Improving the quality of Registered Nurses (RNs') working time use data

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Contributions

Tuula Antinaho proposed the concept and design of the study, was involved in data collection and analysis, and was responsible for drafting and revising the manuscript. Pirjo Partanen, Hannele Turunen and Tuula Kivinen participated in designing the study, critically revised the manuscript and supervised the study. All of the authors gave their approval for the final version of the manuscript to be submitted.

Conflict of interest

The authors declare no conflicts of interest.

Abstract

Aims and objectives. The aim of this study was to examine the advantages and disadvantages of external observation and self-reporting methods in investigating registered nurses' (RNs') working time use in order to improve the quality of working time use data.

Background. External observation and self-reporting methods are the most widely used approaches for studying nurses' working time use in observational work sampling studies, but there is scarce information of the data collection procedures and results in the same research context and in the same study.

Design. A cross-sectional quantitative study with a structured data collection instrument developed for this study. The same instrument was used in both data collections.

Methods. Data were collected from six inpatient units at two Finnish tertiary hospitals in autumn 2013 over two consecutive weeks. All RNs (N = 95) from two internal medical units, two surgical units and two psychiatric units participated in this study.

Results. Statistically significantly divergent information was produced by the two data collection methods in the major nursing categories of value-adding care and non-value added work as well as in each of the seven nursing sub-categories.

Conclusions. External observation and self-reporting gave an overall picture of how RNs' are using their working time, and both methods were useful in examining RNs' working time use when taking into accounts the advantages and disadvantages of these methods. The deviations between the results improved the quality of data because both methods address recognized shortcomings of the other.

Relevance to clinical practice. This research promotes awareness of the divergent study results by investigating RNs' working time use with these two different data collection methods. In future, it would be wise to aim for more comparable data by applying external observation and self-reporting techniques simultaneously.

Keywords: registered nurses, nursing, hospitals, research methods, external observation, self-reporting

What does this paper contributes to the wider global clinical community?

- External observation and self-reporting produce divergent information on RNs' working time use.
- External observation and self-reporting are useful methods for investigating RNs' working time use, but researchers should be aware of the advantages and disadvantages of each method.

- Issues related to validity and reliability are important when designing new research or analyzing previous working time use studies.

Introduction

The work of nurses has become increasingly complex and multi-disciplinary (Pitkäaho *et al.* 2015) in recent years; nurses now carry out a wide range of roles in health care organisations, often acting as managers and researchers at the same time as performing clinical work (IOM 2015). Changes in the health care system, increased workloads, shortened care periods in hospital as well as technological advances, are all significantly changing the fundamental nature of nursing work and thus posing challenges for contemporary practitioners (Ampt *et al.* 2007, Hamström *et al.* 2012, Aiken *et al.* 2014). Currently, little attention has been paid to value-adding care in nurses' work meaning activities benefiting the patient, such as the time nurses spend carrying out direct patient care (Dearmon *et al.* 2013) which is nurses' primary function. More attention has mainly been paid on the provided care to patients, but not on *how* it will benefit them (Teperi *et al.* 2009). It has been claimed that in general nurses have less time for patients and for primary nursing activities because of a wide range of ancillary and miscellaneous tasks (Hendrich *et al.* 2008, Gardner *et al.* 2010), like catering and transportation. It has even been reported that crucial nursing tasks are being left undone because of a shortage of time (Aiken *et al.* 2013). Nurses' time use in non-nursing tasks, so called "non-value-added work", has been claimed to be not cost-efficient and beneficial for patients (Duffield *et al.* 2005; Upenieks *et al.* 2007; Storfjell *et al.* 2008; Upenieks *et al.* 2008). Although nursing work is challenging to assess and measure (Choi & Boyle 2014), in this rapidly shifting professional context there is undoubtedly a need for continuous, reliable and accurate evaluative information in order to identify the core elements of contemporary nursing work; reliable data of this kind would enable efficient allocation of nurses' working time to activities that have been found to be beneficial for patients (Duffield *et al.* 2008, Dearmon *et al.* 2012).

The most frequently used method for studying nurses' working time use has been work sampling (WS), particularly using external observation and self-reporting as data collection methods (Blay *et al.* 2014). WS has been shown to be a suitable method for identifying problems in nursing work, improving productivity (Thomas & Davies 2005) and patient care (Perla *et al.* 2014). However, despite this general acceptance of WS as being appropriate in this field, there are conflicting opinions on the utility of external observation and self-reporting as data collecting methods and hence on the reliability of the information they produce (e.g. Hagerty *et al.* 1985, Ampt *et al.* 2007). Furthermore, in some recent WS studies inconsistencies relating to the implementation of training, the testing of interrater reliability and the reporting of results have emerged; these inconsistencies might well complicate any attempts to compare the results of previous studies of RNs' working time use, and researchers should be aware of them and proceed with caution (Blay *et al.* 2014).

