Patient trajectories in a Norwegian unit of municipal emergency beds

Heidi Nilsen\textsuperscript{a}, Steinar Hunskaar\textsuperscript{b,c} and Sabine Ruths\textsuperscript{a,b}

\textsuperscript{a}Research Unit for General Practice, Uni Research Health, Bergen, Norway; \textsuperscript{b}Department of Global Public Health and Primary Care, University of Bergen, Bergen, Norway; \textsuperscript{c}National Centre for Emergency Primary Health Care, Uni Research Health, Bergen, Norway

\section*{ABSTRACT}
Objective: The Coordination reform was implemented in Norway from 2012, aiming at seamless patient trajectories. All municipalities are required to establish emergency care beds (MEBs) to avoid unnecessary hospital admissions. We aimed to examine occupancy rate, patient characteristics, diagnoses and discharge level of municipal care in a small MEB unit.

Design: Cross-sectional, observational study.

Setting: A two-bed emergency care unit.

Subjects: All patients admitted to the unit during one year.

Main outcome measures: Patients’ age and gender, comorbidity, main diagnoses and municipal care level on admission and discharge, diagnostic and therapeutic initiatives, occupancy rate.

Results: Sixty admissions were registered, with total bed occupancy 194 days, and an occupancy rate of 0.27. The patients (median age 83 years, 57\% women) had mostly infections, musculoskeletal symptoms or undefined conditions. Some 48\% of the stays exceeded three days and 43\% of the patients were subsequently transferred to nursing homes or hospitals.

Conclusion: Occupancy rate was low. Patient selection was not according to national standards, and stays were longer. Many patients were transferred to nursing homes, indicating that the unit was an intermediate pathway or a short cut to institutional care. It is unclear whether the unit avoided hospital admissions.

\section*{Introduction}

The number of people with multiple chronic conditions will increase dramatically over the next decades. This entails organisational challenges for the management and occupies considerable resources, particularly in hospital care. In many countries, there are efforts to reduce acute hospital admissions and duration of hospital stays \cite{1-5}. In Norway, The Coordination reform was implemented from 2012, aiming at seamless patient trajectories, and giving the municipalities increased responsibility for treatment \cite{6}.

As an alternative to hospital admission, all 428 municipalities are from 2016 required to establish municipal emergency beds (MEB) \cite{7}. MEB is defined as a municipal or intermunicipal emergency overnight service for persons in urgent need of health care. According to the national recommendation, MEBs are intended for short-term stays of maximum three days \cite{7}. Prerequisites for admission to MEB include examination by the referring doctor, establishment of a diagnosis, and a treatment plan for the next 24 h or until availability of the doctor in charge of MEB.

The municipalities are expected to provide the same quality of care in MEBs compared with hospitals. Encouraged by economic incentives, half of Norway’s municipalities had established MEB by 2014. No pilot studies regarding quality and impact were performed prior to implementation of this new health service.

The aim of this study was to examine admissions to newly established MEBs in a single municipality with regard to occupancy rate, patient characteristics, diagnoses, diagnostic and therapeutic initiatives, and to where the patients were discharged.

\section*{Material and methods}

\section*{Study population}

This cross-sectional, observational study was conducted in a single municipality with approximately...
14,500 inhabitants in south-western Norway. Two MEBs equalled a bed rate of 0.14/1000 inhabitants, close to the national norm of 0.13/1000. The MEBs were established in March 2013, located at a nursing home ward, close to intermunicipal out of hours (OOH) emergency service and an X-ray facility. In addition to the two emergency beds, the ward comprised 20 beds assigned rehabilitation after hospital discharge, palliative care and other types of short-term stays. In addition to standard equipment for medical examinations, the unit had access to a modestly equipped laboratory (e.g. urine examinations, CRP and glucose), ECG and bladder scan, while X-ray was available during daytime. Other blood tests had to be sent to the hospital laboratory for analysis, from where test results were received two or more days later. The MEBs were staffed with nurses from the nursing home, while medical service was offered by general practitioners (GPs) a few hours daily five days a week in addition to GPs from the OOH services. A GP was available for telephone consultation if a patient’s condition deteriorated between scheduled rounds.

To avoid patients in need of hospital care being admitted to MEB, local exclusion criteria were compiled (Supplementary Table). For instance, patients with chronic obstructive pulmonary disease (COPD) were not eligible for MEB when possibly suffering from concomitant acute heart failure, or if in need of continuous positive airway pressure (CPAP).

The study population comprised all patients admitted to MEB the first year of operation, from 1 March 2013 to 28 February 2014.

