

How Do Different Health Record Systems Affect Home Health Care? A Cross-Sectional Study of Electronic- versus Manual Documentation System

Line Slyngstad , Berit Irene Helgheim 

Department of Logistics, Molde University College, Molde, 6410, Norway

Correspondence: Line Slyngstad, Department of Logistics, Molde University College, Molde, 6410, Norway, Tel +4741621248, Email line.slyngstad@himolde.no

Objective: To investigate electronic health record (EHR) systems compared to manual systems (MS) in home health care and how documentation and reporting activities are impacted regarding time use, variation, and accuracy.

Methods: This is a cross-sectional study of two municipalities (M1 and M2) that use statistical process control charts and interview with caregivers to discuss the issue. Regarding reporting, 309 observations were used for the control charts in M1 and 572 for those in M2. Concerning documentation, 831 observations were used for M1 and 572 for M2. In addition, interviews were conducted with four caregivers from each municipality.

Results: The municipality with EHR system use 3% of their total time for documentation and 7% for reporting. The municipality with the MS uses 7% of their total time in documentation and 12% for reporting. There is less variation in the charts for the municipality with the EHR system, than for the municipality using an MS.

Conclusion: The municipality using the EHR system uses less time for documentation and reporting than the other municipality. This is probably due to the standardization of information in M1, and that M2 needs to record documentation twice. The standardization arising from EHR use system may cause less variation in the process than the MS, but less variation might also negatively affect information accuracy. Reduced time for oral reporting also affects information accuracy.

Keywords: statistical process control, variation, documentation accuracy, home health care, electronic health records

Introduction

Communication among health professionals in health-care settings is facilitated by documentation and the verbal exchange of information.^{1,2} Such communication is necessary for planning and making decisions concerning the care.³ Effective written documentation at a patient level is central in providing continuity and high-quality care,⁴ where poor documentation has been linked to diminished quality of care.² In home health care (HHC), care givers only see when patients are receiving the service, which means that the care givers cannot check patients as frequently as they can do in a facility. Therefore, documentation and verbal exchange of information among caregivers in HHC are critical to delivering services at a high standard.

In general, there is uncertainty regarding the criteria that need to be met to achieve high-quality documentation.⁵ However, crucial factors include aligning documentation with the nursing process,^{5,6} which means that information needs to reflect the recipients health status and needs accurately. These daily observations are the basis for interventions in recipient care plans.

Standardization has been highlighted as a critical factor in establishing regular terminologies for employees,⁵ and providing standardized nursing care plans (in electronic and paper formats) is therefore important.⁷ Using unambiguous language is beneficial because it makes it easier for health-care professionals to compare and exchange information among different health-care settings.⁸ Using standardized approaches (e.g. lean and six sigma) has also been proven to be beneficial to reduce time spent in preparation and registration process for medical records in hospitals.^{9,10}

Technology has provided more integrated documentation systems than what was previously accessible and ensures that some criteria to achieve high-quality communication are met. The main objective with electronic health record (EHR) systems is to create a more efficient and accurate flow of information and to facilitate efficiency and quality in health care.¹¹ Patients care plans, medical histories, allergy lists, medication records, and notes are easily accessible,¹² and errors can be reduced.^{12–14} However, EHR systems may also hinder documentation efficiency and accuracy, for example through an increased workload associated with documentation involving multiple records.¹⁵ Additionally, nurses often over-rely on report and clinical handovers³ and documentation records may be incomplete.^{3,15} It has also been determined that there is often a mismatch between progress notes and formal medication lists¹⁶ and that implementation of an EHR system does consistently not always meet employees expectations.¹⁷

Even if there is evidence to indicate that communication should be rational and standardized, there are still significant differences among different health (and within individual units) regarding how documentation and reporting are conducted. In Norway, it is the companies' responsibility to enable health-care workers to comply with the record keeping obligation.¹⁸ The purpose of this is to ensure that information that is necessary and relevant for a proper treatment of the patient is recorded and can be retrieved. However, there are differences in the documentation systems used. Individual municipalities usually decide this, and competence and finances embody the factors considered in this decision. In addition, different documentation systems probably result in variation in the time required to complete documentation and reporting activities.¹⁹

In general, there is a lack of research concerning home care services. Most attention in this area has been provided with aim to solve patient scheduling problems for care providers.^{20–22} Previous research studies have described nurses and health workers working times and determined that the time required for statutory documentation seems to have been underestimated.²³ Researchers have also investigated the clinical and medical benefits of home care technology in general.²⁴ Lamine et al aimed to address contemporary care problems by providing an interactive information and communication technology platform to improve coordination and continuity of care within homecare organizations.

