for patient-centred services is limited to a handful of Government negotiated priority areas as well as a few cognitive pharmacy interventions such as comprehensive medication management reviews. The content, extent and continuation of remuneration packages for non-dispensing services are negotiated every five years by the Australian federal government, the funders of the products and services, and The Pharmacy Guild of Australia, a union and lobbyist for pharmacy owners. What is included in these agreements is a divisive area of Australian health policy, most recently prompting a comprehensive review of current pharmacy

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professional services.

In addition to remuneration issues, there is very little discourse on how to best implement such services within community pharmacy practice. While professional bodies such as the Pharmacy Guild of Australia and the Pharmaceutical Society of Australia provide guidelines for community pharmacists about the delivery of professional services,[6,7] concerns have been raised about pharmacists not fulfilling the roles of the guidelines, and difference in implementation standards between pharmacies.[4,8] Furthermore, pharmacists report time management issues and privacy concerns as significant barriers to implementing new pharmacy services for chronic diseases.[9,10]

To tackle such issues, the limited evidence base describing how Australian community pharmacists operate must be expanded. Data that has been collected on pharmacy workflow has been largely qualitative, subjective, and difficult to compare between studies.[11] Additionally, data are often collected on highly motivated pharmacists that are participating in large clinical trials and may not be reflective of community pharmacy practice at large. A more robust assessment of pharmacy workflow may highlight ways to practically implement patient-centred interventions for chronic disease into community pharmacy, thus maximising their translation, scalability and uptake into everyday practice.

Time and motion studies provide a method for obtaining quantitative data on workflow and work practices, and have been recently used in some healthcare settings including in Australian hospital pharmacies,[11,12] and non-Australian community pharmacies.[3,13,14] Data collected with this method uses discrete variables and can be more easily compared to standards, between studies, and with future interventions.[11] Such data can be easily collected electronically, with software loaded onto a tablet device. One such software program – called WOMBAT (Work Observation Method By Activity Timing) – has been successfully used to collect workflow data in healthcare settings including hospital pharmacies.

No time and motion studies have been conducted in Australian community pharmacies. Yet workflow data may provide insight on how community pharmacists spend their time, and whether pharmacists have the capacity to provide additional patient services on top of their routine tasks. This type of information would be directly relevant to the current policy debates surrounding professional pharmacy services. This paper reports a pilot time and motion study that utilised the WOMBAT method to collect data on pharmacy workflow. The objectives were to assess the feasibility of collecting such data and provide some preliminary data on Australian community pharmacy workflow by quantifying how much time pharmacists spend on specific tasks, how frequently, with whom, where, and how they interact.

2. Methods

2.1. Study design

This study was a multi-site pilot observational time and motion study of pharmacy workflow at three community pharmacists in Sydney, Australia. Ethics approval was obtained from the University of Sydney Human Research Ethics Committee and written informed consent was provided by each pharmacist prior to participation in the study.

2.2. Recruitment of pharmacists

A convenience sample of pharmacists were recruited through professional contacts at The George Institute for Global Health (not for profit research organisation where most of the investigators work with established collaborations with academic pharmacists). An initial e-mail was sent to the pharmacists, and if they agreed to participate, more information about the study methods and pharmacist commitments was provided via a phone call. Once agreement to participate was obtained,

written permission from the pharmacy owner (if different to the participating pharmacist) was obtained and a mutually suitable time was made for signing of the consent form and commencement of the observation.

2.3. Data collection

One of the authors (DC) who had led the development of the data collection tool including task definitions was trained in use of the WOMBAT tool and stationed at each pharmacy observing a single pharmacist during the pharmacist's work shift. Pharmacists were observed for up to 16 h in two hour time slots over a variety of weekday shifts from May 2016 to October 2016. These time periods were deliberately spaced to collect data over a variety of days and varying times across the workday to maximise data variability.