Because few previous studies have used these information collecting methods in the same research (Ampt *et al.* 2007), we decided to collect data for our study from two Finnish tertiary hospitals during the morning shifts over two consecutive weeks in the autumn of 2013. Our main focus was on examining the advantages and disadvantages of the external observation and self-reporting methods. We wanted to bring out certain weaknesses related to these methods, and will argue here that these shortcomings must be taken into account when designing new research projects or when analyzing results from previous studies which have used these methods. We believe that the enhanced research awareness of this approach will result in more accurate information that will be important in improving the quality of working time use data.

Background

WS as a research method

WS, also known as activity sampling (Robinson 2010), originated in the field of industrial engineering and management, where the statistician Teppett noted that routine work outcomes could be recorded by taking randomly spaced observations of workers. WS is based on the laws of probability: a sample of observations of staff working activities can be generalized into a picture of how they spend their daily or weekly time (Abdellah & Levine 1954, Pelletier & Duffield 2003).

External observation and self-reporting are commonly used in many WS studies**.** A trained external observer or workers themselves identify and record work activities at a number of randomly occurring sample points (Robinson 2010), while the actual time spent on activities is not recorded (Urden & Roode 1997). Recorded activities can be summarized as frequencies and converted to percentages, thus showing the activities to which the workers devote their time during their workday. The calculations are then compared with the total available working time (Pelletier & Duffield 2003, Chaboyer *et al.* 2008, Robinson 2010, Blay *et al.* 2014). It is noteworthy that WS provides information about *what* workers are doing, but not *how* they are doing it (Duffield & Wise 2003, Ampt *et al.* 2007). The estimates of the time percentages are more accurate if the number of recorded activities is large, and obviously improves the reliability of the study as a whole (Robinson 2010).

In previous working time use studies in the field of nursing, and where two different data collection methods have been combined in the same study, the data have usually been gathered over two consecutive weeks. (e.g. Burke *et al.* 2000, Ampt *et al.* 2007.) The data collection period has taken from days to several weeks, and the activity sampling period has varied from 0.5–4 hours to a full work shift. Data have been collected from either every shift, or merely from one shift (Blay *et al.* 2014). WS can be completed with either random or fixed-interval collections during the working day (Ampt *et al.* 2007). In

earlier studies, the random recording time has varied from 4 to 32 alerts per hour, while time in fixed-interval recording has usually ranged from 2–3 minutes to 15 minutes (Blay *et al.* 2014). Shorter time intervals between data collection points have been suggested as a way of providing greater accuracy in the collecting process (Finkler *et al.* 1993). External observation can be implemented either continuously or at fixed intervals. In continuous or direct observation, the observer either follows one RN continuously (Härkänen *et al.* 2014) or records the activities of all personnel in a particular area (Abdellah & Levine 1954). Direct and continuous observation allows for the recording of more activities than fixed-interval observation (Blay *et al.* 2014), and it also enables the observer to note whom the employees are working with (Westbrook *et al.* 2012). In fixed-interval observation, one observer takes intermittent notes of nurses' activities, which enables him or her to observe more employees at the same time (Abdellah & Levine 1954).

Nursing activities are usually coded in a tabular or matrix form in the data collection instrument (Pelletier & Duffield 2003). Each activity has a numerical code and a clear definition of the content of the activity so that the information can be easily checked whenever needed. They are mutually exclusive and usually organised into four classification categories: direct care, indirect care, unit-related activities, and personal time (Williams *et al.* 2009, Abbey *et al.* 2012). Some studies have used additional categories, such as documentation (Ampt *et al.* 2007, Ballermann *et al.* 2011) or administrative activities (Herdman *et al.* 2009). Moreover, unit-related tasks and personal time have sometimes been reported as elements of indirect care.

Shared attributes of external observation and self-reporting, their advantages and disadvantages

External observation and self-reporting have their own inherent advantages and disadvantages as data collection methods, but they do, nevertheless, share certain things in common: both methods require a data sampling instrument, a data collector (an external observer/RN), training and supporting documentation (Pelletier & Duffield 2003). The external observer or the RN records activities on a structured data collection instrument, making a quick note of activities immediately after they have occurred during the observation period. These notes correspond with the activity the RN has performed at the point the recording has taken place (Munyisia *et al.* 2011). A paper-based or electronic instrument, such as a personal digital assistant (PDA) (Robinson 2010) or Work Observation Method By Activity Timing (WOMBAT) (Westbrook *et al.* 2012), can be used for recording the activities (Blay *et al.* 2014).

