

People with chronic wounds cared for at home in Belgium: Prevalence and exploration of care integration needs using health care trajectory analysis

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ABSTRACT

Background: Little is known about the prevalence of people with chronic wounds cared for at home and their care integration needs in Belgium. In high-income countries, chronic wounds are associated with ageing processes, chronic diseases and social and financial vulnerability, resulting in multiple needs. To meet these needs, many health care providers (with nurses figuring prominently) are involved. This can lead to fragmented health care trajectories and the need to strengthen care coordination.

Objectives: This study aims to estimate the prevalence of people with chronic wounds cared for at home in Belgium. It also seeks to explore their health care trajectories and the risk of fragmentation of care to inform policy makers, care providers and research.

Design: Cross-sectional.

Setting(s): Home care.

Participants: Routinely collected data of reimbursed care of 3467 people with a chronic wound cared for at home in 2018.

Methods: We applied a stratification method to our sample based on health care trajectories. First, we constructed individual sequences of care received during the year. Then we summarised the health care events using a K-mers approach. Finally, a multinomial mixture model was used on the previously obtained summary to cluster individuals according to their health care trajectories. Afterwards, other epidemiological, socioeconomic and health care use indicators were calculated for each health care trajectory group.

We also estimated the prevalence of people with chronic wounds treated at home.

Results: We constructed six health care trajectory groups for two age categories (<65 and ≥65 years) showing different intensity of care use and type of care. In some health care trajectory groups, generalist care was found to be predominant. In others, specialist care appeared more prevalent. Depending on the health care trajectory group, a significant proportion of people had multiple care providers involved (mainly nurses, medical specialists and GPs), and many of them also had multiple transitions between care settings.

The prevalence of people with chronic wounds treated at home rises significantly with age: 0.3%, 95%CI (0.2%–0.4%) for people aged under 65, 2.5%, 95%CI (2.3%–2.8%) for people aged 65 and over.

Conclusion: A significant proportion of people with chronic wounds experienced multiple transitions and met many health care providers. This can lead to complex trajectories and risk of fragmentation. Nurses, who are intensively involved in wound care at home, with the appropriate skills, could play a 'reference' role to promote continuity of care and better coordination.

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• What is already known

In high-income countries, chronic wounds are associated with ageing processes, which in turn are associated with a higher prevalence of multi-morbidity, vulnerability and greater use of care.

The combination of factors, including multi-morbidity, polypharmacy, chronic pain, social and financial vulnerability, calls for interventions of multiple care providers. This often leads to care fragmentation.

• What this paper adds

An estimate of the prevalence in 2018 of people with chronic wounds cared for at home in Belgium, aged under 65 years and 65 years and over.

Health care trajectory analysis can be useful to map integration needs of people with chronic wounds; more specifically, shedding light on risks of fragmentation of care induced by multiple transitions between settings and health care providers involved. This, in turn, can provide insights to improve organisation of care for these people.

1. Background

In high income countries, such as Belgium, demographic and epidemiological changes are leading to a higher prevalence of chronic conditions and increased need for care (Rechel et al., 2009). Chronic wounds are part of these chronic conditions. In European countries, wound care is mainly provided by home and community nurses in collaboration with other providers (Moore et al., 2014).

Chronic wounds are wounds whose healing by second intention is delayed, fails or recurs (Bryan and Nix, 2016; Dat et al., 2012; Wysocki, 1996), regardless of its aetiology (Martinez-Zapata et al., 2016). Nowadays, 1–2% of the population would be affected by one or more chronic wounds at least once in their lifespan (Järbrink et al., 2016; Kapp et al., 2018). Martinengo estimated the pooled prevalence of chronic wounds at 2.2 per 1000 (Martinengo et al., 2019). An increase in the prevalence of chronic wounds has been already observed in high-income countries (Heyer et al., 2016; Jones et al., 2018; Olsson et al., 2019).

In people with chronic wounds, the combination of individual (e.g. multimorbidity) and care delivery factors (European Wound Management (EWMA), 2008) can create multiple care needs. In fact, chronic wounds are often managed as a comorbidity of other conditions (Olsson et al., 2019), in medical complex situations. And so, people with chronic wounds living in the community often navigate between generalist and specialist care (Guest et al., 2015) requiring a high level of coordination (Squitieri et al., 2020). These transitions between generalist and specialist care are recognised as high risk scenarios for patient safety (World Health Organization, 2016). Studies of chronic wound management in various high-income countries revealed gaps in coordination and communication between generalist and specialist care (Norman et al., 2016) leading to discontinuity of care. In this sense, the risk of fragmentation of care is related to the patient's journey through the healthcare system (World Health Organization, 2016) or health care trajectory.