The observer collected data on a Google Nexus 9 tablet loaded with the WOMBAT software and was stationed in the most convenient spot to be unobtrusive yet be able to observe behaviour. This was typically beside the dispensing computer towards the side or back of the pharmacy.

Four variables were defined and recorded - what the pharmacist was doing, with whom they were interacting, where, and how – and each task was logged with a time stamp. Tasks were defined predominantly by the 'what' variable and defined logged per patient predominantly e.g. if a pharmacist was filling multiple prescriptions for a single patient then a the task would encompass all the prescriptions for that patient. The software enabled recording of interruptions due to external stimuli (such as a phone call or staff query) and multiple tasks occurring concurrently (such as unpacking medication while talking on the phone). Each task category within the variable (Table 1) was defined from existing industry standards[6] as well as consultation with active community pharmacists on typical workflows and task within community pharmacy practice, with the refinement of the tool achieved through pre-testing of the categories. A screen shot of the data collection tool is shown in Fig. 1. Data was designated as being collected in 4 areas: front of shop (roaming), at the sales desk, behind the sales desk in the dispensing/compounding area or in the back office area.

2.4. Data analysis

Data were downloaded from the WOMBAT server and analysed in Excel and Prism (San Diego, California) as per the WOMBAT analysis guide v 2.0.[15] The frequency of tasks, median time per task, proportion of time per task, and common task combinations were calculated.

3. Results

Data were collected from 5 pharmacists at 3 community pharmacies in Sydney – A small urban single owner pharmacy, a medium sized urban pharmacy attached to a doctor's clinic, and a large urban commercial chain pharmacy. Only one pharmacist could not participate due to working hours being incompatible with the data collector's availability. A total of 1410 tasks were logged over 35.37 h of observations between 8:30am and 6pm on weekdays.

The most common tasks undertaken by pharmacists were counselling, dispensing and professional management activities (27%, 21% and 17% respectively of the overall observation time, Table 2). These three tasks also occupied the majority of their time (72% their total observed time, Table 2).The median time per task for any task performed was less than 9 min (Fig. 2). Pharmacists spent the majority of their time at locations where customer interactions were limited (51% of their time behind the desk in the dispensing/compounding area and 6% of their time in the back office) compared to locations where customer interactions were more available (29% of time at the sales desk and 17% of time in the front of shop). Pharmacists spent 55% of their time performing tasks alone and only 32% of their time was spent interacting

Table 1
Definitions of variables collected.

What: This variable describes what the pharmacist is doing. It is a mandatory and uni-selectable variable. If a pharmacist is doing more than one activity, it is considered a multi-task.

Category	Definition	Includes	Excludes
Sales	Any act of selling a product.	Payment processing including cash handling, EFTPOS Promoting sales of non-pharmaceutical goods (eg drinks, clothing)	Promoting medicines targeted at a patient request (this would be counselling)
Counselling	Counselling a patient about a medication or symptom.	Recommending products specific to symptoms Patient education Educating how to take a medication, dosage, route, frequency, cessation, side effects	Sales pitches for non-pharmaceutical goods Social interactions with pharmacy patrons or staff Educating other staff members
Dispensing	Dispensing medication for the patient	Filling scripts Retrieving medications Direct dispensing for the patient Dispensing of long term scripts including webster packs	Counselling the patient on their scripts or medications Communicating with script providers (eg doctors) about medications (this would be professional communication)
Indirect patient services	Pharmacy services for a patient that are not face-to-face	Organising supply of medications or therapeutic devices Ordering specific medications Providing dose administration aids Organising delivery of medications	Dispensing medications Counselling via the phone Sales Ordering of general stock
Compounding	Compounding medications. Only if the pharmacy has compounding services	Compounding medications	Dispensing medications
Professional Communication (P Comm)	Communication with pharmacy staff, or other health professionals	Asking advice Discussing patient care Requesting scripts Communicating with staff about the running of the pharmacy (eg delegating staffs, updating staff)	Social interactions with other health care professionals or staff Teaching or research
Professional Education (P Edu)	Professional education, research, study, or teaching.	Teaching students or staff Research into specific products, or for specific patient requests	Counselling of patients
Professional Management (P Mgmt)	Any activity related to the management of the pharmacy (business)	Administration tasks Updating records Updating rosters Handling deliveries Maintenance	
Waiting	Waiting for more than 10 seconds.	Pharmacist waiting for a customer to approach the counter.	Waiting for less than 10 seconds (included in following task if less than 10 sec).
Break	A break from any of the above tasks where the pharmacist is not undertaking professional activities.	Food breaks Toilet breaks Socially interacting with customers or staff not related to pharmacy services.	

