

Vulnerabilities in prevention and treatment of malnutrition – the role of the electronic patient journal

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For the past two decades, malnutrition, and especially undernourishment, has received increasing focus in Norwegian healthcare. Documentation is central to the prevention and treatment of malnutrition. However, few studies have addressed this aspect. This paper aims to clarify in what ways the electronic patient journal may be of hindrance to the community nursing services' work in preventing and treating malnutrition. We performed a task analysis based on data from semi-structured interviews with personnel from nursing services (n=11) in two municipalities. The interviews were centred around the process and routines of detecting and treating malnutrition, what the personnel documented and how the documentation was done. The task analysis point to a main vulnerability that is partly created and partly exacerbated by the technological solution: a high degree of dependence on personnel's memory for ensuring that information is documented and conveyed to colleagues internally.

Keywords: Malnutrition, electronic patient journal, community nursing service.

1. Introduction

Malnutrition, and especially undernourishment, has gained increasing focus in Norwegian healthcare for the past two decades. Malnutrition can have adverse effects on a patient's health and clinical outcomes, as well as placing additional stress on the health services and increasing the costs (Barker et al., 2011; Nasjonalt råd for ernæring, 2017; Saunders & Smith, 2010). It is estimated that one third of patients in Norwegian hospitals is either at risk of malnutrition or are malnourished (Tangvik et al., 2014), while a study found that 46% of patients receiving community nursing services (home-based) in two of the largest municipalities were either malnourished or at risk of such (Wensaas et al., 2012). In Norway, the increased focus on malnutrition has been visible in the form of national guidelines for its prevention and treatment (Helsedirektoratet, 2009), its inclusion as one of the focus areas of the national patient safety program (Nasjonalt pasientsikkerhetsprogram I trygge hender 24-7, 2018), and finally its inclusion as a quality indicator in nursing and care services.

Several studies of prevention and treatment of malnutrition has been performed in the Norwegian context. For example, Meyer et al. (2017) explore how community nurses interpret and attend to recommended practices and guidelines. Other studies focus on key practices of the national guidelines. Aagard and Grøndahl (2017), for example, studied routines in community nursing services for assessing patients' nutritional status, while Melheim and Sandvoll (2017) discuss challenges to performing such assessments in the same setting. There have also been studies in the hospital setting, for example Eide et al. (2014) who identified nurses' experiences of barriers for adequate nutritional care for hospitalised older patients. Even though documentation of care is central to the prevention and treatment of malnutrition, few studies, at least in the Norwegian context, have addressed this aspect specifically. The electronic patient journal (EPJ) is the primary

tool for documentation in the community nursing services, thereby contributing to the communication and continuity in provision of nursing and care for a given patient. However, as late as last year, it was reported that the EPJ does not sufficiently support nutrition reporting and is of hindrance to the implementation of the national guidelines (Nasjonalt råd for ernæring, 2017).

In this paper we present results from a study in community nursing services in Norway that aimed to further understand in what ways the EPJ may be of hindrance to the nursing services in preventing and treating malnutrition.

2. Methodology

This study used a qualitative approach. Because documentation is central throughout the process of detecting and treating malnutrition, we needed to understand how the whole process is performed. We first familiarised ourselves with the content and recommendations in the national guidelines (Helsedirektatet, 2009) and the patient safety program (Pasientsikkerhetsprogrammet I trygge hender 24-7, 2017). The main data collection consisted of semi-structured interviews with personnel from the nursing services in two municipalities using the same EPJ system: three department managers, six nurses and two nursing assistants. In addition, we received a brief demonstration of the EPJ system. The interviews were centred around the process and routines of detecting and treating malnutrition, what they documented and how the documentation was done.

Next, we performed a task analysis based on the data from the interviews. For each task step we identified the performing role(s), which information they used, what tools they used, who they collaborated with, potential errors, consequences of the errors, and possible recovery. We also included notes that did not fit into one of the pre-structured categories, but that was informative regarding the nursing services' practice. To verify our description of how the nursing services performed the process, we held a workshop in which we presented the analysis to managers and nurses from the nursing services and discussed the vulnerabilities that we had identified with a special focus on those caused, or exacerbated by, the EPJ system.