Health care trajectories are sequences of patient contacts with health care providers. The way in which these sequences are organised is important because it may affect the use of resources and the outcomes of care provision (Kuwornu et al., 2016). These sequences can be described as a pattern of care and resources utilisation over time. The term “episode of care” refers to all services provided to a patient from the first to the last encounter during a period of illness (Vanasse et al., 2018). The 6W multidimensional framework of care trajectories offers a comprehensive approach (Vanasse et al., 2018) to explore these sequences of contacts answering the “who, what, when, which, where and why” questions. The model is built on characteristics, conditions and treatments of the patient, periods of time, settings and providers involved in the health care trajectory.

Furthermore, it is possible to link undesirable outcomes (e.g. inappropriate use of emergency department) leading to an increased risk of discontinuity of care (Karam, 2019) with health care trajectories. The fragmentation of care, that has been associated with poor health outcomes and inefficient use of health care (Frandsen et al., 2015),

remains a matter of concern in high-income countries. The lack of integration of care can be overcome through care coordination, resulting in a more efficient use of resources and better outcomes. Therefore, mapping health care trajectory groups can be useful to reflect on strategies to improve the integration of care for people with chronic wounds cared for at home (Lambert, 2020).

In Belgium, as in other high-income countries, there is a lack of insight about the prevalence of people with chronic wounds cared for at home as well as their health care use patterns. This insight is needed to inform policy makers, research and raise awareness among health care providers. In order to reduce this gap, the aim of this study is twofold. First, to provide an estimate of the prevalence of patients with chronic wounds cared for at home in Belgium. Second, to explore the health care trajectories of these people in terms of patterns of health care use, which can then help to understand their needs in terms of coordination and continuity of care.

2. Methods

We used routinely collected data on reimbursed care in 2018 to calculate the prevalence and to construct health care trajectories for people with chronic wounds cared for at home. As wound care has specific variables in the database, we were able to identify patients who received wound care at home for at least six consecutive weeks during the year, and who were labelled as having chronic wounds. This threshold is in line with the criterion established by the National Institute of Health and Disability Insurance (Institut national d'assurance maladie-invalidité, 2021) to define chronic wounds.

The database of reimbursed care provided by the Inter-Mutualistic Agency, keeps track of all health care expenditure reimbursed by the compulsory national health and disability insurance. This insurance covers 99% of the Belgian population (Gerken and Merkur, 2020). As the Belgian system is mainly based on fee-for-service, it is possible to trace treatments and services provided through reimbursed care.

Data were provided for a representative sample of the Belgian population in two age categories: people aged under 65 and aged 65 years and over. Health care trajectory analysis was performed by age category in accordance with the characteristics of the sample. Besides reimbursed care, the database contained epidemiological (e.g. number of chronic conditions and diseases) and socio-demographic data (e.g. people receiving social allowances) for each individual in the sample (Inter-Mutualistic Agency, 2020). Moreover, it was possible to identify the care provided (who, what and when), the discipline of the provider (by which) and the setting where the care was provided (where) in line with the “6 W” multidimensional model of care trajectories (Vanasse et al., 2018).

2.1. Prevalence calculation

The prevalence was estimated as a proportion of the total number of people in the age category of the sample, receiving during 2018 ‘chronic’ wound care at home (during ≥ 6 weeks). Prevalence was calculated regardless of aetiology, comorbidity or type of wound care. The estimate was calculated in percentage with 95% confidence intervals interpolated on the Belgian population statistics by age category in 2018 (Direction générale Identité et Affaires citoyennes, 2020).

The analysis was performed with SAS enterprise guide 7.1.

2.2. Health care trajectory analysis

We applied the stratification method that we developed in a previous study (Goderis et al., 2020) to support reflection on care integration and informed decision making. The focus was put on mapping patient's journey through the healthcare system paying a particular attention to the type of care (generalist or specialist), highlighting transitions between care settings (home, hospital, emergency department).

To perform the analysis, we first constructed individual sequences of care, as “chains” of care received during the year. In order to create these “chains”, we selected some care events as markers in the patient’s journey, namely nursing care visits at home; visits to general practitioners; visits to medical specialists on outpatient basis; emergency department visits; and stays in acute care hospital.

These events were selected on the basis of the most common contacts expected in the journeys through the health system of people with chronic wounds cared for at home.

As two or more care events could take place on the same day, we established previously a hierarchy within the events according to their duration and probability of occurrence (Lambert et al., 2021). For example, as a visit to the emergency department is generally less likely than a visit to the general practitioner, the former was ranked higher. This allowed us to construct the sequences of care by assigning to each day of the year the highest ranked care event of those that took place on that day (in our example the emergency department visit). If none of the events in the list occurred to date, the patient was considered to be without care or “being at home”. The care sequence started on the first day of 2018 and finished on 31 December or when the patient died.