With whom:
 This variable describes with whom the pharmacist is interacting. This person must be present and involved in the current task. If the pharmacist is acting alone, this domain is left blank and "alone" is recorded. Otherwise, there are three domains (patient, pharmacy staff, other).

Category	Definition
Alone	The pharmacist is performing the task by themselves. If another person is observing, (Eg student), the activity is still alone as they are not taking part. If the pharmacist is asking the student questions, or interacting with the student the activity is still alone, however the pharmacist will be multi-tasking with the student.
Patient	Any customer / consumer of the pharmacy. This may include consumers that come on behalf of a patient (eg mother coming to buy medications for son).
Pharmacy staff	Employees of the pharmacy including other pharmacists, technicians, sales staff, students
Other	Any other person. This may include delivery staff, any other health professionals, external sales persons etc.

Where:
 This describes where in the pharmacy the activity is taking place. There are four main domains based on generic pharmacy layouts. This variable is mandatory and uni-selectable.

Shop-roam	Anywhere in the main shop. This may include roaming – for example to talk to customers, perform sales, re-stock shelves etc.
Desk	At the main pharmacy desk. The pharmacist is available for interaction with customers. This is usually where point-of-sales occurs
Behind desk	Behind the main pharmacy desk. The pharmacist may not be available for direct communication with customers, but they can often still see customers. This is often where scripts are filled.

How:
 This variable describes how the pharmacist is performing the task. It may include how the pharmacist interacts with customers and whether they use any devices to do so. This variable is multi-selectable as the pharmacist may be utilising more than one mode at any one time – for example while filling a script, the pharmacist may be referring to the script while typing in a computer.

Face to face	The pharmacist is interacting directly with the person face-to-face.
Phone	Either fixed telephone or talking on a mobile phone.
Script	Reading scripts, filling scripts. Scripts may be paper form or online. If the script is online, the pharmacist will be using both script and computer.
Computer	Pharmacist is using the computer
Mobile Device	Tablet of mobile phone where the pharmacist is not talking on the telephone (eg using apps, browsing internet, texting etc

Table 1 (*continued*)

Fax	Facsimile machine, either sending or receiving
Other	Using anything other than the above methods. This may include opening letters, referring to rosters or charts etc.

with patients, 9% with other pharmacy staff, and 7% with other people (for example deliveries person, external representative, doctor).

Five common combinations of tasks were elicited and their count, total time, and median time per task is shown in Table 3.