3. Results

In this section, we briefly explain the process of prevention and treatment of malnutrition in community nursing services. We then provide a brief description of the EPJ system, before presenting the results in terms of limitations of the EPJ that may be of hindrance to the nursing services' work in preventing and treating malnutrition.

3.1 The process of prevention and treatment of malnutrition

The process of preventing and treating malnutrition consist of several steps: 1) assess patient's nutritional status, 2) assess what factors influence the nutritional status of patients identified as at risk of malnutrition, 3) establish an individual treatment plan, 4) provide treatment, and 5) evaluate the effect of treatment and assess further action. The steps may be further detailed, as shown in Table 1.

Table 1: Main task steps and sub steps of preventing and treating malnutrition in community nursing services

No.	Main task-steps	Task sub-steps
1	Assess patient's nutritional status	Perform risk assessment of patient's nutritional status Document results in EPJ If patient is at risk of malnutrition, inform the patient's general practitioner
2	Assess factors that influence the nutritional status of patients identified as being at risk of malnutrition	Perform assessment of factors that influence the nutritional status, e.g. diagnoses, medicines, habits, social factors, dental status, motor skills, etc. Define the patient's energy- and fluid needs Identify the patient's energy- and fluid intake Document results from the above sub-steps in EPJ
3	Establish an individual treatment plan	Establish plan in EPJ Inform the patient's general practitioner
4	Provide treatment according to plan	Perform treatment according to plan Document reports continuously in EPJ
5	Evaluate the effect of treatment and assess further action	Perform measurements of effects of treatment according to specified interval in plan, e.g. weigh patient Document measurements in EPJ Assess effects of treatment and identify need for changes in treatment according to specified interval in plan Document assessments in EPJ Inform patient's general practitioner

It is important to note that the only task that is to be performed for all patients is task step 1) Assess patient's nutritional status. According to the guidelines, this task should be performed at a monthly interval or according to some other specified interval based on clinical justification. Task step 2-5 is only performed for patients that are identified as being at risk of malnutrition. During the interviews, the nurses emphasised that preventing and treating malnutrition is *an additional* task to the primary tasks that are performed for a given patient, i.e. the main reason(s) a patient is receiving assistance from the nursing services may have nothing to do with nutrition. The process of preventing and treating malnutrition is a continuous process that stretches in time. The nursing services are unlikely to move on to step 2 the same day as a patient is identified as being at risk because they do not plan for such and therefore do not have the resources available to perform the more time-consuming step 2. Furthermore, some sub-tasks are not possible to do within a shift. For example, the sub-task of identifying a patient's energy- and fluid intake alone will take a minimum of one day because the information of interest is the patient's intake throughout a full day. This means that the full process spans across different shifts. Consequently, one individual is unlikely to complete the entire process by themselves. Instead, different nurses will perform different parts of the process. This means that transferring information internally in the nursing services is crucial for continuity of care.

3.2 The EPJ system

The nursing services in the two municipalities use the same EPJ system. The system is built for stationary computers and offers additional modules that the municipalities can buy. Electronic message exchange is integrated for communications with other health services such as general

practitioners and hospitals. The EPJ is where all relevant information for a patient is documented: information about the patient, his/her next of kin, medicines, the nursing services observations and assessments of treatment, provision of care, and actions. The EPJ systems allows for some degree of flexibility in the structure of individual plans according to the nursing services' needs. The system has been updated in several iterations. One of the newer updates included creation of a designated area for measurements in which a weight curve can be displayed, amongst others. Figure 1 provides an example of the interface of the EPJ system.

