Frequent users of the emergency department: a mixed-methods observational and retrospective study in Emilia-Romagna (Italy)

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ABSTRACT

Background: the overcrowding of Emergency Departments (EDs) represents a major concern in Italy. Frequent users (FUs) contribute to overcrowding, wasting health care resources. **Objective:** to describe the characteristics of FUs and to evaluate the reliability of the ED information systems. **Design:** an observational single-centre retrospective study. **Methods:** a quali-quantitative analysis of medical records from FU admissions to the ED in a 15-month period at a Teaching Hospital in Italy. **Results:** 1,766 FUs accessed the ED, totalizing 11,842 admissions. The green and white codes were the most frequent ones (n=9,065; 76.5%). Acute conditions prevailed among the reasons for admission. The qualitative analysis showed that FUs were mainly burdened with chronic conditions and highlighted the role of the ED in managing them. **Conclusions:** the adoption of a patient-centred approach oriented towards chronic conditions could result in richer information and better management of FUs.

Descriptors: Emergency Service; Hospital; Social Determinants of Health.

INTRODUCTION

The overcrowding of Emergency Departments (EDs) has been a critical issue for the National Health Service in the last decades. In Italy, ED visits have grown over the years, reaching over 20 million visits in 2015, of which almost 2 million were in the Emilia-Romagna region[1]. Excessive use of the EDs can have deleterious effects such as higher costs, lower quality and effectiveness of care, prolonged waiting times, poor outcomes for patients, and frustration for health professionals[2]. Asplin et al.[3] explain how ED overcrowding results from a mismatch between supply and demand in the health care system and cannot be understood by examining the EDs in isolation. They identify three components that contribute to overcrowding: input, throughput, and output factors. Input factors include any condition that contributes to the demand of ED services, throughput factors refer to the length of stay of patients in the ED, and output factors refer to potential obstacles in hospitalizing or discharging patients. All three components are strongly interrelated and each of them should be understood in order to develop integrated solutions.

In 2016, the Emilia-Romagna region issued regional guidelines in order to address the problem, mainly focusing on throughput and output factors[4]. Much less has been done for the management of input factors, which have been labelled as less- or non-modifiable. However, input factors include key aspects such as inappropriate use of the EDs and the phenomenon of frequent users (FUs).

Inappropriate ED use has been illustrated by studies showing how the majority of ED visits are due to non-urgent patients. An Italian study estimated that more than 80% of the ED accesses are classified as white and green codes, according to the Italian color-coded triage system[5]. International studies show heterogeneous results, mainly depending on the definition adopted to qualify inappropriate use[6]. The phenomenon of FUs has also been described as problematic, severely impacting on costs, quality of care, and crowding[7]. FUs constitute a medically and/or psychosocially vulnerable group, often characterized by a poor socioeconomic background, mental health problems, alcohol and drug use, and a large prevalence of chronic diseases[8]. Given their nature of long-term conditions, all of these problems hardly match with a setting tailored to address emergency situations. This mismatch between demand (mostly chronic conditions) and supply (acute care) represents but a small part of a much larger fracture that emerged in the aftermath of the recent epidemiologic-demographic transition, when chronic conditions have come to make up the vast majority of the health burden in developed countries, placing new long-term demands on the health care system as a whole[9]. Since health care systems were developed in an antecedent era mainly characterized by acute conditions, their actions and strategies are predominantly focused on acute events. The pervasiveness of the acute care model has been pointed out as a major issue undermining the achievement of better health outcomes for the population. In this scenario, the EDs act as a safety net for the acute-care-focused health system, receiving all patients whose health needs are not adequately managed in other settings. In this sense, overcrowding, as well as frequent

and inappropriate use, could be considered symptoms of a deeper problem deriving from the failure of the health care system to adapt to the current epidemiologic situation.

We studied the FU phenomenon in a teaching hospital of the Emilia-Romagna region through a mixed-methods approach, aimed at four goals: 1) Evaluating the presence of FUs, 2) Documenting key medical and social characteristics of FUs, 3) Exploring the reliability of the current information system in detecting and describing FUs, and 4) Discussing the potential use of our results. Prior to the inception of the study, our research team had been active in the hospital catchment area for 5 years. This allowed for a deep knowledge of the services available as well as of the main actors involved in healthcare delivery, both inside and outside the hospital.