Then, a K-mers approach (Fiannaca et al., 2015; Pinello et al., 2011) was used to calculate, for each patient, a summary containing the number of care events of length K (one or two). K-length of one was used to distinguish the type of care: generalist or specialist. Visits to the general practitioner and nursing care at home fell under generalist care. All other contacts were considered specialist, whether inpatient or outpatient. So, for example, the number of visits to the general practitioner or to a medical specialist were considered a sequence of one event ($K = 1$). K-length of two different events indicated transitions in care. For example, when a visit to the emergency department has been followed by home care by nurses ($K = 2$).

Based on these newly defined variables, we used a mixture model (Cruz-Medina et al., 2004) to classify individual care sequences into health care trajectory groups. We fixed an a priori number of groups ($5 + 1$) and associated a posteriori probability of belonging to each group. This decision was made considering previous experiences with this methodology in meetings with coordinators of integrated care projects. Individuals were assigned to the group when the probability was greater than 0.7. An individual was not classified when he or she did not meet the minimum threshold for any of the groups. The performed analysis enabled us to group together individuals with similar health care use in the year.

In addition, we calculated a set of indicators for each health care trajectory group based on available information in the database. These indicators were calculated as percentiles (P50, P25, P75) and percentages. These provided useful information on patient characteristics, health care use and –likely– situations of inappropriate care utilisation. In our previous research, we defined –likely– inappropriate use of care as ≥ 2 emergency department visits within a 6-month period and re-hospitalisation within 30 days (Goderis et al., 2020). A detailed description of the indicators is available in Appendix 4. The set contained different types of indicators,

- Socio-demographic: age, sex, social benefit recipients, capped health care expenditure pointing high individual financial burden, one-member household, sick leave, unemployment. These indicators were considered as proxies for the economic burden of care, financial vulnerability or the risk of social isolation.
- Epidemiological: chronic conditions and pseudo-pathologies.
- Use of health care: number of contacts with general practitioners, with home nurses and medical specialists, visits to the emergency department, number of hospitalisations and length of hospital stay.
- Use of medicines: total number of reimbursed medicines during the year, polypharmacy and prolonged use of painkillers.
- Length of the episode of chronic wound care at home.

- Health care providers involved: disciplines (i.e. general practitioners, nurses, medical specialists, physiotherapists, pharmacists) during the wound care episode.
- Number of individual health care providers involved in care during the wound care episode and visits by health care provider.

The analysis was performed with SAS Enterprise guide 7.1 and R (K-mers and R MixTool packages).

Finally, we used a graph to provide an overview of the health care trajectory groups. On the graph each health care trajectory group is presented as a bubble placed on a plane divided by two axes. The bubbles are ordered along a horizontal axis according to the intensity of health care use. The indicators used to run the multinomial mixture model were used to determine the intensity of care use (the fewer days at home, the higher the intensity of health care use) as well as to highlight the predominance of the type of care received, whether specialist (provided by hospital, emergency department or medical specialists) or generalist (provided by general practitioners and nurses). For instance, the health care trajectory groups of people receiving high-intensity care provided mainly by generalist health providers are placed in the upper right-hand frame.

Two additional dimensions shape the bubble, namely the duration of the wound care episode over the year (in width) and the proportion of people in the health care trajectory group relative to the total number of individuals in the age category (in height).

The project received approval of both the ethics committee (2018/21FEV/069) and the Sectoral Committee ‘Health’ of Belgian Data Protection Authority (SCSZG/18/125).

3. Results

This article presents the results obtained on the 2018 data. Results are presented into two age groups (<65 years and ≥ 65 years) since the population of people over 65 was over-represented in the sample (Fig. 1).

3.1. Prevalence of chronic wound care at home

Among people under 65, 1.6% of people in the sample received wound care at home, of which 16.2%, for six weeks or more, which corresponds to the definition of chronic wounds. For those aged 65 and over, 7.5% of the people received wound care at home, of which 33.3% for a chronic wound. We estimated the prevalence of people under 65 with chronic wounds treated at home to be 0.3%, 95% CI (0.2%–0.4%) and 2.5%, 95% CI (2.3%–2.8%) for people aged 65 and over.

3.2. Health care trajectory groups

The presentation of the health care trajectory groups is based on the entire set of indicators (health care use, socio-demographics, epidemiological, duration of wound care and health care providers involved) already presented in the methodology chapter. Appendices 1 to 4 provide tables containing the detailed calculation of these indicators.

