

Patient-Centred Healthcare Team

Work Practice, Experiences, and Estimated Benefits

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Abstract—The University Hospital of North Norway and the Community Nursing Service in Tromsø Municipality established an integrated patient-centred care model to improve the continuity and quality of care for multimorbid older patients living in the region. The model includes a proactive interdisciplinary team providing outreach services supported by m-health technologies. The team consists of healthcare personnel from the Community Nursing Service and the hospital. The main aim is to help the patients get the needed hospital care, ensure safe discharge, provide support in the home environment, and prevent unnecessary hospital admissions. This paper describes the mobile team's work practices and the information exchange process across two different levels of care. Furthermore, we analysed changes in treatment plans and estimated avoided hospitalisations. This is a prospective registration study supplemented with focus group discussions. This paper reports preliminary results from the first 98 patients the team handled.

Keywords—Geriatrics, integrated care, patient centeredness, interdisciplinary teamwork, e-health, mobile health, safe discharge, avoided hospitalisation.

I. INTRODUCTION

The Division of Internal Medicine at the University Hospital of North Norway (UNN) and the community service providers at the administration in the municipality of Tromsø initiated an integrated patient-centred outreach service to improve the continuity and quality of care for multimorbid older adults in the region. Mobile, proactive, and patient-centred interdisciplinary teams were established, which include personnel from the Community Nursing Service and the hospitals in Tromsø and Harstad. Their main

task is to follow patients through the system, helping them receive appropriate, patient-centred, and timely healthcare services when needed at the most appropriate location. This also includes providing support at home to minimise hospital admissions. The patient-centred healthcare team (hereafter “the team”) is funded as a cost-sharing collaboration between the municipalities and hospitals. As part of this large-scale intervention, a project evaluating effectiveness and cost effectiveness in a prospective matched control before-and-after study is underway. This study will start recruiting patients in June 2016. The protocol describing this research study is published elsewhere [1].

In this paper, we focus on the team established in Tromsø. The first test patients were referred to the team in October 2014. Approximately 300 patients were referred to the team in 2015. The team is now part of the everyday clinical practice. The team's work represents a new service model that is organised and works between primary and secondary care, producing new relations and work practices. The service model is not built around and driven by e-health technologies; rather, it uses ICT and mobile devices extensively to support team work by improving communication and facilitating information exchange between health providers and between patients and providers. We will describe the patient-centred outreach model, including the team's work practice, experiences, and challenges during its first year. Furthermore, we will report some preliminary results for the first 98 patients.

This paper is structured as follows: Section II provides the background and includes an overview of the local context and use of an interdisciplinary team in clinical work. Section III outlines the material and research setting. Section IV describes the method used in this study. Section V reports

some preliminary results. Section VI discusses implications and limitations. Finally, conclusions and future work are discussed in Section VII.

II. BACKGROUND

The proportion of older people is rapidly increasing. It is estimated that the number of people over 67 years old in Norway will continue to increase by 13 000 annually. This demographic will nearly double from 624 000 in 2010 to 1.5 million in 2060, accounting for 22% of the total population [2]. The older population tends to have more health problems. More than 80% of individuals over 65 years old have one or more chronic conditions [3]. Individuals with multiple chronic conditions are also more likely to be hospitalised [4].

The effective management of acutely ill and complex patients with multiple conditions poses one of the greatest challenges in current hospital care [5]. Furthermore, healthcare utilization and costs increase significantly with an increasing number of chronic conditions [6]. One way to improve the management of multimorbid older adults is to implement integrated care models. Integrated care models were developed in response to fragmented and reactive care systems and a lack of patient involvement. One way to improve patient involvement and achieve more patient-centred care is to establish interdisciplinary teams [7].

Interdisciplinary teamwork offers an integrated approach to providing coordinated healthcare patients with complex long-term needs. This has been considered a good practice for more than two decades [8]. Evidence also suggests that interdisciplinary teamwork can improve the quality of care [9-13]. Well integrated models have been found to improve the process of care and could reduce hospitalisation and community service use [9]. Teamwork may also improve prescription and medication adherence [10].

The UNN and the community service providers at the municipality have jointly established an interdisciplinary patient-centred team to improve the quality of care for older multimorbid patients in the Tromsø area. This was mainly to improve the quality of care, reduce hospitalisations and cut costs. The team includes personnel from the Community Nursing Service and the hospital.



Figure 1. The University Hospital of North Norway

The UNN is the leading healthcare provider and health trust in North Norway. It serves as the local hospital for Troms County residents and other parts of Nordland, providing a full range of hospital functions (see Figure 1). The Municipality of Tromsø, which is the host for the hospital, is the largest in the area. It has a population of 72 000. The Municipality is responsible for ensuring good and proper health and care services at the primary care level to all its residents. These health and care services include childcare, preventive healthcare, nursing care, medical services, rehabilitation, and social services.