**Data collection**

We collected routinely registered information from patients’ stay in MEB. Demographic data (age, gender and residential municipality, date of admission and discharge, municipal care level on admission and discharge, e.g., nursing home, home/nursing home rotational scheme) and clinical data (principal diagnoses on admission and discharge, comorbidity, diagnostic and therapeutic initiatives) were transferred to a data sheet. Nurses in charge of MEB extracted the data from patients’ electronic medical record and replaced ID-number with a record number on the individual data sheet; the key to which remained undisclosed to the research group. Data registration was supervised and controlled thoroughly by author HN. Occupancy rate was defined as the total use of beds (days) divided by total available bed days.

**Statistical analyses**

Due to the exploratory nature of this study, no power analysis was performed. To compare categorical data, we used the $\chi^2$ test for independence. In case of numbers smaller than 5, we used Fisher’s exact test. $p$ values 0.05 were considered statistically significant. IBM SPSS Statistics 20 (SPSS Inc., Chicago, IL) was used for statistical analyses.

**Results**

Sixty admissions occurred during the study period; four patients were admitted more than once. More patients were admitted by OOH doctors than by GPs. Patients’ median age was 82.5 years, 57% were women; they had on average 3 (range 0–8) chronic conditions (Table 1). Length of stay varied between one and seven days (median 3). Total bed occupancy was 194 days, yielding an occupancy rate of 0.27.

Table 2 shows the main diagnoses on admission. The most common diagnoses were infections (pneumonia 20%, urinary tract infection 7%) and musculoskeletal symptoms (10%). In 10% of the cases, the diagnosis was unclear or not specified. Diagnostic procedures were performed in 95% of the cases, most commonly blood samples and a variety of basic clinical measurements. Some 17% of the patients received no specific treatment, while the rest received various treatments, such as pain management (30%), intravenous antibiotics (23%) and intravenous fluid (13%) (Table 3).

**Table 1. Descriptive data for patients in municipal emergency beds ($N = 60$).**

| Variable | Number of patients |
|----------|--------------------|
| Age (median and range), years | 83 (37–98) |
| Women | 34 |
| Men | 26 |
| Referring doctor | |
| Doctor at out-of-hours services | 33 |
| General practitioner | 27 |
| Number of known diagnoses (mean and range) | 3 (0–8) |
| Pre-existing comorbidities on admission* | |
| Hypertension | 24 |
| Heart disease, including arrhythmia | 24 |
| COPD | 15 |
| Diabetes | 13 |
| Cancer | 11 |
| Arthritis or arthrosis | 10 |
| Dementia | 10 |
| Vascular disease, for example stroke | 9 |
| Osteoporosis | 8 |
| Depression | 6 |
| Other diagnoses | 25 |
| Length of stay in MEB (median and range), days | 3 (0–7) |

Number of patients, if not otherwise indicated.

*Most patients had more than one pre-existing diagnosis.
In eight cases, diagnoses on admission and discharge differed. Agreement between diagnosis on admission and discharge was 96% (26/27 cases) in patients admitted by GPs and 79% (26/33 cases) in those admitted by OOH doctors ($p = 0.063$).

Altogether 26 patients (43%) were discharged to a higher care level than before admission to MEB; one patient to home/nursing home rotational scheme, 18 to nursing home and seven to hospital ($p < 0.001$ for change in distribution) (Figure 1). Of hospitalised patients, five patients were transferred within one day and two patients after 2–3 days. The most common reasons for hospital admissions were fracture, wound infection, pneumonia and stroke. One patient died shortly after transfer to hospital. Five of the seven patients transferred to hospital had been admitted to MEB by OOH doctors and two by GPs ($p = 0.44$). Out of the 31 patients discharged from the MEB within three days, nine were transferred to short-term stay and 10 to long-term stay in nursing home.

### Table 2. Main diagnosis on admission to municipal emergency beds ($N = 60$).

| Diagnoses                      | Number of patients |
|--------------------------------|--------------------|
| Infections                     |                    |
| Pneumonia                      | 12                 |
| COPD                           | 4                  |
| Urinary tract infection        | 4                  |
| Skin infection                 | 2                  |
| Musculoskeletal conditions     | 6                  |
| Falls                          | 5                  |
| Cardiovascular conditions, including arrhythmia | 5 |
| Abdominal symptoms and conditions | 5                |
| Mental symptoms, that is, delirium, anxiety | 4 |
| Bleeding, that is, epistaxis, hematoma | 2 |
| Other, but specified diseases and conditions | 5 |
| Undefined conditions, that is, fever and pain | 6 |