The recent years, several studies have been conducted that aim to measure time spent on different activities in healthcare, for example in internal medicine,^{25,26} with physicians in primary care,²⁷ or to quantify the activities of workers in community elder care.²⁸ In contrast to previous research, this paper considers the time use, variation, and accuracy in documentation and report activities at a process level. More specifically, this research investigates how different documentation systems affect activities documentation and reporting in HHC in two Norwegian municipalities. The municipalities use different types of documentation record systems, an EHR system and a manual system (MS). Statistical process control (SPC) charts and structured interviews were used as methods in examinations of these systems.

Materials and Methods

Sources of Data

To measure how much time is spent on documentation and reporting activities, we collected data from HHC organizations using different record systems in two municipalities. One municipality (M1) uses an EHR system, while the other (M2) uses a MS. In the municipality using the EHR system each worker has a smartphone with a list of recipients they are going to visit during each shift. Each recipient has a tick-off list that workers use to document standard work assignments. The smartphone is directly connected to the EHR system so that the manager can monitor when staff have finished with a recipient, and when they have finished all the tasks.

In contrast with M1, M2 has a paper-based system where each worker has a list of recipients and a to-do list for each one. These lists are printed from the electronic patient journal (EPJ) system. Employees handwrite notes on the lists concerning any circumstances that should be documented for the recipients. These lists provide caregivers with an overview of recipients and tasks, where they can write notes about recipient if necessary. The notes are then transferred into the EPJ when the employee returns to the office. Both municipalities have an EPJ.

The two municipalities are located on the west coast of Norway. They have similar geography and landscape, with mountains and fjords. Table 1 reveals that M1 has 9787 inhabitants and M2 has 6708. The land area is 370 km² in M1 and 352 km² in M2. M1 has 230 recipients and M2 has 275. Even though there are slight differences, the municipalities

Table I Municipality Characteristics

Variables	Municipality	
	M1	M2
Inhabitants	9787	6708
Land area	370	352
Recipients	230	275
Planned certified staff		
Staffing per week	104	150
Registered nurse (%)	54	40
RNA (%)	46	60
Sum (%)	100	100
Participating staff		
Average weekly staffing (n)	77	84
Registered nurse (%)	53	34
RNA (%)	47	66
Sum (%)	100	100

are relatively equal in terms of recipient needs and services. There are 104 staff in M1 and 150 in M2. In M1, 54% of the 104 study participants are nurses, and 46% are registered nursing assistants (RNAs). In M2 40% are nurses and 60% are RNAs. These figures reveal that M1 carries intention to use more nurses than RNAs as compared with M2. Concerning the actual number of participants in the study, the average weekly staffing in M1 is 77 workers, while the average for M2 is 84 workers. In M1, the staff consists of 47% RNAs and 53% nurses. In M2 66% are RNAs, and 34% are nurses.

Ethical Considerations

The project was reviewed by the Regional Ethic Committee, Middle Norway, REK number 2015/1548, which waived the need for approval. All participants provided informed consent, in accordance to Declaration of Helsinki.

Data and Data Collection

Quantitative Data

The employees either collected data using a time-tracker application, or they recorded activities manually on paper. The time-tracker application was installed on their smartphones, allowing employees to record the various activities. Alternatively, the same activities were recorded manually. In M1, a total of 6961 observations were collected, resulting in 92,190 hours of activity. In M2 8644 observations were collected resulting in 130,442 hours of activity.

Selecting rational subgroups is a vital part of statistical process control methods. According to Montgomery,²⁹ the subgroups should be selected so that if special causes are present, the chance for differences between subgroups is maximized, while the chance for differences due to special causes within a subgroup is minimized. In this study, rational subgroups are defined as time spent on documentation or reporting, by all certified personnel between 7:00am and 10:00pm each day. The study period was 29 days. The assistants were removed, since they were performing unique tasks, and because the data was expected to differ from that of the nurses and RNAs. In this research, assistants are employees without any formal education. While nurses and RNAs tasks involve recipient care and nursing procedures, assistants perform practical tasks as house cleaning.

Table 2 Descriptive Statistics of the Quantitative Data

				Duration (Min)					
Municipality	Activity	No. Obs Total	Subgroup Size Min–Max	Median	Mean	SD	Var	Min	Max
M1	Documentation	831	10–77	1.3	3.1	6.4	40.7	0.033	57.2
	Report	309	5–18	17	19.7	13.7	188	0.17	75.5
M2	Documentation	366	6–22	20.1	25	18.4	339.6	0.3	98.1
	Report	572	10–29	28.8	27.8	15.5	241.2	0.1	78.8

With minor differences, the time between 7:00am and 2:30pm represents dayshifts, and the time between 2:30pm and 10:00pm represents evening shifts. The length of shifts varies between 6.5 and 8.5 hours.