Previous literature has presented issues related to external observation partly contradictory being advantage or disadvantage of that data collection method. The essential advantages of external observation are that it is a generally accepted method among nurses, and data collection is efficient because the external observers can just focus on the collection of data. According to Hagerty *et al.* (1985) observation

can produce more accurate data than self-reporting because there is less possibility of inflationary reporting or deliberate falsification. Ampt *et al.* (2007) have also argued that observation is a more reliable method for providing a better description of the content of nursing work, and also point out that as a research method it does not seem to affect to nurses in any adverse way. External observation also has its disadvantages, though: professionals may dislike being observed, an external observer may bring biases into the study, nurses can change their behaviour under observation (the so-called 'Hawthorne effect'), and it can plausibly be argued that nurses' work is too complex or ambiguous for an external observer to really understand, inevitably leading to incorrect interpretations (Ampt *et al.* 2007). It is also a costly and time-consuming (Hagerty *et al.* 1985, Bourrée *et al.* 2014) method because of the need to employ paid external observers. In order to get accurate information, the observer has to be familiar with the working environment and to gain the trust of the nurses under observation. It is also essential to maintain the strictest impartiality so as to avoid influencing opinions on or attitudes towards the observed nurses and their work; a partial observer could obviously threaten the objectivity of a study (Walshe *et al.* 2011, Bloomer *et al.* 2012).

Self-reporting, where nurses independently record their working time use by submitting information into data collection instruments (Blay *et al.* 2014), also has certain advantages. Reducing the likelihood of incorrect interpretation has been considered the main advantage of the self-reporting method, because nurses are experts in their work and thus in the best position to correctly identify the main activity to record in each instance. Using self-reporting, nurses can also report activities not observable to an outsider because of the need to respect the patient's privacy. In fact, some researchers have claimed self-reporting to be more accurate, because it does not require the presence of external observers; thus, there is no possibility of nurses changing their behaviour due to being under observation (Pelletier & Duffield 2003, Ampt *et al.* 2007). Finally, self-reporting does not require paid external observers, and is thus economical. Against the foregoing may be set a number of disadvantages: self-reporting is not well received among nurses due to the fact that it is more laborious for them; it is also generally considered the least reliable method for gathering data, since workers may not record activities in a timely fashion and may not be completely honest regarding the activities performed at the specific sampling times (Finkler *et al.* 1993).

Aim

The aim of the study was to examine the advantages and disadvantages of the external observation and self-reporting methods in investigating RNs' working time use in order to improve the quality of working time use data.

Methods

Study design, research settings and sample

The study design is presented in Figure 1. This observational cross-sectional quantitative WS study was conducted in autumn 2013 in two Finnish tertiary hospitals (549 and 473 hospital beds, respectively) where specialized medical services are produced in cooperation with a nearby university hospital. At the end of 2013, the hospital with 549 beds was responsible for 250,000 inhabitants, while the hospital with 473 beds catered for 214,000 inhabitants. All RNs from two internal medical units, two surgical units, and two psychiatric units participated in the study (N = 95). Nursing managers were not involved, because most of their work consists of administrative duties.

RNs were informed of the study and its voluntary nature verbally as well as through written information sheets. They were also instructed by the researcher (TA) to inform their patients about the study both verbally and through written notices placed on bulletin boards in the units studied.

Ethical approval for the study was granted by the university committee on research ethics (IRB No 3/2012). Permission to carry out the research was obtained from the participating hospitals.

Instrument and data collection

The data collection instrument developed for this study was based on earlier research (Partanen 2002, Upenieks *et al.* 2007, 2008), and the content of the instrument is presented in Table 1. The same instrument was used in both the external observation and self-reporting data collection groups. The instrument contains 39 nursing activities, which were classified into three major categories: 1) value-adding care (including sub-categories of direct care, indirect care and patient documentation); 2) necessary activities (including sub-categories of indirect work and unit-related work); and 3) non-value-added work, which contains the sub-categories of personal time and miscellaneous work (Authors). Background data on the respondents, such as age, sex, work experience and employment history, were collected using a separate question form.