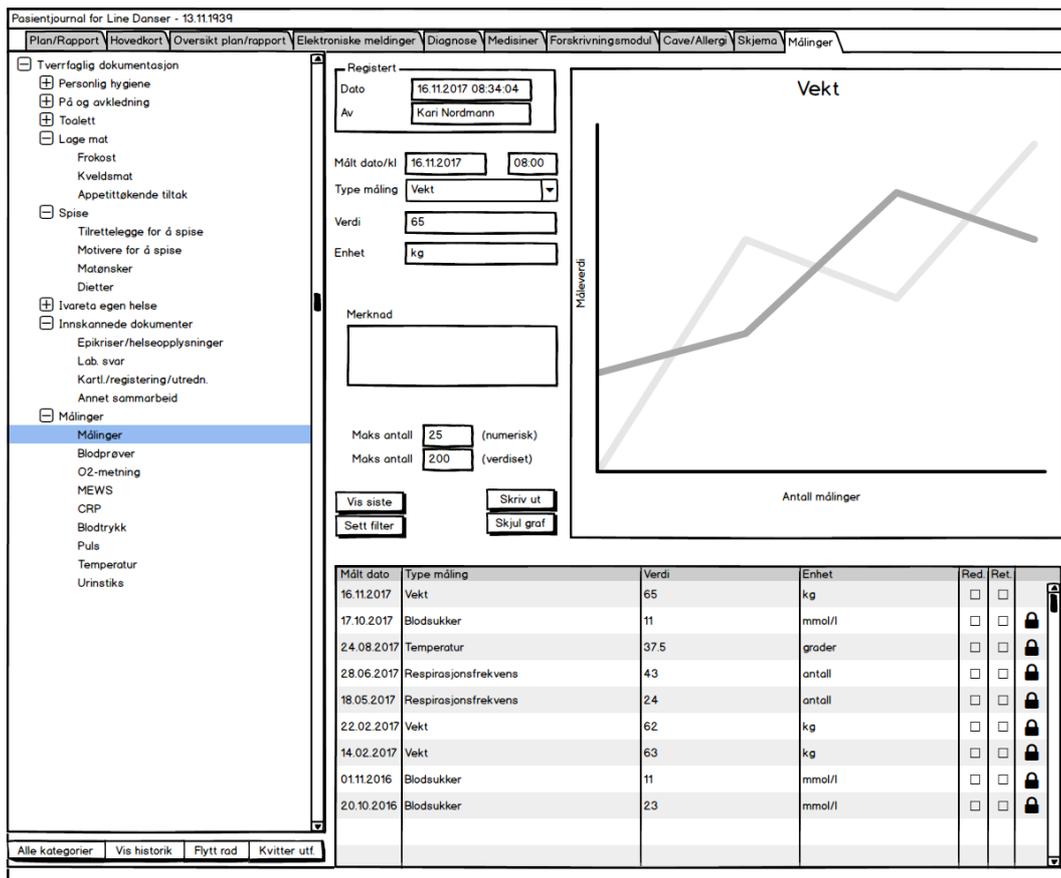


Figure 1: Example of the EPJ system interface, showing the screen where measurements are presented.

In addition to the EPJ system, the vendor offers a web application that communicates and partly exchanges information with the EPJ system. The web application is used by both municipalities in this study on mobile tablets. Through the application, personnel have access to work lists (patient visits), treatment/care scheme, key information about the patient, and the possibility to read and write reports and sign that the treatment/care scheme has been performed. Figure 2 provides an example of the interface of the web application.