In M1, 831 observations for documentation and 309 observations for reporting were collected. In M2, 366 observations for documentation and 572 observations for reporting were collected. Table 2 presents descriptive statistics for the data.

For documentation in M1, descriptive statistics for median, mean, standard deviation (SD), and variation were 1.3, 3.1, 6.4, and 40.7, respectively. For reporting, the figures were 17, 19.7, 13.7 and 188, respectively. For documentation in M2 the median, mean, SD and variation figures were 20.5, 26.3, 20.9 and 439.6, respectively. For reporting, the figures were 28.8, 27.8, 15.5 and 241.2, respectively.

Statistical Control Methods

The SPC methodology, introduced by Shewhart,³⁰ is a statistical tool for quality improvement that distinguishes between common cause variation and special cause variation. While common cause variation is a constantly active phenomenon within all systems, special cause variation is caused by external events and (in the worst case) is harmful to the process. A process that only experiences common causes of variation is said to be in “statistical control”. In cases where the variability is caused by special causes, the process is said to be “out of control”. Montgomery²⁹ elaborates on basic methods for statistical quality control. Using continuous data, time spent on documentation and reporting, Shewhart control charts for individual measurements (I-charts) and control charts for $\bar{X}$ and s are used in this study.

I-charts can be used in cases where an individual measure ($n = 1$) is the best way to describe a process.²⁹ In this research, where the study is cross-sectional, it is necessary to use the most effective measure for comparing the municipalities’ processes. For both documentation and reporting, the percentage of time spent on documentation each day is used as an individual measurement in the Shewhart control charts. For reporting, it is also relevant to observe the process stability and the level of each observation where control charts for $\bar{X}$ and s are used.

If n differs between the subgroups, control charts with variable control limits need to be used. Control charts for $\bar{X}$ and s require two charts, one for $\bar{X}$ chart and one for s . Due to the data and the fact that M1 has a quiet report, $\bar{X}$ and s charts are only used for the data from M2. $\bar{X}$ and s charts were not used for the documentation, since the data were too skewed to be used in the charts.

The Western Electric rules are used to conclude whether or not the process is out of control.²⁹ These are as follows:

1. One point plots outside the three-sigma control limits,
2. Two out of three consecutive points plot beyond the two-sigma warning limits,
3. Four out of five consecutive points plot at a distance of one-sigma or beyond from the center line (CL), or
4. Eight consecutive points plot on one side of the CL.

Qualitative Data

The objective of the qualitative portion of this study has been to provide data to compare the municipalities and what was already recognized through the quantitative data. In such cases, it is appropriate to conduct shorter interviews with respondents.³¹

Semi-structured interviews were conducted by telephone with four caregivers from each municipality: three nurses and one RNA. The respondents were recruited by the department manager. Each interview was conducted by one of the principal authors. This should minimize differences in the interpretation of responses. Answers from employees were captured by note taking. Each interview lasted between 10 and 15 minutes. Each interview started with a background question to clarify the respondent's profession as an RNA or nurse. The interviews had five questions concerning the documentation theme and four concerning the reporting theme. These focused on variation, accuracy, and time use in documentation and reporting activities to uncover the differences between the two systems. Several questions held follow-up questions, which invited more detailed answers.

Questions asked about documentation were as follows: (1) "When during the shift do you write documentation?" with possible answers "Right after the patient visit", "During the shift", "At the end of the shift", and "Other. If other, please specify."; (2) "If you apply documentation after returning to the office, have you taken notes during the shift?"; (3) "Do you have to write supplementary information about the individual recipient? If yes, could you give examples on information/assignments that need to be written as supplementary information in the documentation system? (beyond what is already included); (4) "Are there cases with the recipient that are not documented in writing? If yes, please provide examples."; and (5) "Are many resources used to ensure the information about the recipient is kept up to date?". The following questions concern about the oral report: (1) "Which and how many participants are included in the reporting session?"; (2) "Are all assignments/procedures concerning recipients discussed in the reporting session? If not, is it only the extra procedures not in the care plan that are reported?"; (3) "Provide (general) examples of what is discussed in the reporting session"; (4) "Are there recipient scenarios that are reported orally but not written?"

Results

Statistical Process Control results

Table 3 reveals the percentage of time spent on reporting and documentation in M1 and M2 at daytime. M1 staff spend 7% and M2 staff spend 12% of their time, respectively, on reporting. M1 staff spend 3% on M2 staff spend 7% of their time, respectively, on documentation.

Figure 1 presents the I-chart for the percentage of time spent on documentation per day in M1 and M2 and provides information about differences in time spent on daily documentation between M1 (EHR) and M2 (MS). A total of 6961 observations resulting in 92,190 hours of registration were used to calculate the charts for M1. For M2, the figures were 8644 registrations and 130,442 hours.