METHODS

We conducted a single-centre retrospective study based on current data from the ED of the S. Anna University Hospital of Ferrara, which is the main hospital of the province of Ferrara, located in the Emilia-Romagna Region, with a hospital catchment area catering for approximately 340,000 inhabitants. The network has a hub & spoke structure for STEMI and stroke. The hub is located in the S. Anna University Hospital and the spokes are community hospitals. Since 2010, the primary health care services in the hospital catchment area have been subjected to a reorganization, centred on the implementation of Health Homes (HHs). HHs are meant to be points for access, provision, and integration of health and social services. The hospital district is actually served by three HHs.

For the realization of the study we collected all the medical records from ED admissions made by FUs between January 2016 and March 2017. A literature review assisted in choosing an appropriate definition for FUs; however, no consistency was found in the relevant literature, which showed highly heterogeneous results[7]. Given the need to collect a sufficiently representative sample size and, at the same time, to limit the number of observations in order to allow qualitative analyses, we set the cut-off point at 5 or more visits per patient in the study period.

For each admission, the medical records contained anagraphic, clinical, and logistic information. All the variables expressed in numbers or scales were analysed through quantitative methods. Descriptive statistics were elaborated using the STATA Software, version 13. In order to better handle the diagnosis variable, expressed through the ICD-9 CM coding system, the closest matching categories were used to group the diagnoses into major diagnostic clusters.

All the free texts were the main source for qualitative investigation, which took place in three steps. In the first one, three authors (AU, GR, SBS) independently reviewed all the medical records and identified relevant keywords through semantic and content analysis. No software was used for this process. Keyword identification was done in accordance with the theoretical framework of ill-health developed by medical anthropology, in particular with the three interrelated dimensions of illness, sickness, and disease[10]. These concepts were fundamental to broaden the biomedical perspective in order to include the dimensions of ill-health related to the

patients' perceptions and social constructs. In the second step, the identified keywords were discussed among all the authors in order to reach a consensus and group them into categories, using the framework of the Social Determinants of Health (SDHs) as a benchmark[11]. Three of the identified categories pertain to the patients' characteristics (multimorbidity, mental health, social conditions), and three to characteristics of the organisation of the ED (fragmentation, resoluteness/efficiency, Primary Care Sensitive Conditions or PCSCs).

RESULTS

Quantitative analysis

A total of 1,766 FUs were admitted during the study period. The characteristics of the population are shown in Table 1. The patients were predominantly females. Their mean age was 53 years old (range: 0-99 years old). Adults and older adults accounted for similar proportions of the total population, together representing almost 90%. Most of the patients were Italian. Other most represented nationalities were the following: Romanian, Moroccan, Albanian, and Pakistani. 71.6% of the patients resided in the hub hospital district, and 22.3% came from spoke hospital districts, while 6.1% came from outside the territory of the Local Health Unit.

FUs were collectively responsible for 11,842 accesses. The mean number of accesses per patient was 6.7±4.1. Figure 1 shows the relation between the number of patients and the number of accesses per patient. Around 80% of the patients made between 5 and 7 accesses, while the remaining 20% made 8

Table 1 - Population characteristics. Ferrara, Emilia-Romagna, Italy

Characteristic	n (%)
Males	**781 (44.2%)**
Age (mean ± standard deviation)	53.3±27.9
Children (0-16 years old)	222 (12.6%)
Adults (17-64 years old)	771 (43.7%)
Older adults (≥65 years old)	773 (43.8%)
Nationality	
Italian	1,525 (86.3%)
Romanian	47 (2.7%)
Moroccan	42 (2.4%)
Albanian	28 (1.6%)
Pakistani	23 (1.3%)
Nigerian	18 (1.0%)
Moldavian	13 (0.7%)
Chinese	11 (0.6%)
Serbian	11 (0.6%)
Tunisian	10 (0.6%)
Other	38 (2.1%)
District of residency	
Central-North	1,265 (71.6%)
South-East	220 (12.5%)
West	174 (9.8%)
Other	107 (6.1%)