Data were gathered from Monday to Friday during morning shifts only. The data collection was carried out over two consecutive weeks: the observational study that took place in the first week consisted of five morning shifts (each comprising some eight hours of observations), and was followed immediately by a self-reported study conducted in the following week and also consisting of five morning shifts consisting of about eight hours of observations. The decision to collect data over consecutive weeks was taken after careful consideration: working time use studies had not been done before in these units (or indeed

elsewhere in the hospitals), so RNs were not familiar with data collection methods, and the implementation of two simultaneous data collection studies might have seriously disturbed their work. We also wanted to ensure that the presence of the external observer would not influence the self-reported data (Ampt *et al.* 2007

Validity and reliability of the instrument

Evidence from previous studies (Partanen 2002, Upenieks *et al.* 2007, 2008) and information gathered from clinical RNs and two nursing expert groups were used to evaluate the content validity and the reliability of the instrument. There were six to nine members in each expert group, including nursing managers, clinical nursing experts and students of nursing science (both masters and doctoral students) from both tertiary hospitals. Nursing activities were mutually exclusive and organised into the categories defined by the instrument. One mark in the instrument accounted for ten minutes of work activity. The external observers and RNs were provided with information about the study before the actual data collection in meetings arranged by the researcher (TA). The instrument was pre-tested by observers in their training sessions and by three clinical RNs in their daily clinical work over a one-day work shift. Based on the pre-testing, some nursing activities were added to the instrument and the contents of some activities were further specified. Pre-testing also helped to evaluate the practicability and suitability of the instrument for the study.

Training sessions for the data collectors

Three external observers conducted the observations. They were clinical RNs with at least ten years of clinical work experience in the inpatient units; however, they were not employees in the observed units. The researcher (TA) was one of the observers. Preliminary training sessions have been found to be essential to ensure consistency and interrater reliability, and to facilitate standardized and competent data collection (Abbey *et al.* 2012). Thus in this study, the external observers participated in a three-hour training session conducted by the researcher (TA). The session included information about the study, the theoretical basis of and practical instructions for the observation itself, and a two-hour 'dry run' in the observed units to test the instrument. In addition, the ability of one observer effectively to study six RNs was tested during the training session. In our study the external observers practised the consistent data collection process in a two-hour 'dry run' to collect data from the same units and from the same RNs'. After observation inter-observer reliability was calculated being 90 %. Thus, the inter-observer reliability was recommended to be above 90% (Pelletier & Duffield 2003).

The RNs had their own training sessions for self-reporting. The one-hour training sessions were held in order to provide instruction on the use of the instrument. The participating RNs received detailed background information about the study, and precise instructions for recording activities

with the instrument. Sessions were arranged before the actual data collection and conducted by the researcher (TA). Information about the study was also sent to those participating by email and in paper copy format.

Data collection procedure

The summary of the data collection procedure is presented in Table 2. Fixed-interval data recording was chosen for this study, because it was seen as well suited to the study design in which the number of available external observers was limited. All of the RNs working the morning shifts participated in the data collection even though they had shorter workdays than others. The morning shifts were chosen because they are the busiest working shifts with more RNs working and more observable activities taking place.

It was decided that in external observation, one observer would record in real time the work of six RNs in one unit; RNs were randomly selected by the unit's head nurse, Observation was conducted in four-hour blocks: 07:00 to 11:00 and 11:30 to 15:30. The potential threat of observer fatigue was tackled by dividing the activity sampling time into these two four-hour blocks. Observation was conducted by observation rounds, which began at the same spot in the unit every ten minutes, and the observers walked the same route each time when recording the RNs' work on the data collection sheet (Finkler *et al.* 1993). One data collection sheet was reserved for each observed RN on each day of observation. The observed RNs placed an alphabetical sign (marked a, b, c … f) on their uniforms to help observers notice them during the shift (Pelletier & Duffield 2003). If the observer was uncertain about what the nurse was doing at the point of recording, she asked for clarification (Herdman *et al.* 2009). The observers familiarized themselves thoroughly with the RNs' working areas in the units before commencing the observation, as knowledge of the observed area was considered important by the observers in order to maximize the efficiency of the data collection. This also allowed the observers to become familiar with the RNs, thus minimising the risk of the Hawthorne effect (Munyisia *et al.* 2011). During the data collection period, the observers met every day to discuss observation-related issues. The self-reporting involved all of the RNs from the morning shift recording their nursing work in real time or retrospectively in ten-minute time slots. This was considered a tolerable intrusion upon RNs during the busy morning shift. The RNs conducting self-reporting were offered the opportunity to contact the researcher (TA) by telephone on a daily basis in case they had any problems with the process.

Data analysis

Data were analysed with SPSS version 21.0 (IBM® SPSS® Statistics 20), and described using frequencies and percentage distributions. The differences were analysed using the Mann–Whitney U test. The significance level was set at 0.05.

Results

Respondents' background data are presented in Table 3. Nearly a third of the RNs (31%) belonged to the age group of 31– 40, and nearly nine out of ten (88%) were women. The majority (77%) of the RNs had overall work experience of less than 21 years, and 54% of them had worked less than five years in the unit where they were working at the time of data collection. The majority of the RNs had permanent employment contracts (75%), worked full time (88%) and on a three-shift rota (80%).