The mean time spent on documentation per day during the period as represented by the CL was 3% in M1; upper control limits (UCLs) are as follows: SD3 at 7, SD2 at 6 and SD1 at 4. In M2, the mean value was 7% of total time; UCLs as follows: SD3 at 14, SD2 at 12 and SD1 at 9.

Concerning Western Electric rules, time spent on reporting seems to be in statistical control, with no special cause variation detected in the charts. The results indicate that M1 staff spend less time on documentation, with a lower value on the CL in M1 than in M2. This is confirmed in Table 3. The variation is also more concentrated around the mean in M1 than in M2. Seventeen of the observations are under the mean and 11 are over the mean at 3% of total time in M1 and 7% in M2. The pattern in M1 seems to be more irregular than in M2. The variation in M2 concerning time spent on

Table 3 Total Time Spent on Documentation and Reporting

Municipality	M1		M2	
	Documentation	Report	Documentation	Report
Total time spent in %	3	7	7	12
Median	1.3	17	20.1	28.8
Mean	3.1	19.7	25	27.8
SD	6.4	13.7	18.4	15.5
Var	40.7	188	339.6	241.2

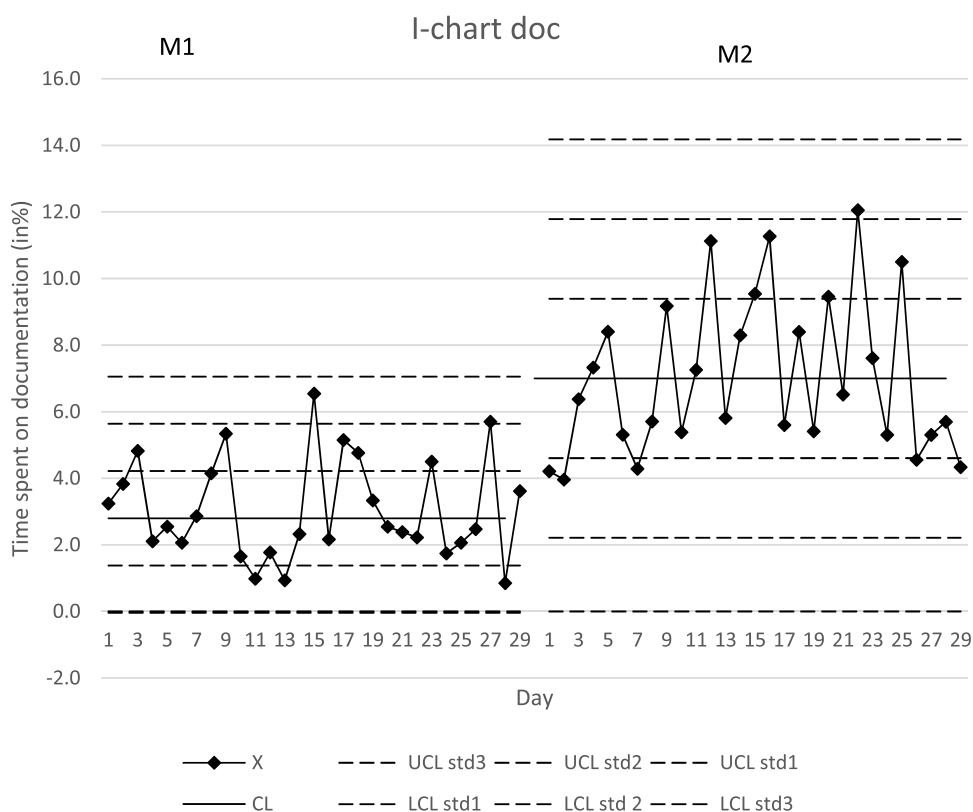


Figure 1 I-chart of total time spent on documentation per day (in %) in Municipality 1 and Municipality 2.

documentation is larger in M2 than in M1, with 16 observations under the average time and 13 over the average time spent on documentation. The charts do also reveal that the EHR system reduces time spent on documentation.