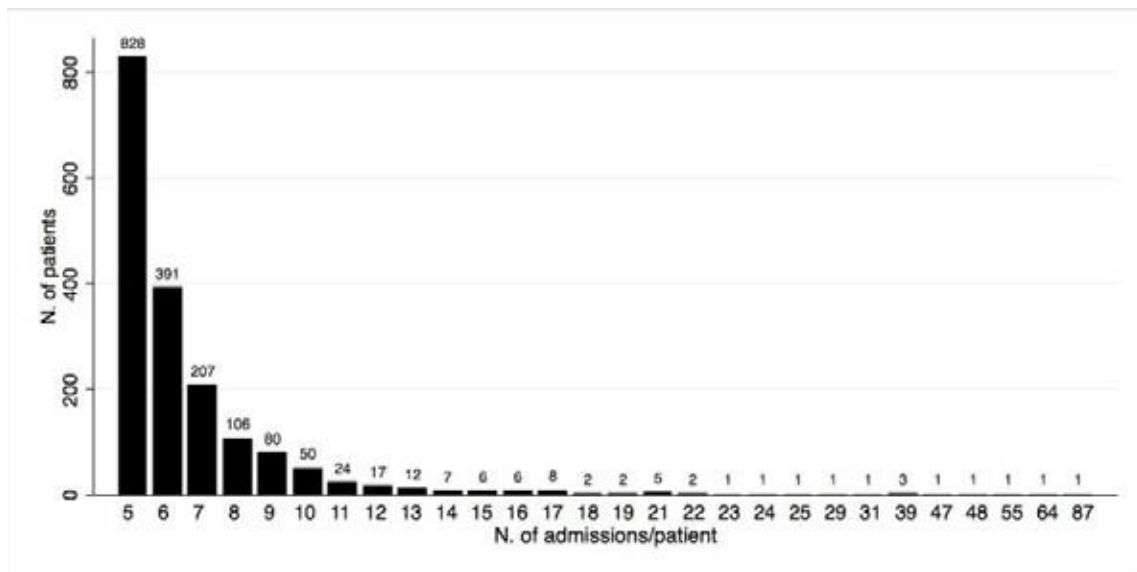Source: Elaborated by the authors.

Figure 1 - Frequency distribution of the number of admissions per patient. Ferrara, Emilia-Romagna, Italy
Source: Elaborated by the authors.

or more accesses, contributing to one third of the total number of admissions.

Most of the admissions were non-urgent (Table 2), as white and green codes constituted three quarters of the total (76.5%). This proportion varied through age ranges: urgent admissions were less frequent in children (White=421, 30.9%; Green=864, 63.5%; Yellow=76, 5.6%; Red=0, 0.0%) and more frequent in adults (White=554, 9.9%; Green=4,074, 72.6%; Yellow=946, 16.9%; Red=38, 0.7%) and in older adults (White=254, 5.2%; Green=2,903, 59.6%; Yellow=1,582, 32.5%; Red=130, 2.7%). The adults were the ones making the larger proportion of admissions (47.4%), even if their number was similar to the number of older adults. The majority of the accesses was registered during day time and in week days. The number of admissions varied through the days of the week, being slightly lower on Saturdays and Sundays. The accesses resulted in hospitalization in 17.1% of the cases.

The reasons for admission were classified into 24 categories. The most frequent reasons for admission were the following: other, abdominal pain, other symptoms of the nervous system, trauma, respiratory disease, and eye disease. Among the discharge diagnoses, 475 unique diagnoses were attributed, grouped into 108 diagnostic clusters. The most frequent were the following: complication during pregnancy, eye disease, other, trauma, and abdominal pain. The "other" category was attributed in 7.7% of the admissions, while no diagnosis was attributed in 3.4% of the cases. Less frequent diagnoses were related to psychosocial problems (0.3%), psychiatric problems (1.9%) or chronic conditions like diabetes (0.4%), hypertension (0.6%), COPD (0.7%), and heart failure (2.8%).

Qualitative analysis

The qualitative analysis of the medical records' free-text content led to the identification of 33 keywords, related to characteristics of the patients or to characteristics of the ED.