III. MATERIALS AND RESEARCH SETTING

In this section, we present the integrated patient-centred care model, its structure, and the team's work practice.

A. The patient-centred healthcare team model

The patient-centred healthcare team represents a mobile, seamless, and proactive model that aims to ensure safe discharge and prevent hospital admissions for older patients with multiple conditions. The team's main task is to follow patients through the system and help them receive appropriate and timely healthcare services when needed at the most appropriate location. The team identifies and assesses care needs early, provides support during discharge and follow-up, facilitates coordination and integrated services, and provides home-based services by actively monitoring, supporting, and caring for patients outside the hospital until adequate follow-up services are in place. This could reduce unplanned hospital admissions, reduce the need for community services, and improve or prevent deterioration in health and functional outcomes.

The patients will actively be involved in the care and self-management process. The team will identify patient goals, assess home situations, and facilitate individual tailored care plans and follow-up protocols. Such patient involvement and engagement in care has been shown to improve health and functional outcomes [14].

B. The team structure

The interdisciplinary patient-centred care model is a complex intervention that delivers collaborative care focused on care coordination. The team has two separate focus areas: a pre-hospital focus and a safe discharge focus. The former targets patients living at home. The latter addresses hospitalised patients. The core team consists of the team leader and two full-time coordinators (both geriatric nurses). One coordinator comes from the hospital, and the other is selected from the Community Nursing Service. The core team is responsible for daily teamwork management and ensuring patients receive appropriate and timely support and services. The core team seeks to:

- Understand which professionals providing care and services are currently available,
- Develop joint work to enable services integration,
- Encourage a proactive and structured assessment of patients goals and needs,
- Facilitate understanding and ensure the use of personal and advance care plans,

- Act as a central resource for the health and social care professionals, both within the team and across the municipality and hospital sectors.

The wider interdisciplinary team includes hospital and community personnel and consists of ten positions. These include one geriatric specialist (senior consultant), two nurses, two district nurses, two physiotherapists, two occupational therapists, and one pharmacist. Four of these are part-time positions.

C. Team work practice

The structure and organisation of the service model cover complex areas, such as patient and information logistics. Patient logistics include regulating the patient flow through the system, knowing when and how blockages occur and resolving them, using various instruments (such as case management, discharge protocols, capacity constraints, and home monitoring). Information logistics includes team communication, information exchange, and patient communication.

The patient-centred model includes four main tasks: to identify the patients with special needs for coordinated care; to conduct patient-centred need assessments; to facilitate individualised care plans and follow-up protocols; and to initiate meetings for the coordination and integration of patient care across service providers.

In the first phase after the start-up, the team actively promoted its existence and services by visiting GPs, district nurses, other community service providers, and hospital wards and clinics. The team has been assigned office space at the hospital and scheduled two daily meetings to plan activities and discuss patients. Between team meetings, the team conducts home visits, visits hospitalised patients, attends coordination meetings, assesses patients, and plans follow-up activities, writes case reports, and updates patient records. The patients are referred to the team by phone, electronic referrals, and ordinary mail. Most are inpatients at the hospital when they are referred to the team (see Table I).

The team assesses each patient's needs based on what the patients view as important. The team also assesses the fall risk and the need for special aid, reviews medication lists, and ensures that the patients' GPs are informed. Furthermore, the team ensures continuity of care in the hospital setting and during the transition phase from hospital to home. The team is responsible for the patients until adequate follow-up services are in place. Figure 2 illustrates the main steps in the patient-centred model.

D. Communication and information exchange

The team works with hospital inpatients, patients in nursing homes, and individuals living at home supported by home care. In Norway, the community services and the hospital sector have two distinct and separate patient information systems. Therefore, the patients referred to the team have two different patient records: the hospital's Distributed Information and Patient System for Hospitals (DIPS in Norwegian) and Profil, the community services' patient records.

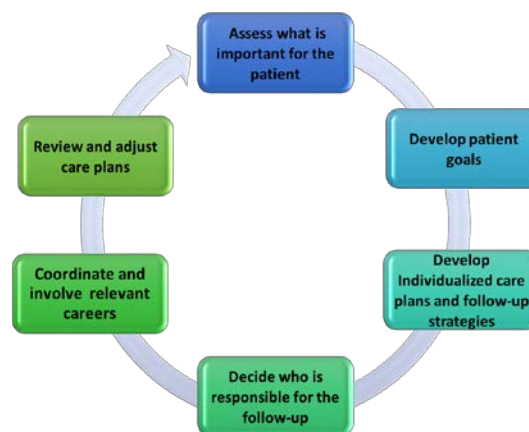


Figure 2. The main steps in the patient-centred model.