External observation and self-reporting produced a variety of data relating to RNs' working time use. In total, 15,302 nursing activities were reported (external observation = 6,781; self-reporting = 8,521), as presented in Table 4. The first major category of value-adding care covered 67% of total nursing time when measured with external observation, while self-reporting produced the rate of value-adding care of 76% (p = .000). Differences also emerged in the sub-categories. The amount of direct care was clearly higher (p **=** .000) in self-reporting (40%) than in external observation (30%), while the share of indirect care (p = .005) was higher in observed data (22%) compared to self-reported data (20%). There was a slight difference (p = .002) in patient documentation (external observation = 15%, self-reporting = 17%**).**

In the second major nursing category of necessary activities, the rate of RNs' working time use was measured as 14% using external observation, while self-reporting produced the rate of 11% (p = .183). Some differences were found in the sub-category of indirect work (p = .000, external observation = 2%, self-reporting 3%), and in the sub-category of unit-related work (p = .000, external observation = 12%, self-reporting = 7%).

The third major nursing category of non-value-added work amounted to 19% of total nursing time when measured with external observation, and 13% with self-reporting (p = .000). In the sub-category of personal time, a significant difference was found (p = 000, external observation = 11%,

self-reporting = 8%), as was the case in the sub-category of miscellaneous work (p = .004, external observation = 8%, self-reporting = 5%).

Discussion

The aim of this study was to examine the advantages and disadvantages of the external observation and self-reporting methods in researching RNs' working time use. Overall, this study did not reveal anything new about the two methods of data collection under review, but it did emphasize how the inherent advantages and disadvantages of each must be taken into account when evaluating their utility. We have shown that external observation and self-reporting produce divergent information that is statistically significant in the two major nursing categories of value-adding care and non-value-added work, and in each of the seven nursing sub-categories. More value-adding care activities were reported in self-reporting, while the rate of non-value-added work was higher when recorded by external observers. It is interesting to note that the results diverged in the categories directly related to patient care or to non-nursing tasks. Despite these divergences, both methods do provide a useful general picture of how RNs use their working time, and judging by the results of this study it can be said with some confidence that regardless of the method used for data collection RNs focus mostly on value-adding care. Considering the 70 % level set to target for nurses' time use in direct patient care (Robert Wood Johnson Foundation & Institute for Healthcare Improvement 2006), the 30-40 % level in this study still seems to be far from it. Nevertheless, both collecting methods were generally quite well accepted by the RNs, as confirmed by their verbal feedback and by the number of highly detailed self-report sheets received by the authors. Of course it is possible the RNs' did not say their true opinions related to the data collection methods.

In external observation, it is clear that one absolute advantage over the other method is that the external observer was able to focus exclusively on recording RNs' work activities while RNs' had in addition to the collection of information to focus on the care of patients. Therefore, it can be argued that the data collected from RNs' work in this way were highly accurate, with the added benefit that the data were also collected in real time. The external observer had also the opportunity to ensure by asking what the RN was doing at the point of the activity recording. External observation also provided more general information from the units, for example how RNs' work was organized, how RNs interacted with each other or with the other occupational groups and how the spatial solutions affected RNs' work. One of the disadvantages was that as RNs were multi-tasking (i.e. doing many things at the same time), so the observer might have found it difficult to choose the most appropriate activity to record. There was also a possibility that because of the need to respect the privacy of the patient, the external observer was not always in a position to record their care sufficiently closely, thus potentially failing to obtain a full understanding of the activity that the RN was carrying out with a patient. In this scenario, it was possible that the observed activity was something entirely different than what the RN would normally carry out with a patient. Questions, therefore, about the accuracy of observers' reporting of specific nursing activities are entirely legitimate. In relation to self-reporting, RNs were also able to complete the data collection sheet retrospectively rather than in real time simply because of the intense pressures of their work. RNs also completed their self-

reporting as an additional task to their actual nursing work, which could have served to undermine the accuracy of the data collected. In both data collection procedures data were recorded manually on the data collection sheets; there is no doubt that in self-reporting this constituted an additional and laborious task to normal clinical work.