Table 2 - Characteristics of the admissions. Ferrara, Emilia-Romagna, Italy

Characteristics	N. of admissions (%)
N. of admissions per patient	6.7±4.1
Triage Code	
White	1,227 (10.3%)
Green	7,838 (66.2%)
Yellow	2,604 (22.0%)
Red	173 (1.5%)
Age class	
Children (0-16 years old)	1,361 (11.5%)
Adults (17-64 years old)	5,612 (47.4%)
Elders (≥65 years old)	4,869 (41.1%)
Day of admission	
Monday	1,853 (15.7%)
Tuesday	1,691 (14.3%)
Wednesday	1,660 (14.0%)
Thursday	1,753 (14.8%)
Friday	1,749 (14.8%)
Saturday	1,505 (12.7%)
Sunday	
Time of admission	
Day (08-20)	8,426 (71.2%)
Night (20-08)	3,416 (28.8%)
Visit outcome	
Deceased	7 (0.1%)
Discharged	8,567 (72.3%)
Left Without Being Seen (LWBS)	442 (3.7%)
Hospitalized	2,021 (17.1%)
Transferred	690 (5.8%)
Other	115 (1.0%)
Reason for admission	
Other	4,671 (39.4%)
Abdominal pain	1,318 (11.1%)
Other symptoms of the nervous system	917 (7.7%)
Trauma	865 (7.3%)
Respiratory disease	787 (6.6%)
Eye disease	585 (4.9%)
Diagnosis	
Complications during pregnancy	1,267 (10.7%)
Eye disease	934 (7.9%)
Other	916 (7.7%)
Trauma	746 (6.3%)
Abdominal pain	519 (4.4%)
Missing	408 (3.4%)

Source: Elaborated by the authors.

Keywords referring to the patients' characteristics belong to three thematic categories:

- "Multimorbidity" grouped all the keywords related to the co-existence of 2 or more chronic diseases in the same patient.
- "Mental health" included all the keywords related to psychiatric diagnoses and other mental health problems.
- "Social vulnerability" included all the keywords related to social conditions such as poverty, precarious living conditions, conflictual relationships with the family, etc.
- The keywords related to the ED's characteristics belong to three thematic categories which constitute the second axis.
- "Fragmentation" referred to keywords expressing the existence of gaps, discontinuity or lack of coordination in the management of patients.
- "Resoluteness/Efficiency" grouped keywords referring to admissions' outcomes and to the appropriateness of the clinical setting.
- "Primary Care Sensitive Conditions (PCSCs)" referred to all conditions for which good primary care could potentially prevent the need for ED admission.

The contents and implications of these six thematic categories are more thoroughly discussed in the section below.

DISCUSSION

Our study confirms the presence of FUs in the ED setting. As already known from previous studies, FUs were found to be responsible for a large number of non-urgent admissions, with white and green codes representing more than three quarters of the total. Most of the admissions were in week days during day time, when primary health care services are usually working. This aspect suggests that at least part of the FUs' health needs, which could be managed in the primary healthcare setting, leaks to the ED, contributing to its overcrowding. As observed by other authors[12], we noted that most of the FUs made a small number of admissions (5 to 7 in the study period), while 20% of them made more than eight admissions and were collectively responsible for 33% of the total admission number. Given this aspect, FUs could be further divided into subpopulations according to their pattern of use of health care services. Specific activities could be targeted on high-consuming FUs, including case management[13], further and more thorough research studies, or extrapolation of complex cases to be used for the training of health professionals. Even if the scientific literature describes FUs as a population mainly affected by chronic conditions[7], this was not apparent from our quantitative data analysis, which mainly reported acute events as a reason for admission and discharge diagnosis. Our hypothesis was that the way in which data is collected and managed in the Eds (i.e. through a disease-focused-approach and mainly relying on quantitative methods) is well suited within an acute-condition-paradigm, but could be underperforming in a chronic condition one. We tested this hypothesis exploring data through a qualitative analysis, alternating the disease-focused-approach (DFA) with a person-focused-approach, or PFA[14].