### Table 3. Diagnostic and therapeutic procedures during stay in municipal emergency beds for 60 patients.

| Diagnostic and therapeutic procedures | Number of patients |
|---------------------------------------|--------------------|
| Diagnostic procedures                 |                    |
| Blood samples                         | 41                 |
| Basic clinical observations only      | 27                 |
| Urine samples                         | 12                 |
| Oxygen saturation measurement         | 11                 |
| X-ray                                 | 10                 |
| ECG                                   | 6                  |
| Bladder volume; bacterial culture     | 3                  |
| No diagnostic initiatives             | 3                  |
| Treatments                            |                    |
| Pain management/analgesics            | 18                 |
| Intravenous antibiotics               | 14                 |
| Adjustments of medication             | 15                 |
| Intravenous fluid                     | 8                  |
| Mobilisation, physiotherapy           | 8                  |
| Oxygen therapy                        | 6                  |
| Wound care                            | 1                  |
| Catheterisation                       | 1                  |
| No therapeutic initiatives            | 10                 |

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### Discussion

Our study has shown that the new ward with two municipal emergency beds had a low occupancy rate, that OOH doctors and not GPs referred most patients. These were old and had complex health problems. The length of stay was longer than three days for half of the patients [7], and although admitted from home, only about half the patients were discharged back to their home.

This small one-year observational study with complete data can shed light on some of the most important issues concerning the MEB innovation from the Coordination reform in Norway. The main weaknesses of the study are the restriction to one municipality and the small sample size. Also, we were unable to validate diagnoses with regard to severity and completeness of information.

MEBs have been used less frequently than anticipated all across Norway, with a mean occupancy rate of 0.34 in 2014 [8]. Our results indicate an overestimated demand of the facilities [9], as many patients admitted to the MEBs did not fulfil the recommended criteria for admittance, because of comorbidity and inability to be discharged to their home.

More patients were admitted by doctors from the OOH service than by GPs. Doctors’ decisions about admission to MEB instead of hospital, or treatment at home, have not been evaluated in the study, but it is known that several factors influence such decisions. OOH doctors have less knowledge of their patients compared to GPs; they have no access to patients’ medical records; and consultation time is often too short for comprehensive assessment. Studies also show that GPs have difficulties selecting which patients are best suitable for treatment in MEBs [9,10]. Diagnostic clarification prior to admission may be challenging, particularly in OOH emergency settings, and

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To the best of our knowledge, no study has shown that establishment of community medical wards such as MEBs has reduced hospitalisation. In Great Britain, the number of hospital admissions is still increasing [18]. In other countries, implementation of ‘hospital at home’ or ‘medical homes’ has been shown to decrease unnecessary hospital admissions [19], an alternative that may be worthwhile in Norway as well.

There are wide variations between municipalities regarding organisation, staffing and number of MEBs, hampering generalisation of our results. A systematic review, comparing MEB to hospitalisation [20] identified three small studies of low quality conducted in Norway [15] and United Kingdom [21,22]. These studies suggest that patients admitted to MEB are slightly more satisfied with their stay in smaller departments closer to their home, shorter transportation distance and waiting time, compared with those who were hospitalised. Another study revealed no significant differences in activities of daily living or number of readmissions to hospital and nursing home after one year [23]. However, there is insufficient scientific evidence to determine whether there are differences in outcomes such as quality of life. We believe that if the MEB system in Norway is to be continued and the occupancy rate to increase, we need better risk assessment instruments, larger involvement of the GPs, and probably somewhat better equipped units, diagnostically and therapeutically.

Conclusions

Occupancy rate was low in the small MEB unit in our study. Patient selection was not according to national standards, and stays were longer. Many patients were transferred to nursing homes, indicating that the unit was an intermediate pathway or a short cut to institutional care. It is unclear whether the unit avoided hospital admissions.

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Ethical approval

The Regional Committee for Medical and Health Research Ethics approved the study (REC West ref. 2014/1389).
Disclosure statement
No potential conflict of interest was reported by the authors.

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Notes on contributors
Heidi Nilsen is a GP in Egersund, Norway. She is currently employed at Dalane District Psychiatric Centre. She is affiliated with the Research Group for General Practice in Bergen, Uni Research Health.

Steinar Hunskaar is research leader at The National Centre for Emergency Primary Health Care, Uni Research Health, Bergen, and also a professor in general practice at the Department of Global Public Health and Primary Care, University of Bergen. He is an approved specialist in general practice.

Sabine Ruths is research leader at the Research Unit for General Practice in Bergen, Uni Research Health, and professor in elderly care medicine at the Department of Global Public Health and Primary Care, University of Bergen. She is approved specialist in general practice.

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