Ensuring effective day-to-day information exchange between team members across these sectors is one of the challenges in the project thus far. The team uses two different systems to access patient records. Two desktop computers are connected to the community service network and are used to access patient information in Profil. Three computers are connected to the hospital network and are used to access the hospital records. All team members have login credentials for both systems. To get all the needed patient information on one specific patient the team must log on to both systems. The team also employs laptops.

Furthermore, the team uses information and communication technologies to support patient treatment and follow-up outside of the hospital. The team members use mobile devices (phones and tablets) to communicate outside the office. The data security system does not allow them to include patient records on the tablets so they must be in regular contact with the office to receive updated patient information. The tablets are also used to film physiotherapy sessions. This facilitates patient exercises at home without in-person supervision. The films are also used for team education and training. The patients can contact the team through tablet videoconferences, as well. They make the calls through the secure health network using WebRTC technology.

IV. METHODS AND RESEARCH APPROACH

We used a multi-method research approach to evaluate the first 98 patients referred to the team. The patients included were over 60 years of age with multiple conditions, in need of coordinated care and considered to be at risk of experiencing adverse health outcomes. Data were gathered in a prospective registration study and in focus group discussions. For each patient referred to the team, changes in treatment plans and services offered were logged. Data were also collected from the electronic patient records. Group discussions with team members were conducted to support and deepen the understanding of the data and how the team works.

A. Registration of the descriptive data

The descriptive data used in this study were registered in two ways:

1. Each team member consecutively logged data by entering information about patients into a pre-defined registration form. Background variables (such as age, sex, total diagnoses, and number of hospital admission in the last 12 months), date of referral to the team and discharge from the team, services provided, and estimated benefits were registered in the case form.
2. The patient records, both from the hospital and the community service records, were then used to verify the registered data and to include additional missing data. Data on re-hospitalisations within 30 days were also included. Two of the authors extracted data from the two electronic record systems simultaneously, while a third author updated and included new data in the registration form.

B. Focus group discussions

Focus group discussions can be a useful way to learn about the team's everyday practices. They are helpful in reviewing the team's role as well as technological and organisational barriers. Lastly, they can reveal work practice dynamics and pinpoint common and different experiences among members [15]. Two focus group discussions were conducted including all team members. At the first meeting, eight team members were present. Nine attended the second meeting. Seven attended both meetings. Themes discussed included patient integration, case histories, tasks, perceived benefits, and the main challenges the team experienced. The first discussion lasted approximately one hour; the second ran about two hours. The discussions were audio recorded and then transcribed.

C. Ethics

The implementation of the new team model was defined and registered as a quality improvement project at the UNN and falls outside the Health Research Act. No approval from a regional ethics committee is therefore required. Evaluating resources used in such projects do not require patient consent. However, the local data protection supervisor did approve the project. All data are temporarily stored on a secure research server at the UNN.

TABLE I PATIENTS LOCALISATION AT REFERRAL DATE

Where the patients are located when referred to the team		
<i>Description</i>	<i>No</i>	<i>%</i>
Hospital	62	63.3
Home	26	26.5
Nursing home	8	8.2
Rehabilitation centre	2	2.0

TABLE II CHANGES MADE IN TREATMENT AND PLANS

Changes and plans		
<i>Description</i>	<i>No</i>	<i>%</i>
Increased community services	70	71.4
Offered rehabilitation	18	18.4
Clarified home situation/nursing home	55	56.1
Rapid and complete hospital review	16	16.3
Written follow-up plan completed	53	54.1

V. PRELIMINARY RESULTS

In total, 101 patients were included in this study. Three did not want to receive services from the team, which left 98 for analysis.

The mean age was 80 years, ranging from 54 to 95. The patients had 3.5 diagnoses (ranging 0-7 per patients), and they had been hospitalised 0 to 9 times (mean 2.5) during the last 12 months. Of the patients, 41 were male. Hospital staff referred most of the patients to the team (62%). GPs and healthcare personnel in the municipality referred the remaining patients. Most were inpatients at the time of referral (see Table I).

The team initiated an increase in community services for more than 70 percent of the patients. Of these patients, 25% were offered rehabilitation. For more than half of the patients, the team clarified the home situation and made the transition process from the hospital feel safer for the patient. Table II shows the changes the team made.

The team estimated that some of the patients who received services avoided a hospital admission (15%) or shortened their lengths of stay (15%). Data from the electronic patient records at the hospital showed that only 3% of the patients handled by the team were readmitted within 30 days.