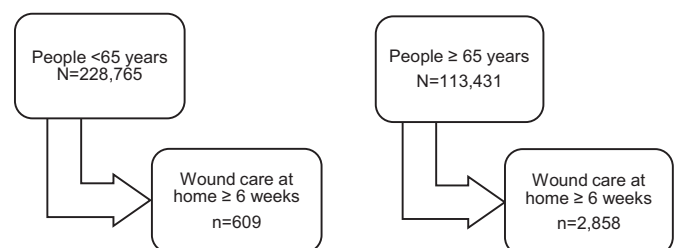


Fig. 1. Composition of the sample in 2018.

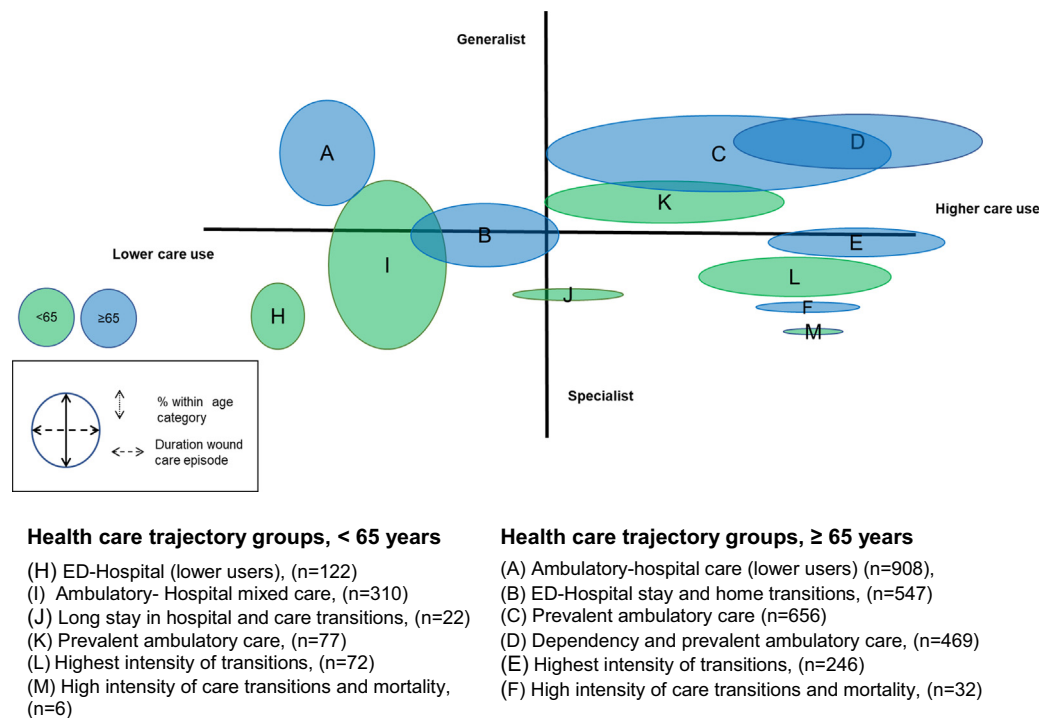


Fig. 2. Health care trajectory groups of people receiving home care for chronic wounds in 2018 according to the intensity of care use and the predominance of type of care (generalist vs specialist) by age category. The graph displays also information on the median duration of the wound care episode (width of the bubble) and the percentage of people of the age category included in the health care trajectory group (height of the bubble).

Groups of health care trajectories are presented in Fig. 2. The grouping is based according to the intensity of care use and the predominance of type of care (generalist vs specialist) by age category. People aged < 65 received predominantly specialist care, i.e. from medical specialists, hospital or emergency department (lower half of the graph) in comparison to people ≥ 65. They also had relatively shorter wound care episodes – which is represented by the width of the bubble – with the exception of ‘(K) Prevalent ambulatory care’ group. A higher proportion of people (70.9%) in this age category has a lower care use (left half of the graph).

Moreover, chronic diseases were less frequent in two groups of this age category, ‘(H) ED-Hospital (lower users)’ and ‘(I) Ambulatory- Hospital mixed care’) than in other health care trajectory groups. The intensity of care use and multi-morbidity was high for the remaining 29.1% of people. So was the presence of a higher proportion of people with capped health expenses (33.3%–59.7%), one-member household (16.7%–43.1%) or social allowance (up to 54.2%). Cardiovascular disease was the most prevalent chronic condition among all groups (22.1%–63.6%). Diabetes, COPD and cancer were also present but the proportion varied between health care trajectory groups.

Otherwise, in the age category ≥ 65 years, 79.4% of the people received clearly generalist care (upper half of the graph). People in this age category had also longer wound care episodes. In this age category, 49.1% of people had a higher care use (right half of the graph). Chronic conditions were common across all health care trajectory groups. Vulnerability factors were also found, including capped health expenditure (51.2%–68.7%), one-member households (34.8%–56.3%) and social allowance (30.3%–53.1%). Cardiovascular disease was, as in the < 65 age group, the most prevalent chronic disease (50% to 84.9%). Diabetes, cancer and COPD were also present but in smaller proportions than cardiovascular disease.