4. Discussion

This pilot time and motion study provides detailed quantitative data around the day to day tasks of community pharmacists in Australia. This data provides confirmation of feasibility of collection of such data
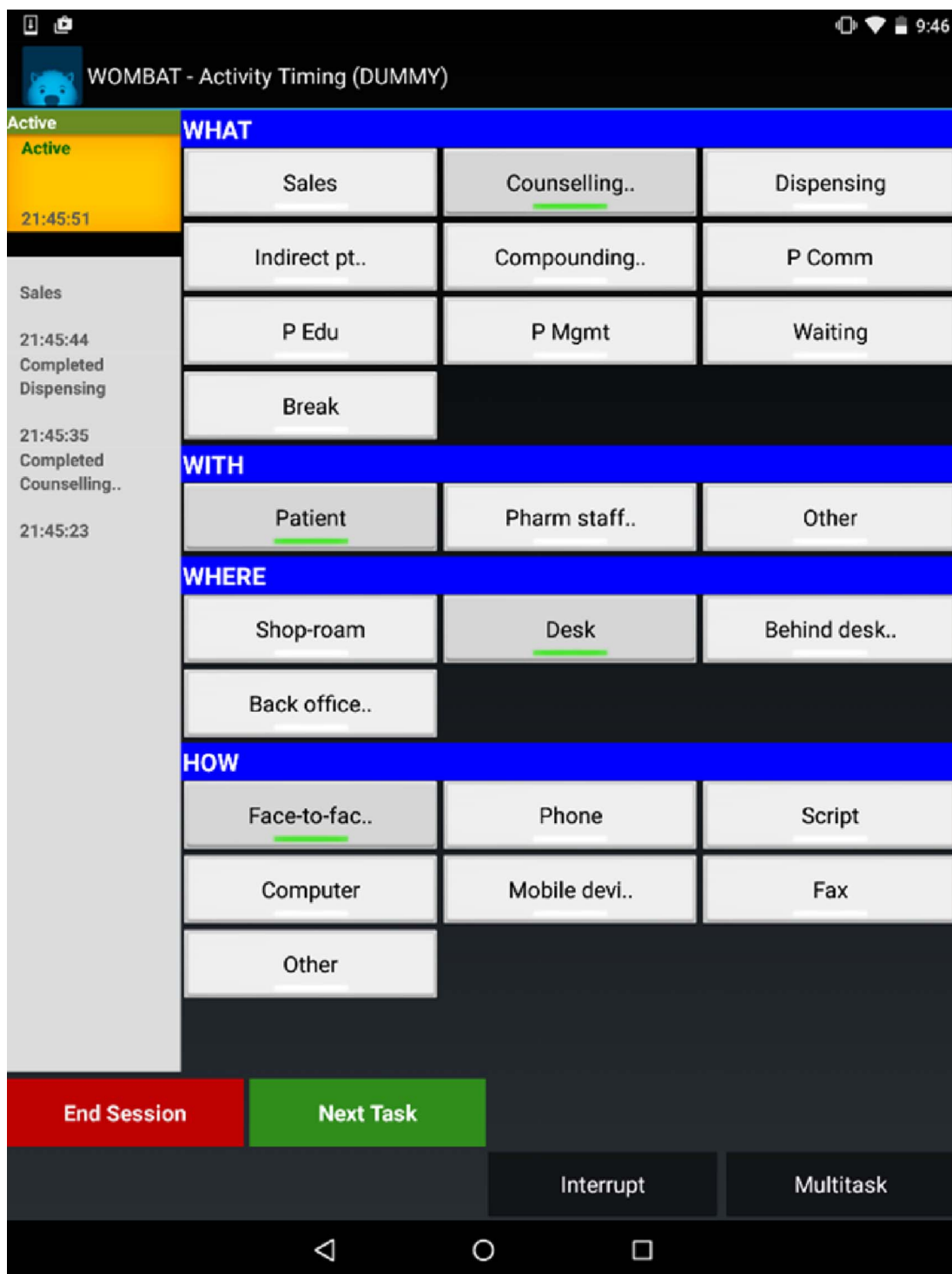

Fig. 1. Screenshot of the WOMBAT data collection tool.

Table 2
Frequency of tasks performed by pharmacists and Proportion of overall time spent on each task.