The team members agree that coordination is the most important part of their work, which is a service that did not exist prior to the team's establishment. This involves engaging the appropriate professionals as soon as possible, initiating and arranging meetings, and creating communication channels that include personnel from community care services and the hospitals. The first couple of days after discharge are critical for positive patient outcomes. It is also important that the patients take part in the planning process and are informed about available follow-up services.

Some patients are anxious about how they will manage on their own after a hospital stay. In situations where they have simple and specific needs, one home visit and one phone call to the nursing services can be enough to reassure the patients. The team emphasised the importance of being "interdisciplinary." The combined expertise that the team possesses enables a broad approach to the geriatric field. This was essential to ensuring high quality and effective integrated and patient-centred services.

Organisational barriers and the lack of information systems between the two levels of care were reported as the

main challenges of working in a mobile patient-centred team. The team worked across the primary and secondary health systems, and this caused some challenges due to the different organisational cultures. Existing guidelines and procedures within each unit and defined meeting structures did not match well with the mobile patient-centred approach. Furthermore, two separate EPR systems limited the information exchange within the team and between the different units and departments. Another challenge was that the team could not access the patient records outside the office. The team members agreed that resolving some of these technical issues would make everyday teamwork more effective.

The smartphones and tablets were in regular use to contact the office for information during home visits and meetings. Videoconferencing was also used to communicate directly with patients. In one situation, videoconferencing was used to assess a patient whose condition had deteriorated. The team medical doctor spoke directly to the patient, and based on this exchange, pursued further action. Videoconferencing was also used in leg ulcer treatment, where the patient was at home with one of the team nurses and consulted an ulcer specialist at the hospital via video link. However, most videoconferences have been to coordinate health personnel across the different sectors.

VI. DISCUSSION

In this paper, we described an integrated care model that includes mobile and proactive patient-centred interdisciplinary teamwork. We focused on the team's work practice as well as roles, experiences, and challenges during the first year. Furthermore, we analysed changes in treatment plans and reported some preliminary results for the first 98 patients.

These results show that the team initiated an increase in community services for more than 70 percent of the patients. Of these patients, 25% were offered rehabilitation. For more than half of the patients, the team clarified the home situation and thereby made the transition process from hospital to home feel safer. Furthermore, we found that only 3% of the patients handled by the team were readmitted within 30 days. Official statistics from 2013 report that 12.7% of the patients over 67 years old were readmitted after a hospital stay in Tromsø [16].

These positive results correspond to other findings reported in the literature. One study, for instance, reported that multidisciplinary patient-centred intervention offered to all patients 60 years or older reduces hospital readmissions for the patients who received the service [17]. Another study from Sweden reported that patient-centred care is associated with reduced the length of hospital stay [18] [19], reduced patient anxiety and uncertainty [20], reduced medical complications following surgery [21], and cost savings [22].

To understand the mobile patient-centred team described in this paper, it is important to assess how organisational issues and communication patterns in two different organisational cultures affect the team's work practice. The team realised that working across two different healthcare organisations made effective collaboration difficult. To

facilitate such a change, a new culture must be created that supports an integrated patient-centred approach to patient care [23].

The strengths of the present study are its real-world setting and the involvement of designated health professionals in designing and developing a patient-centred team model. The model was initiated and is solely driven by clinical personnel at the hospital and the community services. The structure and organization of the team is continuously adapted to the clinical and everyday routines at the hospitals and in the home care settings. This might increase the probability of sustaining the mobile teamwork after the project has ended.

Furthermore, the project boasts the committed engagement of leaders and managers from all three healthcare organisations in the area. The community services, the GPs, and the hospital are all involved and collaborating to improve service integration. This might also increase the likelihood of sustaining the team, to expand the service to include more municipalities in the region and to adapt the service to other patient groups.

VII. CONCLUSION AND FUTURE WORK

In this paper, we described an integrated patient-centred model that aims to improve the continuity and quality of care for multimorbid older patients. The practice model consists of a proactive interdisciplinary outreach team, which includes personnel from the Community Nursing Service and the hospital. The team's main task is to follow patients through the system and help them receive appropriate, patient-centred, and timely health services. Preliminary results indicate that the team can improve care, shorten hospital stays, and reduce hospital admissions.

At the time of writing this paper, more than 300 patients received services from the team. The next step is to further develop and adapt the integrated care model and evaluate work practices. Specifically, we will evaluate the use of tablets in a home setting, both from the patients' and the providers' perspective. Future work will also include analysing effectiveness and cost effectiveness using matched controls from two separate hospitals in the region.

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