3.3. Transitions of care and –likely– inappropriate health care use

The analysis showed also some differences in these indicators related to transitions of care and –likely– inappropriate use of health care between

and within age categories. In general, the percentage of people aged 65 and over admitted to hospital via the emergency department was higher than that of people under 65. In contrast, a higher proportion of people aged under 65 were sent home directly after contact with the emergency department, or had visited the emergency department the day after discharge. As shown in Figs. 3 and 4, other differences seem to be more related to the health care trajectory group than to the age category.

In the age category of < 65 years, we found that the health care trajectory group ‘(J) long time in hospital and care transitions’ had the highest number of transitions between hospital, emergency department and home with significant percentages of rehospitalisation and frequent emergency department use. People in this health care trajectory group (J) had the most unfavourable profile in terms of health care use. However, a significant proportion of people in the groups with the highest intensity of care transitions (L, M) had also several visits to the emergency department in six months, in some cases leading to hospitalisation or re-hospitalisation.

Among all health care trajectory groups, on the one hand, 50% of people received generalist care at least once in the 24 h following the discharge from hospital, excluding people in the care trajectory group ‘(H) Emergency-Hospital (low users)’. On the other hand, only 25% of the people in the health care trajectory groups ‘(K) Prevalent ambulatory care’ and ‘(L) Highest intensity of transition’ had not benefitted of generalist care within 24 h after being discharged.

In the age category of ≥ 65 years, a significant proportion of people were hospitalised referred by the emergency department. In five of the six health care trajectory groups the proportion was over 25%. This proportion was slightly lower (21.9%) in the health care trajectory ‘(A) Ambulatory-hospital care (lower users)’.

Even if the figures related to emergency department use were more moderate for this age category, in some health care trajectory groups more than 20% of people have used the emergency department at least twice in six months. The health care trajectory groups with the most unfavourable indicators related to transitions and –likely– inappropriate use of health care were in this order ‘(E) Highest intensity

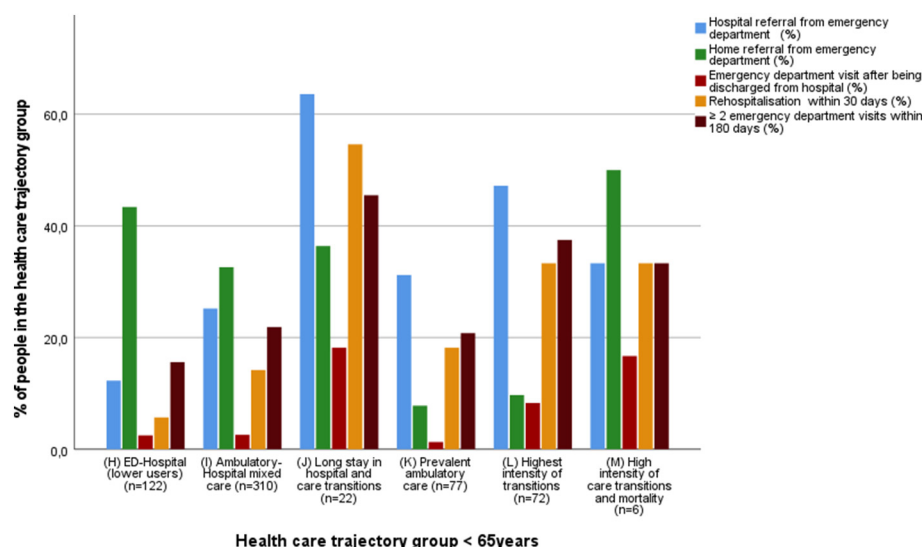


Fig. 3. Indicators related with transitions and – likely – inappropriate health care use by health care trajectory group in the age category of <65 years.

of transitions', '(B) ED-Hospital stay and home transitions' and "(D) Dependency and prevalent ambulatory care". The former had the lowest number of times people received care from general providers within 24 h of hospital discharge.

3.4. Health care providers involved and encounters per health care provider during the wound care episode

In general, people under 65 met more individual providers during the wound care episode than people in the older care trajectory groups, although the latter had longer wound care episodes and the number of encounters per provider was higher. In this age category, there was less variation in the number of individual providers seen and the number of encounters per provider across the health care trajectory groups. Nurses, GPs and pharmacists remained stable providers for people across age categories and health care trajectory groups in two different ways. On the one hand, nurses, more numerous to intervene, had more frequent contact with the patients than all other health providers. The general practitioner and the pharmacist in their discipline were a single reference for the patient but with fewer interventions. Across all groups, there were also single contacts with multiple medical specialists (Table 1).