Figure 2 presents the I-chart for total time spent on reporting in M1 and M2. The mean value spent on reporting per day during the period was 6.6% of total time in M1, with a UCLs as follows: SD3 of 15.4, SD2 at 12.5 and SD1 at 9.5. In M2, the mean value was 12.4% of total time, with UCLs as follows: SD3 of 17.7, SD2 at 9.5, and SD1 at 7. LCLs

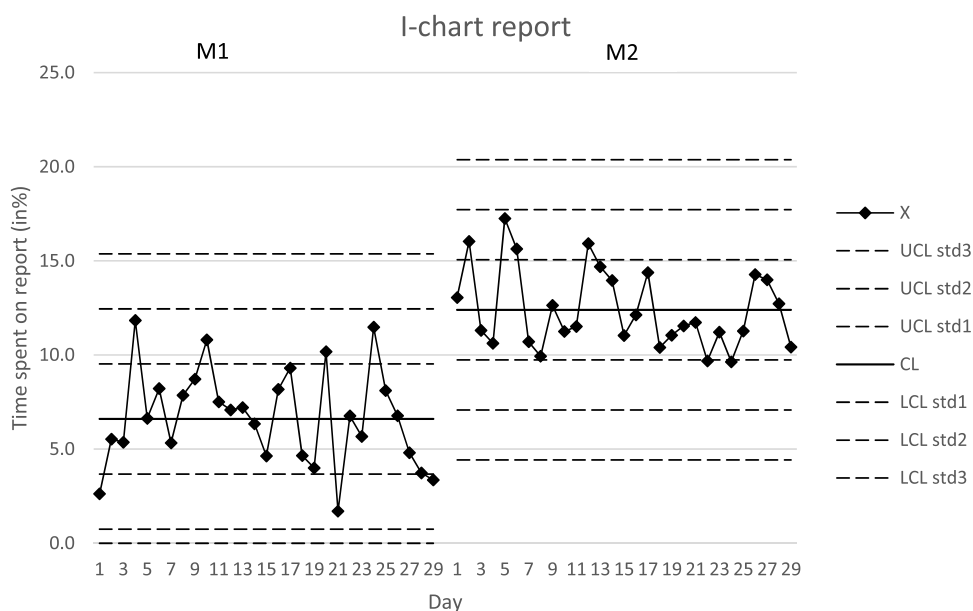


Figure 2 I-chart of total time spent on reporting per day (in %) in Municipality 1 (M1) and Municipality 2 (M2).

as follows: SD3 at 7, SD2 at 7, SD1 at 9.6. The same number of observations used for documentation was used to calculate the charts for reporting.

The time spent on reporting seems to be in statistical control, with no special cause variation detected in the chart with regard to the Western Electric rules. The M1 staff who practice “quiet reporting”, spend less of their total time reporting per day than the M2 staff. This is confirmed in Table 3. Furthermore, M1 has more variation than M2, meaning that the time they spend on daily reporting varies.

Figure 3 presents the $\bar{X}$ and s charts for reporting in M1 and M2. The time spent on reporting in minutes is on the Y-axis, while the number of days is on the X-axis. One observation represents the total time one employee spends on reporting. The number of registrations used to calculate the limits was 309 in M1 and 572 in M2, with a subgroup size of 5 to 18 in M1 and 10 to 29 in M2.

The CL in the s chart is the average of all subgroup SD, and the control limits are drawn three SDs above and below the CL.

In the $\bar{X}$ chart, points represent the mean value of time spent on reporting throughout 29 days. The CL is the grand average time spent on reporting, $\bar{\bar{x}}$, while the limits are drawn three SDs above and below the centerline. The value on the