Epidemiology and patients' characteristics

The narrative content of the medical records contained a lot of information about

the characteristics of the FUs, summarized in three potentially overlapping categories: multimorbidity, social vulnerability, and mental health. Multimorbidity characterized the majority of the FUs, especially the older adults. This characteristic was not evident when we analysed quantitative data. Given the nature of the ED, a service dedicated to urgent care, this did not come as a surprise, since its professionals tend to focus on acute events when they encode admissions through the ICD-9 CM system. Therefore, while the medical records mainly described multiple chronic conditions, the encoded diagnoses were mainly oriented to acute events. This dichotomy does not necessarily stand for a contradiction, but signals two different approaches to the same situation, each of them implying different possibilities for action. Neither one is inherently wrong, but we argue that a combination of both, qualitative and quantitative investigation, could be better able to depict the whole chain of events, from distal to proximal, so revealing more chances to act.

We also expected FUs to be a socially vulnerable population[7]. In the ICD-9 CM coding system, however, the psychosocial problems category only accounted for 0.3% of the admissions. Our analysis showed that the patients from this cluster often had social problems without a biological component (for example, homeless people using the ED as a shelter). More information on SDHs was reported in the narrative component of the medical records. Patients accessing the ED with a medical condition often also suffered various kinds of social vulnerabilities. Despite the relevance of the impact of these de-terminants on the clinical presentation, the final diagnosis always reported the biological condition, with SDH information - when present - lost in the background of the free text. Physicians tended to report data on the SDHs only in extreme cases, ignoring them in situations in which they were less prominent. Moreover, reports on social problems were often formulated with a judgmental or critical tone, conveying feelings of distress and frustration by the health professionals. Potential negative attitudes of the physicians towards the patients should be detected, since they are known to have a detrimental impact on patient care[15]. Finally, FUs suffering from mental health problems were also difficult to identify with a quantitative investigation only. The psychiatric diagnoses detected with the ICD-9 CM system accounted for 1.9% of the admissions. A psychiatric diagnosis was only attributed when the mental condition was directly responsible for the ED admission (for example, in case of psychotic crisis, panic attacks, self-harming or aggressive behaviours, etc.). Our analysis showed that mental conditions often acted indirectly, influencing self-care, compliance, and the social competence of the patients. More often than not, FUs with psychiatric diagnoses were accessing the EDs for reasons related to exacerbations or complications of chronic conditions, traumas, incongruous assumption of medicines or drugs. Discharge diagnoses mainly focused on these events, concealing the underlying psychiatric disorder and so determining an underestimation of the number of patients suffering from mental health problems. Identifying this subpopulation, which often

goes undetected, is important in order to plan targeted interventions. Lawrence et al. showed how mental illness is associated with large increased risks of morbidity and mortality, with almost 80% of excess deaths being associated with physical health conditions, and suggested that both physical and mental health problems should be evaluated and treated, through a better integration and coordination of mental health services with other health and social services[16].

All three categories just discussed were evident in a paradigmatic case study: the case of a patient making repeated ED admissions because of epileptic seizures, falls, and trauma. The diagnosis variable was coded in the ICD-9 CM system either as trauma, contusion or seizure, without any other relevant information. The qualitative analysis helped to step back from acute trauma and contusions and proceed backwards to more distal causes. We linked contusions and trauma to the seizures that caused them. The narrative content of the medical records also allowed documenting that the seizures were in turn related to lack of compliance with the pharmacologic therapy, to a not better specified personality disorder, and to the absence of a caregiver and of a reliable social network. This case illustrates how quantitative analysis only allows counting the number of acute events mainly relevant to the biological dimension (seizures, falls, and traumas) and planning activities targeted on them. Integration with a qualitative analysis brings into light more complexity, showing several determinants belonging to perceptual and social dimensions, on which to plan potential corrective strategies. Tange

et al. discussed the issue of different models of medical record keeping, arguing that shifting health paradigms often bring with them disputes about which approach should be adopted. They continue suggesting that each new paradigm actually represents an extension of the previous, being complementary rather than alternative to it. In this sense, the biopsychosocial paradigm represents a way to align the biomedical model, of which the ICD is a product, to the whole patient, with all his biological, social, and psychological problems[17]. This is also consistent with medical anthropology's main tuitions about disease, illness, and sickness[10]. Anthropologists argue that, when we deal with acute conditions, the clinical reality of the patients can be easily approximated to the dimension of disease, which is perfectly captured using systems focused on pathology, such as the ICD. However, when chronic conditions prevail, the dimensions of illness and sickness become more prominent and cannot be ignored. Our study shows that many relevant data about FU characteristics are routinely collected during ED activities, but they are not properly recognised, coded, or used for practical purposes.