In the age category <65 years, in general, we did not observe a large difference in the number of individual nurses involved across trajectory groups. However, more nurses were involved in care of 25% of people in three trajectory groups, '(J) Long stay in hospital and care transitions', '(K) Prevalent ambulatory care' and '(L) High intensity of transitions'. 25% of the people in these groups also had more frequent visits from the same nurse and general practitioner.

With regard to medical specialists, the median number of individual providers involved varied according to the intensity of the care use. In each health care trajectory group, people above the 75th percentile saw a significant number of different medical specialists. However, the number of contacts with the specialists remained mainly limited to 1 or 2 visits.

The number of pharmacists involved and the number of contacts both remained limited among the health care trajectory groups.

In the age category of ≥65 years (Table 2), we neither observed a significant difference in the number of individual nurses involved in the care across the health care trajectory groups. The number of visits per nurse was significantly higher in the case of the people in the trajectory groups '(C) Prevalent ambulatory care', '(D) Dependency and prevalent ambulatory care' and '(E) Highest intensity of transitions'.

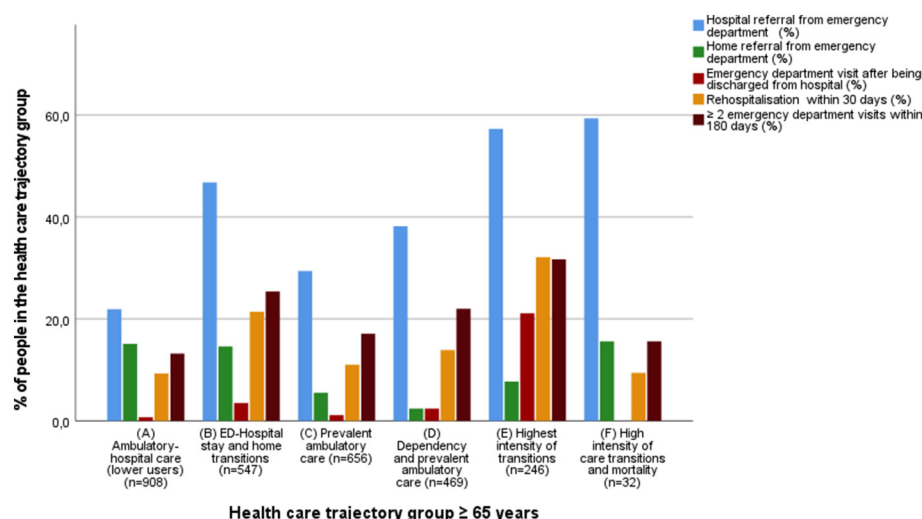


Fig. 4. Indicators related with transitions and inappropriate health care use in the age category of ≥65 years.

Table 1

Number of health care providers and visits by health care provider during the episode of chronic wound care at home by age category in people <65 years, in 2018.

	(H) ED-hospital (lower users) (n = 122)	(I) Ambulatory- hospital mixed care (n = 310)	(J) Long stay in hospital and care transitions (n = 22)	(K) Prevalent ambulatory care (n = 77)	(L) Highest intensity of care transitions (n = 72)	(M) High intensity of care transitions and mortality (n = 6)
Nb of nurses P50 [P25- P75]	4 [2-6]	5 [3-8]	5 [2-6]	6 [3-11]	4 [3-8]	2.5 [1-12]
Visits by nurse P50 [P25- P75]	5 [2-11]	6 [2-16]	7 [2-23]	7 [2-31]	6 [2-26]	5 [2-10]
Nb of GP P50 [P25- P75]	1 [1-2]	1 [1-2]	1 [1-2]	1 [1-2]	1 [1-2]	1 [1-2]
Visits by GP P50 [P25- P75]	2 [1-3]	2 [1-4]	2 [1-3]	4 [1-8]	3 [1-8]	2 [1-4]
Nb of medical specialists P50 [P25- P75]	5 [2-13]	6 [2-15]	5 [1-11]	5 [2-9]	6.5 [1-16]	11.5 [9-18]
Visits by medical specialist P50 [P25- P75]	1 [1-1]	1 [1-2]	1 [1-3]	1 [1-2]	1 [1-3]	1.5 [1- 3]
Nb of pharmacists P50 [P25- P75]	1 [0-2]	1 [0-2]	1.5 [0-3]	1 [0-2]	1 [0-2]	1.5 [0-2]
Visits by pharmacist P50 [P25- P75]	1 [1-1]	1 [1-2]	1 [1-5]	1 [1-3]	2 [1-4]	1.5 [1-3]

The implication of general practitioners varied across the groups with the number of visits per GP being highest for people in the '(C) Prevalent ambulatory care' and the '(D) Dependency and prevalent ambulatory care' group.