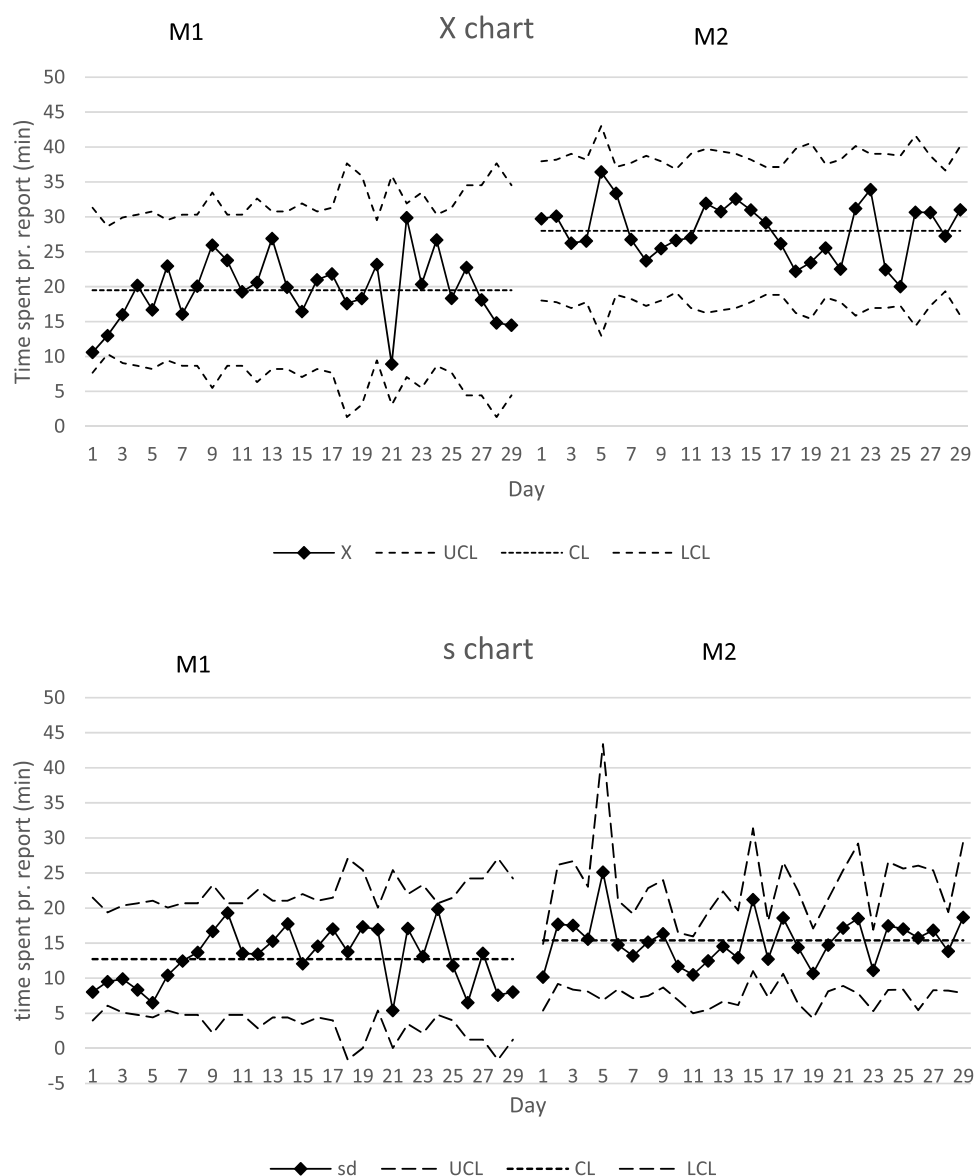


Figure 3 X and s charts for time spent on reporting (in minutes) in Municipality 1 (M1) and Municipality 2 (M2).

CL, as well as the pattern, is less in M1 than in M2: CL = 20 in M1 and CL = 28 in M2. This means that M1 staff spend less time for each report than M2 staff. Both SD and variation are less in M1 than in M2 (Table 2). However, in M1, the points tend to be above the CL, while in M2, the observations are around the CL. However, both charts are in statistical control, with no special cause variation detected.

M1 Interview Results

All respondents in M1 reported that they usually complete documentation immediately after each recipient visit and that the documentation is usually done efficiently. Tasks undertaken with the recipient are entered directly into the documentation. The tick-off system makes it easy to accomplish this quickly. However, the respondents reported that they need to complete the standard tick-off system every day. If additional work is required, or if there are other observations that are not on the tick-off list, this requires extra writing. This is usually performed after the visit, although one respondent mentioned that it can be done after the shift if there are abundant extra details to register. Examples of extra input added to the documentation system include describing wounds (which may be important due to the need to monitor the progress of the treatment), security alarms and changes in medications or stoma functions.

Information not typically registered on the system is reported to be as follows: procedures with wounds, medical appointments and recipients not being at home. Other non-reported information includes the recipient or their relatives calling with questions or messages. Staff occasionally acquire assignments that are not in the system. Additionally, recipients' daily moods and general health statuses are not typically captured on the system.

Although most information is written in the documentation system, two respondents reported that some information is only reported orally. This includes the types of bandages used for a wound dressing, recipients not being at home and emergency visits.

Among the benefits of the EHR system, respondents mentioned that the system is regularly updated and enables a report to be completed after every recipient. The system provides access to information such as medication lists, care plans, and patients' relatives. Staff can also send messages for example if they have delivered equipment to a recipient. Information safety was mentioned as a benefit, since there is no need for written notes that might be mislaid. Disadvantages mentioned were that the system is dependent on update for the information to be correct, as well as the technology itself. Sometimes it does not work, which causes suspension of its use.

To update the system and the care plans they have an administrative (usually a nurse) who answers e-links, implements new information, and updates the care plans. These tasks need to be performed every day and are rotated between team leaders and nurses. If there are changes in the care plan, care givers currently out with recipients notify the administrative worker, so that they can input changes in the system. All respondents noted that this aspect was time-consuming.

Respondents noted that they have what is termed a "quite report". The system is established so that everything is written in the care plan, minimizing the need for oral reports. Regular and standard information is only reported if extraordinary initiatives have been taken (eg, if a recipient's sickness has worsened and so on). In cases where there is a need for an oral report, for instance if a recipient's condition has worsened, the oral transfer of information is achieved via a shift change meeting between overlapping nurses.