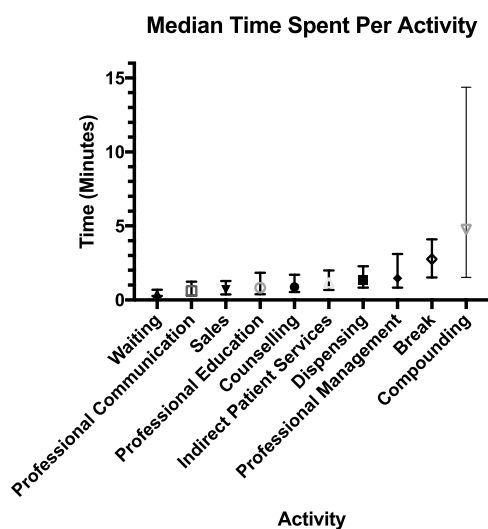| Task	Task frequency (%) n = 1410	Proportion of time (%) n = 35.4 h
Counselling	26.6	23.9
Dispensing	20.7	23.9
Professional management	16.7	24.2
Professional communication	15.0	10.7
Sales	11.3	6.9
Indirect patient services	2.6	2.4
Professional education	2.6	2.1
Waiting	1.9	0.8
Break	1.8	4.0
Compounding	0.7	3.7
Missing value	0.1	0.6

Fig. 2. Median time spent on each task. Error bars represent inter-quartile ranges (IQR).

and preliminary insight into pharmacy workflow and may be used to inform the design, implementation, and evaluation of pharmacy interventions in practice.[16]

Pharmacists spent the majority of their time on three tasks – dispensing, counselling, and professional management. While dispensing and counselling are expected of pharmacists, a large proportion of time is also spent on professional management activities such as administration, updating of rosters and receiving of deliveries. A study on community pharmacies in Portugal reports similar results, while a study in the USA reports similar results for the counselling and dispensing domains, and less time (5%) on professional management.[3] Task shifting some of these professional management activities to a pharmacy assistant for example, i.e. moving towards more of the US model may free up some pharmacist time to commit to chronic disease management activities.

Pharmacies in this study were shown to be fast paced environments with the median length of time for the four most common tasks taking

1–2 min. This is slightly shorter than data published by Gregorio et al. which showed an average task duration between 2 and 5 min depending on the task type.[14] Interventions that take significantly longer than this, e.g. 10–15 min therefore may not be easily integrated into current workflow.

4.1. Limitations

Due to its exploratory nature, this study had a small sample size, and there was variation observed between the pharmacies in terms of size, staffing, and clientele which limits the generalisability of results. Recruitment bias may be present due to recruitment via professional contacts.

Data was collected via an observer. Therefore observer bias, observer fatigue, and the Hawthorne effect (whereby participants activity is enhanced simply because they know there are involved in a study or being observed) may be present.[17] These were mitigated by having frequent breaks, random observed time intervals, and placing the observer in a convenient position, in view of but out of the way of normal pharmacy practices.

There is also a limitation of categorical data collection - whilst it is easy to collect due to the defined variables, it is not possible to know what each specific task was, and no data was collected on the quality of interactions e.g. did the patient benefit from the counselling provided. Comparison to literature is also difficult due differences in categorical variables. This could be overcome by standardised variables as suggested in other time and motion studies.

4.2. Further research

A larger study involving a greater number of pharmacies with purposive sampling across different parameters (e.g. urban vs rural, commercial chain vs independent pharmacy) is being planned to improve the generalisability of results. Further workflow data will be collected using the same established variables and data collection tool. This data could be used to compare against existing standards, assist in designing future pharmacy based interventions, and changes in pharmacy practice over time including transitions for alternate work models in pharmacies such as technician based dispensing.[18]

5. Conclusion

Without knowledge of pharmacy workflow, future pharmacy interventions may not be integrated successfully into pharmacy practice. This study was the first using the WOMBAT data collection tool and a time and motion design to collect workflow data. It demonstrated that this method was effective and easy to use in Australian community pharmacies. Data showed workflow patterns that reflected common pharmacy tasks, and provided initial insights that will be utilised to conduct a broader study.

Conflicts of interest

None of the authors declare any conflicts of interest.

Table 3
Top five common task combinations, their frequency, total minutes spent on each task, and mean minutes per task.