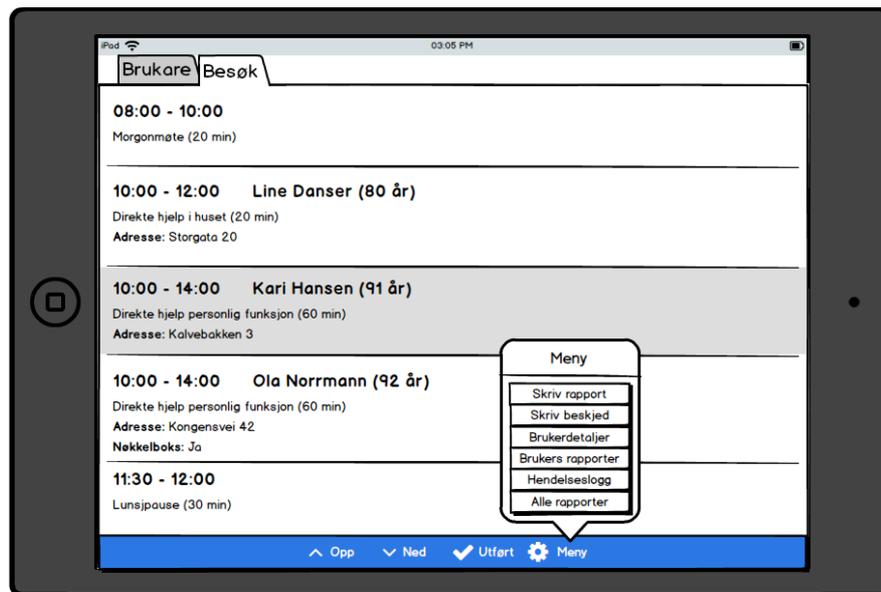


Figure 2: Example of the EPJ web application on a tablet, showing a work list over patients to visit.

3.3 Limitations for effective work by the EPJ system

The results from the task analysis points to one major limitation of the EPJ system that is of hindrance for effective work. The nursing services provide assistance to patients living at home or in residences with service. Consequently, their work is not performed at an office. However, the office is the only place where the EPJ system is available. The web application is a solution that is better adapted to how the nursing services work. However, the application is not a mobile version of the EPJ system but exchanges certain information with the EPJ system. For the nursing services work in preventing and treating malnutrition, the EPJ system and the web application have yet to be adapted to the services' needs. Table 2 provides an overview of where the different tasks are performed, the possibilities for documentation in web application for each task, and how documentation is performed.

Table 2: Overview of location for task performance and documentation possibilities

<i>Task step</i>	<i>Physical location</i>	<i>Possibility to document in web application</i>	<i>How documentation is performed</i>
Assess patient's nutritional status	Patient's home	No	Paper version of risk assessment tool is filled out. The information is then scanned or entered into EPJ system when [nurse] back in the office.
Assess factors that influence the nutritional status of patients identified as	Patient's home	Yes, as reports	Information is either documented on paper, then scanned or entered into EPJ system when [nurse] back in the office or as reports in the web application.

being at risk of malnutrition			
Establish an individual treatment plan	Patient's home / office	No	Individual treatment plan can only be established in EPJ system, and consequently in the office.
Provide treatment according to plan	Patient's home	Yes	[personnel] can write reports and sign that they have performed actions as specified in treatment/care scheme
Evaluate the effect of treatment and assess further action	Patient's home / office	No	Measurements function is only available in EPJ system, and consequently in the office.

What is evident from Table 2 is that documentation is often not possible in connection with task execution because of limitations in the web application. For task step 1 there is only paper based versions of established risk assessment tools available to the nursing services. Therefore, the information is frequently scanned into the EPJ, or the services have developed their own template for documentation in the EPJ system. For task step 2 the nursing services have no tools available. It should be noted that during the interviews, the informants expressed that they were not accustomed to performing this task step and did not know how to do all sub-steps. At the time of the interviews, the services were in an initial phase of implementation of prevention and treatment of malnutrition as described in the national guidelines. However, it was clear from the interviews that documentation of the information collected in task step 2 needed to be registered in the EPJ system in the office or as a series of reports in the web application. For task step 3, the EPJ system is the only means to establish an individual treatment plan. One interviewee noted that this was unfortunate because it was of hindrance for the dialogue with the patient, and that ideally they should be able to set up a plan together with patient during their visit. Finally, for task step 5 the key measurement that the nursing services use to evaluate the effect of treatment is the patient's weight. However, this measurement could not be registered via the web application because the "measurement" functionality is only accessible in the EPJ system. Consequently, the nurses needed to take note of the weight and register it in the EPJ system upon their return to the office, or document it in a report. The latter would result in not having all weight measurements represented in the weight curve. Furthermore, any changes to the treatment plan needs to be made in the EPJ system, similarly to task step 3.