As for medical specialists, we did not observe large variations across the health care trajectory groups either in terms of the number of providers involved or visits. The median number of specialists seen was 5–6, with 1 to 2 contacts for the vast majority of people. The exception was the '(E) High intensity of care transitions and mortality' group where the number of providers was lower, probably due to a trajectory shortened by the death of the person.

The number of pharmacists involved was limited to 1 or 2, as was the frequency of contact.

4. Discussion

In our sample, representative of the Belgian population, the prevalence of chronic wound care at home in 2018 was far from anecdotal, particularly for people aged 65 and over. These findings are in line with other studies conducted in high-income countries (Gray et al., 2018; Heyer

et al., 2016) where prevalence of chronic wounds is associated with an older population. However, our results show that chronic wounds may also be an issue for younger people having poor health. In our sample, a significant proportion of people with chronic wounds cared for at home faced other chronic conditions and risks of social and financial vulnerability, also in the age category of people aged under 65.

Furthermore, we found that a large group of patients –mainly but not exclusively aged 65 and over– received wound care at home for longer periods (i.e. health care trajectory groups J, K, L, B, C, D, E). During these periods, health care was provided by generalist providers –mainly nurses and general medical practitioners–, combined with specialist care. Our results suggest that a significant proportion of people experienced complex trajectories where continuous care could have been compromised and care coordination was needed. This was certainly the case for people in some health care trajectory groups (J, L, M, B, D, E) who had to deal with multiple transitions between home, emergency department and hospital, involving many health care providers.

Our findings, shed a strong light on the risks of care fragmentation for people with chronic wounds. Indeed, the differences observed between age categories and within trajectory groups in terms of intensity

Table 2

Number of health care providers and visits by health care provider during the episode of chronic wound care at home of people ≥65 years, in 2018.

≥ 65 years	(A) Ambulatory-hospital care (lower users) (n = 908)	(B) ED-Hospital stay and home transitions (n = 547)	(C) Prevalent ambulatory care (n = 656)	(D) Dependency and prevalent ambulatory care (n = 469)	(E) Highest intensity of transitions (n = 246)	(F) High intensity of care transitions and mortality (n = 32)
Nb of nurses at home P50 [P25- P75]	4 [2-7]	5 [3-8]	6 [4-11]	5 [3-8]	5 [3-9]	4 [3-5.5]
Visits by nurse P50 [P25- P75]	6 [2-16]	6 [2-19]	10 [3-37]	16 [4-47]	7 [2-23]	5 [2-15]
Nb of GP P50 [P25- P75]	1 [1-2]	1 [1-2]	1 [1-2]	1 [1-2]	1 [1-2]	1 [1-1.5]
Visits by GP P50 [P25- P75]	2 [1-5]	3 [1-7]	5 [2-11]	4 [1-10]	3 [1-8]	3 [1-7]
Nb of medical specialists P50 [P25- P75]	6 [2-13.5]	6 [2-14]	6 [2-14]	5 [2-13]	5 [2-13]	3 [1-13.5]
Visits by medical specialist P50 [P25- P75]	1 [1-2]	1 [1-2]	1 [1-2]	1 [1-2]	1 [1-3]	1 [1-1]
Nb of pharmacists P50 [P25- P75]	1 [0-2]	1 [0-2]	1 [0-2]	1 [0-2]	1 [0-2]	1 [0-3]
Visits by pharmacist P50 [P25- P75]	1 [1-2]	1 [1-3]	1 [1-3]	1 [1-3]	2 [1-5]	1 [1-2.5]

of care and type of care (generalist vs specialist) point to different challenges and opportunities in terms of coordination and continuity of care. Generalist health care providers, in our study intensively involved in care of older people or people living with chronic conditions, are identified in the literature as a focal point to care coordination and improvement of care integration (Miller et al., 2018). Further, some of our results related to transitions or –likely– inappropriate use of care may indicate a mismatch between people's needs and the services provided (Grembowski et al., 2014). In order to facilitate coordinated and continuous care (World Health Organization, 2018) adapted to the patient's needs, preferences and goals (Mc Cormack and McCance, 2010) different strategies have been developed (Karam et al., 2021a), such as the role of 'reference health care provider' (Brusano, 2021). According to our findings, on the one hand, general practitioners were a regular contact point for many people with chronic wounds. Therefore, they may be well placed to play the role of 'reference health care provider' (Vassbotn et al., 2018) because of the stability of the relationship with the patient, their regular –albeit limited– contact, and their capacity to integrate different opinions of medical specialists. However, some evidence indicates that the coordination of the whole care process, can be challenging for general practitioners (Stumm et al., 2019). One of the reasons is the overall fee-for service mode of payment that has shown to be an obstacle to coordination by general practitioners in Belgium (Karam et al., 2021b) and elsewhere (Tummalapalli et al., 2022). On the other hand, people with chronic wounds received a lot of nursing care. More frequent contact would allow for better knowledge of the patient, his/her living environment, as well as a closer view of her/his evolution. This knowledge is essential to play the role of 'reference health care provider'. In both cases, the skills of the provider must be appropriate to the role and be recognised by the other professionals involved (Gilbert, 2016).