Combination	Count	Total Minutes	Median Minutes per task
Counselling + Patient + Sales Desk + Face to face	252	307.75	0.77
Dispensing + Alone + Behind Desk in dispensing area + Script + Computer	200	379.23	1.62
Professional Communication + Staff + Behind Desk in dispensing area + Face to Face	113	83.95	0.40
Counselling + Patient + Shop-roam + Face to face	105	174.78	1.13
Sales + Patient + Desk + Face to face at computer	97	78.50	0.68

Acknowledgements

References

1. Duckett S, Breadon P, Ginnivan L. *Access All Areas: New Solutions for GP Shortages in Rural Australia.* Melbourne: Grattan Institute; 2013.
2. George PP, Molina JA, Cheah J, Chan SC, Lim BP. The evolving role of the community pharmacist in chronic disease management - a literature review. *Ann Acad Med Singapore.* 2010;39:861–867.
3. Fisher AM, Ding MQ, Hochheiser H, Douglas GP. Measuring time utilization of pharmacists in the Birmingham Free Clinic dispensary. *BMC Health Serv Res.* 2016;16:529.
4. Watkins K, Seubert L, Schneider CR, Clifford R. Post hoc evaluation of a common-sense intervention for asthma management in community pharmacy. *BMJ Open.* 2016;6:e012897.
5. Moles RJ, Stehlik P. Pharmacy practice in Australia. *Can J Hosp Pharm.* 2015;68:418–426.
6. Pharmaceutical Society of Australia. *Professional Practice Standards.* fourth ed. Deakin West: Pharmaceutical Society of Australia; 2010.
7. Goma S. *Submission to: The Legal and Social Issues Legislation Committee Inquiry into the Role and Opportunities for Community Pharmacy in Primary and Preventative Care in Victoria.* Victoria: The Pharmacy Guild of Australia; 2013.
8. Hattingh HL, Hallett J, Tait RJ. 'Making the invisible visible' through alcohol screening and brief intervention in community pharmacies: an Australian feasibility study. *BMC Publ Health.* 2016;16:1141.
9. Armour C, Bosnic-Anticevich S, Brillant M, et al. Pharmacy Asthma Care Program (PACP) improves outcomes for patients in the community. *Thorax.* 2007;62:496–502.
10. Phillips L, Ferguson R, Diduck K, Lamb D, Jorgenson D. Integrating a brief pharmacist intervention into practice: osteoporosis pharmacotherapy assessment. *Can Pharm J : CPJ.* 2012;145:218–220.
11. Lehnbom EC, Li L, Prgomet M, Lam WY, Westbrook JI. Little things matter: a time and motion study of pharmacists' activities in a paediatric hospital. *Stud Health Technol Inf.* 2016;227:80–86.
12. de Clifford J-M, Blewitt P, Lam SS, Leung BK. How do clinical pharmacists spend their working Day? A time-and-motion study. *J Pharm Pract Res.* 2012;42:134–139.
13. Davies JE, Barber N, Taylor D. What do community pharmacists do?: results from a work sampling study in London. *Int J Pharm Pract.* 2014;22:309–318.
14. Gregorio J, Cavaco AM, Lapao LV. How to best manage time interaction with patients? Community pharmacist workload and service provision analysis. *Res Soc Adm Pharm.* 2017;13:133–147.
15. Walter SR, Ling L, Westbrook J. *A Guide to the Analysis of Data from the Work Observation Method by Activity Timing (WOMBAT) System.* Macquarie University; 2016.
16. Cain C, Haque S. Organizational workflow and its impact on work quality. In: Hughes R, ed. *Patient Safety and Quality: An Evidence-based Handbook for Nurses.* Rockville (MD): Agency for Healthcare Research and Quality; 2008.
17. Paradis E, Sutkin G. Beyond a good story: from Hawthorne Effect to reactivity in health professions education research. *Med Educ.* 2017;51:31–39.
18. Zheng K, Guo MH, Hanauer DA. Using the time and motion method to study clinical work processes and workflow: methodological inconsistencies and a call for standardized research. *J Am Med Inf Assoc.* 2011;18:704–710.