The results of this study are in line with those of Ampt *et al.* (2007). However, meaningful comparisons between the results of our study and theirs are hampered by the fact that the data collection instruments were different. It is also noteworthy that in the study by Ampt *et al.*, the self- reported data (N = 667) were significantly less extensive than the observation data (N = 3,243). In their study, the amount of direct care measured through external observation (40%) was higher than when using self-reporting (33%), while our study indicated the opposite. The share of documentation measured with self-reporting was nearly at the same level in the study by Ampt *et al.* (2007) as in this study. We found differences in the results perceived in the sub-category of unit-related work. The rate of unit-related work was found to be higher when recorded with external observation, and the same result was also obtained by Ampt *et al.* (2007) in their study (observation 7%, self-reporting 3%). We also noticed that the share of nursing time in the sub-category of personal time was much higher when measured with external observation than when using self-reporting. In the Ampt et.al (2007) study there were no significant differences in rates obtained by the two methods in the sub-category of breaks, which included personal and social time.

We believe the results of our study to be reliable based on the following: the number of analysed nursing activities was sufficiently extensive (see e.g. Ampt *et al.* 2007) – with the amount of collected data being nearly the same in both weeks – and the use of experienced external observers. We have also taken into account the shortcomings of WS studies mentioned in the study of Blay *et al.* (2014): we have described the data collection procedures including the training sessions for data collectors; we tested the interrater reliability in addition to reporting the results by the data collection methods. The degree of reliability was augmented by the fact that there were no major changes in the units during the data collection period, even though the data collection was conducted over consecutive weeks. Ampt *et al.* (2007) have argued a similar case, and as there were no major changes within the unit during the data collection the main cause of differences between our results and theirs must logically lay in the data collection methods.

Limitations

The main limitation of our study is that the data collection occurred during different weeks, and because of that the content of nursing work and RNs' workloads might have varied a little due to different patients requiring attention on different days. It is also possible that data collection disrupted RN work. When under external observation, the RNs might have changed their behaviour by unconsciously enacting the

'Hawthorne effect' previously mentioned (Pelletier & Duffield 2003, Ampt *et al.* 2007), even though, based on the RNs' feedback, they had not paid attention to the observers after the first few observation days. This finding was in line with the feedback obtained in the study by Ampt *et al.* (2007). It is also possible that the observer was unable to recognize the exact nursing activity taking place due to the hectic working environment hindering careful completion of the instrument. There is also a possibility that the RNs conducting self-reporting did not receive an equal amount of instruction on filling out the data collection instrument (see Blay *et al.* 2014), or that they did not receive instructions at all (which might have been the case with the pool RNs, for instance). A further limitation is related to the fact that recording only occurred during morning shifts. Therefore, this study does not represent nursing work that takes place during evening and night shifts and weekends.

Regardless of these undisputed limitations, the strengths of the study should be emphasized: these include the amount of data collected and the consistency of the results (both data sets were almost equal). The data collectors (external observers/RNs) were well trained, and the observers' interrater reliability was thoroughly tested, which in turn increases the reliability of the study results. The respondents primarily filled out their working time use sheet thoroughly, with only a few sheets omitted from the analysis due to their lacking sufficient detail. In addition, both data collection methods were fairly well received among the RNs.

Conclusions

Firstly, we concede that external observation and self-reporting data collection methods produced markedly varying results when investigating RNs' working time use. Nevertheless, after carefully considering their advantages and disadvantages and their possible limitations, we believe that both methods can be used for this purpose with equal facility. Indeed, we would argue that the discrepancies between the results improved the overall quality of our data because each method addresses recognized shortcomings of the other. We would urge that other researchers should bear in mind these methodological differences and the results they are likely to produce when choosing data collection techniques for their own studies. The differences between these methods should also be taken into account when comparing the results of different working time use studies carried out in the past. Our view is that despite their shortcomings using either external observation or self-reporting will give a largely accurate picture of how RNs are using their working time. In our study RNs' work focused quite well on value-adding care, though in future it would be important to set a target level for value-adding care.

The study of nurses' working time use is currently hampered by the fact that there are wide differences in data collecting methodologies, and the comparability of results is consequently limited. Our study showed that there are sub-categories of nursing work (such as indirect work) that contain a limited number of activities; thus, the classification of the work could be further refined, thereby improving the contents of the instrument and increasing its usability. Data collection could also be significantly improved by introducing portable electronic recording devices. For example, a PDA would enable nurses conducting self-reporting to record their activities more conveniently and accurately, although such devices naturally cannot ever fully remove the intense pressures inherent in the work and the drawbacks for research that these create. Finally, further attention is needed to ensure that all data collectors have been fully trained and briefed by the researcher before actually embarking on data collecting activities.

The application of two standard data collection methods in the same study is an approach that has seldom been used when considering working time use of RNs, and by employing this novel methodology we have produced some valuable insights. Based on our findings, we are convinced that it is necessary to obtain more reliable and comparable data, and that the key to this is the use of external observation and self-reporting techniques simultaneously, preferably in conditions where all the factors affecting the research are more standardized: data should be collected via the same instrument from the same units and from the same RNs.