The role of this 'reference health care provider' is particularly important to ensure safe and seamless transitions of care on discharge from hospital or after contact with the emergency department given the high use of these services in some health care trajectory groups. Transitional care strategies (Agency for Healthcare Research and Quality (AHRQ), 2021; Hirschman et al., 2015; Morkisch et al., 2020) could address the need for continuity and coordination for people experiencing multiple transitions, or a high intensity of specialist care, particularly in specific situations (e.g. end of life or dialysis patients) as suggested by our data.

The role of this reference person raises the question of the skills needed by this professional to meet the needs of integrated care for people with chronic wounds, especially for nurses. In Belgium, as in other countries, the introduction of the advanced nursing practice is in its early stages (Van Hecke et al., 2022). Core competences of guidance and coaching, collaboration and leadership (Tracy and O'Grady, 2019) of advance practice nurses could be a response to the challenges of improving continuity of care, coordination for people with complex health care trajectories (De Geest et al., 2008) and better wound care outcomes (Jiménez-García et al., 2019).

5. Limitations

The choice of the chronicity threshold of ≥ 6 weeks of care can restrict the international comparability of our results (Kyaw et al., 2018) as there is not general agreement of this threshold. In addition, we chose to only study people receiving wound care at home. In our calculation of the prevalence, people with chronic wounds, for example with self-care or in nursing homes, were not included. For this reason, even if people with chronic wounds are in a large majority cared for at home in Europe (Probst et al., 2014), our estimate cannot be considered as a total prevalence estimate.

Certain precautions should be taken to interpret our results. We assumed in our study that the health care provided met people's needs and that non-provision of care corresponded to the absence of need. Despite the 99% coverage rate of health insurance in Belgium (Gerken and Merkur, 2020), the interpretation of lower

health care use (or no use) remains particularly challenging because the health insurance does not cover all costs. To date, 9,1% of households indeed reported having to postpone care for financial reasons (Sciensano, 2019). For people with low income, this means that care was not always affordable.

Moreover, we were able to map in our analysis five of the six dimensions of the 6 W model –who, when, where, who and what– (Vanasse et al., 2018). The available data did not allow us to explore the reasons 'why' people had –likely– inappropriate use of health care. They also did not allow us to explore the actual nature of collaboration within and between generalist and specialist care around these people with chronic wounds cared for at home.

Despite the differences between healthcare in high-income countries and the diversity of situations that people with chronic wounds may encounter, our results highlighted similar challenges to those shown by other studies (Squitieri et al., 2020) for a predominantly older population with multiple care needs. Although the limited international generalisability of our results, the health care trajectory approach used in our study may offer a valuable methodology for exploring care integration needs of specific populations.

Finally, more empirical evidence on how providers and organisations collaborate, is needed to better understand the key issues related to continuity and coordination of care for people with chronic wounds cared for at home. Qualitative research approaches could help to better understand how intertwined patient's and care factors affect health care trajectories and how innovative collaborative practices can address challenges to improve continuity and coordination of care (Doessing and Burau, 2015).

6. Conclusions

Our study showed that a significant number of people with chronic wounds required long term care at home, often provided through a mix of generalist and specialist care. Among these people, a significant percentage experienced a complex health care trajectory. Given the number of health care providers involved and the number of transitions between generalist and specialist care, these people were particularly at risk of fragmentation of care. The analysis of health care trajectories was useful in mapping health care use and highlighting the risks of fragmentation and discontinuity for people with chronic wound. New roles and collaborative models could foster more continuity of care and coordination for this population. Since nurses, who are frequently involved in wound care at home, can gather important information about the patient's living conditions and evolution, with the right skills, may be well placed to play a role as 'reference health care provider' for people with chronic wounds living complex health care trajectories.

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CRediT authorship contribution statement

Lucia Alvarez-Irusta: conceptualisation, methodology, software, formal analysis, writing –Original Draft.

Anne-Sophie Lambert: methodology, software.

Thérèse Van Durme: writing-review & editing, project administration.

Jean Macq: supervision, resources, methodology, writing-review & editing, funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijnurstu.2022.104349>.

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