M2 Interview Results

In M2, the work-lists are printed from the documentation system and delegated before the shift. The caregivers consult the lists during the day and finalize the documentation on the computers in the office, either before their lunch break or after finishing their duties with recipients. Whether they finalize the documentation before lunch or after finishing the work-list, usually depends on the amount of work that day. One of the respondents mentioned that they sometimes use overtime for finalizing documentation.

There was great variation in the types of information employees record into the documentation system and how detailed the notes are. Some respondents reported taking short notes, while others said they take detailed notes. One respondent reported taking notes only if there is something additional to record, while others take detailed notes for each recipient.

Personal notes are recorded on the digital patient system for each care plan, which is time consuming. Workers undertake care plan tasks and elaborate on the assessments. This includes notes about wound dressing and recipient's general physical and psychological states. One respondent said they even note when a recipient needs help putting their socks on. This led to discussion concerning whether only special conditions should be documented because they are many employees who approach the work differently. According to the respondents, it is the employee's responsibility to keep the care plans in the documentation system up to date. Even if they already spend abundant of time on documentation, the respondents reported that they struggle to keep the care plans in the documentation system up to date because of time pressures. Three respondents mentioned that they feel they should spend more time on documentation and that, because of time constraints, many care plans in the system are not at place of validity where they should be.

Thirty minutes is allotted for oral reporting of information between shifts. All staff from both day and night shifts are invited to participate and comment. Staff usually try to be efficient, and they only report extraordinary circumstances regarding recipients, things that need to be elaborated on, and emergency visits. If the physician asks for extra visits to a recipient, this is also reported.

Information reported orally and not written into the system, includes simple notes for example if there is no need to visit a recipient, if there are one-off events with recipients, or if information is not useful to other caregivers. Other examples include phone calls from the doctor and instances where caregivers are asked to pick up medicine at the pharmacy. There are also events involving individuals who do not receive regular service. In such cases, the recipient will not necessarily have a medical record. Thus, caregivers do not have the opportunity to record information in the documentation system. Furthermore, caregivers sometimes register the reason for some tasks not being performed. However, they might also register that a recipient did not want help with showering, without providing a reason for this.

Staff may be called for emergency visits while they are visiting their assigned recipients. The emergency visits are not always recorded when staff return to office, especially if the case involves a new recipient. One respondent mentioned that they have an agreement book in addition to the documentation system. Things that are conveyed in this include recipients' appointments, simple messages, and if the caregivers do not have to visit a recipient on a particular day.

Discussion

This research demonstrates that there are differences in how distinct documentation systems affect time use, variation, and accuracy in the documentation and reporting activities for the two municipalities.

The documentation is particularly important because employees in HHC cannot go back to the recipient in the same manner as with institutions. They are with the recipient so briefly that it is even more important to document details regarding the patient's condition. The report should elaborate on what is not written and the activities are complementary.

The interviews reveal that respondents in M1 produce documentation immediately after visiting a recipient and only add extra documentation after the shift if extra ordinary situations have arisen. The expectation to spend limited time on documentation may also be a driver to minimize the use of time. Although one person regularly updates the information, M1 staff spend less time on daily documentation than M2 staff. Previous research also confirms that an EHR system results in less time being spent on communication.¹²

The MS used by M2 staff forces them to record all information twice, first on paper and then in the documentation system. This leads to significantly greater time being spent on documentation than in M1. It is more cumbersome to take notes for each patient via a tick-off system. A more standardized system (even a manual one) should generate a reduction in time spent on documentation. However, an MS can be beneficial because it results in individual assessments of each patient. This lies in contrast to an EHR system, which carries a greater risk of documentation being completed automatically.

In M2, the content and timing of documentation depend on caregiver's workload that day. Some respondents reported that they struggle to keep information about recipient up to date on the system due to time pressures. The relationship between huge workload and poor documentation is noted in other studies¹⁵ and it can lead provoke documentation characterized by an unavailability of patient information or written documentation that is illegible, inaccurate and incomplete. M2 staff allocate more time on oral reporting as compared to M1 staff. In M2, all staff members participate

in the reporting. This seems less efficient than sitting face to face with staff members who are directly involved with the recipients. It seems to be exaggerated if you have rich documentation as well. However, making oral reports is not standard practice in either municipality. The interviews suggest that there is a consensus to only report changes.

Even though it is within the limit of two SDs, the SPC charts illustrate a relatively large variation in time use for both reporting and documentation in both municipalities. This indicates that there is significant variation concerning the need to conduct reporting and documentation. When using SPC, there is a question of whether there is unassignable variation or special cause variation, although this may be difficult to distinguish. There will typically be individual variation in healthcare, and unassignable variation is therefore part of the process. Although all the SPC charts were within the limits, question arises of whether there are reasons to reduce the average hence the SD would probably decrease. A higher level of standardization will contribute to a lower average, but it is needed as a trade-off between too much standardization and accuracy.