Relevance to clinical practice

As well as the results of the work patterns themselves (which have inherent value for policy makers and practitioners), our study provided information about the two data collection procedures we chose to use: thus we have provided new data on RNs' working time use and theoretical insights on the use of external observation and self-reporting in this particular context. It has long been known fact that both of these processes have their advantages and disadvantages as collecting methods, but it is worth reiterating that their relative merits should always be carefully considered when selecting research methods for a new study or when analyzing previous work on working time use. We also highlighted other important issues (in particular those related to validity and reliability) that need to be taken into account when designing new research or evaluating previous studies. Finally, this study has increased the information available on the content of nursing work, which can be utilised when developing clinical nursing work that allows more time to be focused on patients.

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Registered nurses' (RNs') working time use

⬇

Aim:

to examine the advantages and disadvantages of external observation and self-reporting methods

in investigating registered nurses' (RNs') working time use in order to improve the quality of

working time use data.

⬇

Instrument:

Working time use sheet

The content of the instrument:

39 nursing activities divided into the following three main categories and seven sub-categories:

- Value-adding care (direct care, indirect care, patient documentation),
- Necessary activities (indirect work, unit-related work),
- Non-value-added work (personal time, miscellaneous work**).**

Data collection period:

Two consecutive weeks from Monday to Friday in the autumn of 2013

- the first week: external observation
- the second week: self-reporting

⬇   ⬇

External observation		Self-reporting

⬇ ⬇

Results		Results
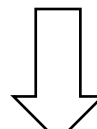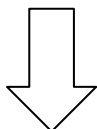
Figure 1. The design of this study

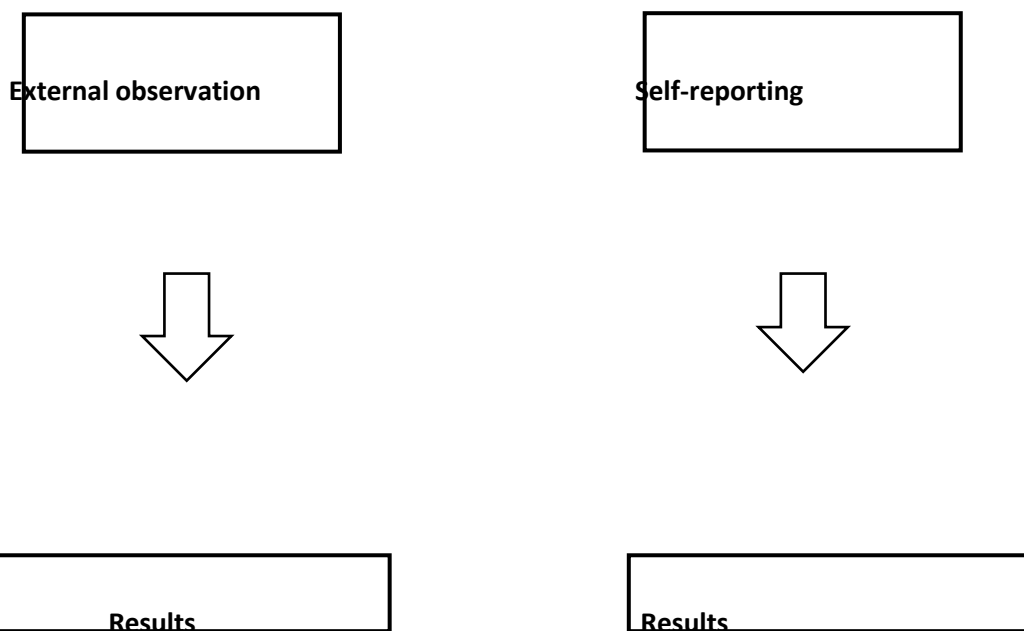Table 1. The data collection instrument used to measure the use of work time in major nursing categories, including subcategories and nursing activities (Authors).

Value-adding care		
Direct care	**Indirect care**	**Patient documentation**
- patient monitoring/assessment - ADLs, bedside procedures - vital signs - medication administration - performing treatment procedures/sampling /examinations - patient education - communication with patient - communication with patient and care team/relatives - admission /discharge	- medication preparation - preparation of treatments /research/samples - reporting - communication with care team/ relatives without patient medical rounds - medical rounds	- recording actual treatment - processing doctor's orders - care planning tasks - processing laboratory orders and responses

Necessary activities

Indirect work	**Unit-related work**
• organizing outpatient care • searching/calling for auxiliary staff/care team • patient transportation • other documentation	• employee orientation • in-service education • staff meetings • work supervision • student education /counseling • co-operation with other units • departmental tasks