The task analysis further points to a lack in support of the nursing services' workflow by the EPJ system and web application. For all the task steps in preventing and treating malnutrition, the nurses explained that the primary means to ensure continuity in the process was to write a message in a message book (an almanac) for the relevant date that the next task step is to be performed. At each shift, the messages pertaining to that shift is read out loud during a meeting before the personnel begin their patient visits. This demonstrates that the EPJ system and web application had neither functionality directly supporting the nursing workflow nor notification functionality amongst personnel in the service. The only type of notification that was possible in EPJ system was to mark a report as "priority" which signalled that the report should be read by the next shift.

4. Discussion

The limitations to documentation by the technological solutions creates a high reliance on the personnel's individual memory: they need to remember to register information when they return

to the office, they need to remember to write messages ahead in time, and they need to remember to perform a task step when it is time to do so (e.g. risk assessment of patient NN on day X). The latter is particularly an issue for prevention and treatment of malnutrition because it is a continuous and *additional* task for the nursing services. It is likely to be less problematic for other tasks such as administering drugs because such tasks have already been decided as separate treatment schemes for which the patient receives assistance.

The reliance on personnel's individual memory creates vulnerability in terms of continuity of care. Dismukes and Nowinski (2006) discuss pilot error from the perspective of concurrent task management and prospective memory. They describe prospective memory as "remembering to perform an action that cannot be executed when the intention is formed" (ibid, p. 226). The authors describe how prospective memory demands emerge during five types of task situations: Episodic tasks, referring to tasks that are not habitually performed, or habitual tasks that circumstances force to be performed out of their usual sequence; habitual tasks in which the intention to perform a task is implicit in the action sequence and not needing to form an explicit intention; disrupted habitual tasks which refers to circumstances in which one need to deviate from a well-established action sequence; interruptions during performance of a task after which there is no explicit reminder to complete the interrupted task; and multitasking which refers to switching attention between tasks without being explicitly prompted to do so. For the nursing services, several of the task steps in preventing and treating malnutrition can be characterised as such task situations. The medical context is generally considered one such environment in which heavy demands on prospective memory are placed (Dismukes, 2012; Fink et al., 2010; Grundgeiger & Sanderson, 2009). For example, Fink et al. (2010) found that nurses self-report to remember a total of 233 prospective memory tasks, while forgetting a total of 104 prospective memory tasks. As such, the probability of nursing services personnel forgetting any of the prospective memory tasks involved in the prevention and treatment of malnutrition process is considerable.

That the EPJ and web application is not designed to support prevention and treatment of malnutrition can also be a contributing factor to difficulties in implementation of such work in a systematic manner in the nursing services. Melheim and Sandvoll (2017) raises a similar question and touch upon how the EPJ system can strengthen the preconditions for conducting risk assessment of malnutrition. They point to how standardisation of documentation can be done based on variables from validated risk assessment tools, but that nutritional information is currently largely unsystematic, a lot of which is written in free text as reports. Consequently, the EPJ does not provide support in systematising the information and providing the nursing services with a readily available overview that can support their awareness of the situation.

5. Conclusion

This study set out to identify how the EPJ may be of hindrance to the nursing services' work with preventing and treating malnutrition. The task analysis pointed to a main vulnerability that was partly created and partly exacerbated by the technological solutions: a high degree of dependence on personnel's memory for ensuring that the information is documented and conveyed to colleagues internally. As such, we demonstrate how key technology can be of hindrance to the nursing services and introduce the possibility of error when it is not sufficiently adapted to the context in which it is supposed to be used.

The results of this study, however, apply to only one of the most commonly used EPJ systems in Norwegian municipalities. Consequently, the results may not be applicable to other EPJ systems. Furthermore, our sample consisted of community nursing services in two municipalities that had

limited experience with systematic prevention and treatment of malnutrition. It is possible that a broader sample with municipalities in which they have fully implemented the national guidelines will provide other insights. Further research should therefore be undertaken to understand how the EPJ systems are aligned with the services' needs in this respect. Despite these limitations, we believe this study is an important first contribution to identify in how EPJ systems can better support community nursing services' work in preventing and treating malnutrition.

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