In order to increase the quality of service, attempts have been made toward standardization in several ways for instance in clinical practice³² or in the documentation process,⁷ with various results. However, the results for this study indicate there is variation in the documentation for both municipalities. It is conceivable that strict standardization and an expectation to do not spend ample time on documentation may lead to under-documentation. Previous studies have already determined that inadequate EHR documentation is a widespread problem in long-term care,³³ and that for some, the EHR system did not meet their expectations after implementation.¹⁷ In this case, no time is allocated for elaborations in the oral report, which may increase the probability of losing information. For example, some respondents in M1 claim that daily mood and general health status are not documented or mentioned in the oral report. Therefore, it may be beneficial to include general health status in the tick-off system, since this information is vital for older people. Another example is wound care. Staff can tick-off a list immediately after a wound dressing, indicating whether the condition of the wound was in the “same”, “better” or “worse” condition. The above examples are not consistently reported in the current M1 system. This implies that an over-standardized system and a narrow time window for oral reporting may generate less accurate information.

Each employee in M2 writes the documentation themselves, which can generate detailed information and hence greater accuracy. Workload and time pressure among employees may also lead to differences in the kinds of information registered in the documentation system. This effect is stated in other studies.¹⁵ Workload and time pressure were mentioned as factors determining whether respondents took time to write supplementary information. For instance, some respondents mentioned that they record most of the information, while others only register changes. This implies that there is no consensus on what should be reported. Although it is they agreed that changes should be incorporated, it is generally left to each staff member to decide what to document and report. This requires all staff to know which elements to document and report. Applying a level of standardization to documentation may provoke more accurate documentation and save time.

This situation contrasts with M1, where much of the information is pre-defined in a tick-off system. Because of this, the information in M1 is more standardized than in M2, where employees input what they deem important to include. The accuracy of the information depends to a large extent on each employees' available time and competence. As mentioned by one of the respondents in M2, “We have discussed whether it's better to only document special conditions. This is because we are different and have many employees.” From this perspective, standardization could be a way to assure quality. If there are beginners among the caregivers, who lack experience, they could be informed about what they should note with recipients. However, this requires standardization to be sufficiently comprehensive.

Concerning care plans in M1, respondents reported that these are updated by different nurses in rotation. Changes required for care plan are reported by caregivers working with recipients and entered into the system by the nurse responsible for updates. A weakness of this method may be that the information registered on the documentation system is less accurate than it would be if the one observing the changes had written it.

In M2, care plan updates do not encompass the daily routine, which means information is not consistently updated in recipient care plans. However, since many caregivers provide detailed information about recipients, certain information is

up to date and accurate. While EHR systems tend to be more efficient concerning time use, paper-based records tend to carry higher levels of quantity and quality regarding content.³⁴

Due to the EHR system in M1 being ubiquitously, it is easy for employees to access the necessary information about recipients regardless of where they are located. Thus, the need for reporting is reduced. They have what they call a quiet report. This contrasts with M2 where all employees perform reporting. By reducing the time spent on reporting, more time can be spent on other activities. However, since the reports facilitate communication between employees and are linked to service quality,² the units implementing EHRs should be aware that there are also negative aspects to their system.

Documentation and reporting are complementary activities that are crucial for disseminating information about patients. A system that is too standardized should be altered to be flexible enough to provide supplementary reports and documentation when needed. Nevertheless, a non-standardized system requires abundant time for documentation and can thus generate inaccurate documentation and information. Using an EHR system saves time saving and makes people's work more manageable, but it should still be sufficiently easy to document what is important and necessary to communicate.

Previous research determined that EHRs in elder care could lead to a reduction in communication and follow-up care, which may adversely affect care services.³⁵ Although the link is not proven, it would be helpful to understand how reduced time spent on reporting could influence quality in terms of content and staffs ability to produce it.

Conclusion and Further Research

This study determined that M1 staff using an EHR system spend less time on documentation, than M2 staff who use an MS. This is due to the standardization of information in M1 and that M2 staff must record information twice; first on paper and then within the system. The standardization associated with the EHR system in M1 causes less variation in the process than in M2. However, less variation in the process can also affect the accuracy of the documentation, and some potential key information could be missed (eg, a recipient's daily mood or current condition of health). Due to the EHR system, the staff in M1 do not have a specific session for reporting like M2 staff do. Because reporting facilitates communication between employees, and is linked to quality service, whether the reduced time spent on reporting affects accuracy of documentation and quality of care should be explored. Thus, it is essential for further research to be conducted in this area.

Disclosure

The authors report no conflicts of interest in this work.

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