Non-value-added work

Personal time	**Miscellaneous work**
• breaks • personal affairs	• waiting • searching or retrieving things/people • cleaning/ housekeeping/ food supply/ maintenance of equipment • warehouse tasks • placing a variety of orders • trips outside the ward • non-patient- related information • other activities (not on the sheet)

Table 2. Summary of the data collection procedure using external observation and self-reporting methods

	General information	External observation	Self-reporting
Data collection instrument	A working time use sheet developed for this study based on earlier research. Clinical RNs and expert groups participated in instrument evaluation.	The same instrument was used both in external observation and self-reporting.	The same instrument was used both in external observation and self-reporting.
Instrument pretesting	Working time use sheet was pre-tested before the actual data collection.	The instrument was pre-tested by external observers as a part of their training sessions.	The instrument was pre-tested by three clinical RNs.
Data collectors	Data were collected by external observers and RNs themselves.	An external observer: three clinical RNs (not employees in the observed units).	The clinical RNs themselves.
Training for data collectors	Preparatory training sessions were organized for data collectors to ensure consistency and interrater reliability, and also ensure standardized and competent data collection.	A three-hour training session, including observation instructions, and two-hour 'dry run' for testing inter-observer reliability (90%).	A one-hour training session for RNs, including information about the study, and correct use of the instrument.
Data collection place	Data were collected from two Finnish tertiary hospitals.	Two inpatient units from internal medicine, surgery and psychiatry.	Two inpatient units from internal medicine, surgery and psychiatry.
Data collection time	During morning shifts.	During morning shifts.	During morning shifts.
Time collection points	Fixed-interval data collection at ten-minute intervals.	Data collection at ten-minute intervals (in real time).	Data collection at ten-minute intervals (in real time or retrospectively).
Length of data collection period	Data were collected over two consecutive weeks from Monday to Friday in the autumn of 2013.	The first week by external observation (consisting of five morning shifts, about eight-	The following week after external observation by self-reporting consisting of five morning shifts, eight-hour

		hour observations).	observations.
Possible limitations during data collection	Data have not been collected during the same week.	RNs might change their behaviour during data collection (the 'Hawthorne effect'); the observer might have considered it difficult to choose the exact activity to record because of the RNs' multi-tasking.	RNs might fail to record their activities in a timely fashion.
The number of RNs	N= 95	Six RNs/unit/observer.	All RNs/unit (6–10 RNs) in self-reporting.
The amount of nursing activities	N = 15,302 (100 %)	n = 6,781 (44 %)	n = 8,521 (56 %)
The acceptability of the data collection methods	Acceptability of the data collection methods among RNs.	Well accepted	Fairly well accepted

Table 3. Background information of the RNs participating in external observation and self-reporting (N= 95)

Background information	n (%)
Age (years)	
• < 31	22 (24)
• 31–40	29 (31)
• 41–50	18 (20)
• 51–60	18 (20)
• > 60	5 (5)
Sex	
• female	83 (88)
• male	12 (12)
Work experience (years)	
• < 6	
• 6–10	
• 11–20	
• 21–30	
• > 30	
Work experience (at the current unit, years)	23 (24.5)
	23 (24.5)
• < 6	26 (28)
• 6–10	16 (17)
• 11–20	6 (6)
• > 20	
RNs' employment data	
• full time	
• part time	
	49 (54)
• three-shift work	19 (21)
• two-shift work	16 (18)
• office hours	7 (8)
• permanent	

- **temporary**

83 (88)

12 (12)

76 (80)

17 (18)

2 (2)

71 (75)

24 (25)

Table 4. RNs' working time use assessed by external observation and self-reporting (n, %, p-value)

Major nursing categories	Observation n (%)	Self-reporting n (%)	Nursing sub-categories	Observation n (%)	Self-reporting n (%)
Value-adding care	4,577 (67)	6,500 (76)	**Direct care**	2,008 (30)	3,386 (40)
			p-value[1]	.000	
			Indirect care	1,520 (22)	1,680 (20)
			p-value[1]	.005	
			Patient documentation	1,049 (15)	1,434 (17)
p-value[1]	.000		p-value[1]	.002	
Necessary activities	933 (14)	902 (11)	**Indirect work**	115 (2)	295 (3)
			p-value[1]	.000	
			Unit-related work	818 (12)	607 (7)

			p-value[1]	.000	
Non-value-added work	1,310 (19)	1,119 (13)	**Personal time**	762 (11)	674 (8)
			p-value[1]	.000	
			Miscellaneous work	509 (8)	445 (5)
p-value[1]	.000		p-value[1]	.004	
Total	6,781	8,521		6,781	8,521

[1] Mann–Whitney U test