ED's characteristics

Insights about the ED's characteristics and its pattern of use also emerged from our results and were synthesized in three categories: fragmentation, resoluteness/efficiency, and PCSCs.

Fragmentation

Fragmentation emerged as a theme in two ways. First, we observed fragmentation

in the way the ED collects and manages data through a DFA, which tends to separate long-term clinical records in discrete episodes of care, disconnected from each other. Secondly, fragmentation constituted a characteristic of the clinical pathways of several FUs. This was particularly evident in patients who were experiencing the onset of a chronic condition. These patients were approaching the ED with vague and undifferentiated symptoms and were discharged after symptomatic treatment without a proper diagnosis. The process was repeated for a variable number of times, until the symptoms became more specific and allowed reaching a diagnosis of the underlying chronic condition. This process is quite common in the context of primary care, where diagnoses are usually produced over a discrete period of time and through many contacts between patients and health services, preferably characterized by coordination and continuity of care. It is peculiar to find a similar pathway in the ED setting, where the characteristics of the emergency context make coordination and continuity much more difficult to realize. Since lack of coordination and continuity were found to be associated with higher costs and worse outcomes[18], fragmentation should be overcome. Clinical pathways could benefit from the implementation of horizontal, multilevel, and inter-sectoral networks, able to conjointly work to deliver integrated and comprehensive care.

Resoluteness/Efficiency

Frequent use is to be considered problematic only when it is not associated with an improvement in the health status of the patient. We considered *resoluteness* as the capacity of a healthcare system to adequately address and solve a person's problem, and tried to answer the following question: Do FUs return to the ED because their needs are met or because they are not? At the same time, we explored the concept of *efficiency*, defined as the production of a desired effect with the minimum use of resources. In this sense, the question to be asked was the following: Could problems be addressed with fewer resources outside the ED? Combining resoluteness with efficiency, two kinds of FUs could be described:

1) Patients whose problems were solved: patients accessing the ED for complications or maintenance of devices (catheters, nasogastric tubes, PEG tubes), or patients accessing for pain management in conditions of recurring or chronic pain. In these cases resoluteness was high, as the patients got their problems solved, but efficiency was low, as other more suitable and appropriate settings compared to the ED could be identified and used. The ability to adequately identify this subgroup of patients could lead to reorganization strategies aimed at avoiding inefficient practices and at directing patients to care settings that are more appropriate for treating their conditions.

2) Patients whose problems were not solved: patients whose diagnoses could not be verified and who remained in a situation of diagnostic uncertainty, patients who repeatedly accessed because of anxiety, patients whose symptoms persisted, and patients with a general perception that their health needs were not being satisfied. In these cases, both resoluteness and efficiency were low, since the major concerns of the patients were not solved despite the

resources used to address them. Proper identification of this subgroup, together with a stronger integration of the ED with other services, could help in taking care of these patients' needs, with higher resoluteness and efficiency.

Primary Care Sensitive Conditions (PCSCs)

PCSCs are defined as conditions for which good primary care can potentially prevent complications, need for hospitalization or, in our case, need for ED admission[19]. We applied this concept to detect inappropriate ED admissions and to expose the link between ED and primary health care. We found that PCSCs could detect inappropriate accesses better than triage coding. Exacerbations of chronic conditions represent a good example of PCSCs. They can require urgent care in the ED setting if the management in primary health care is not adequate. A pulmonary oedema, for instance, would be considered appropriate from the perspective of the ED. If we shift the focus to primary care, however, we can appreciate the fact that the same condition could potentially have been prevented.

PCSCs have the potential to identify inappropriate admissions and to act as a tool for the evaluation of primary health care performances[20]. This appears to be particularly promising in a context in which primary healthcare services are being reorganized. From this perspective, data about PCSCs could be used to support, guide, and monitor the activity of the HHs as well as to train health professionals.

LIMITATIONS

The single-centre, retrospective design poses limits to the generalizability of our results. The study period and the sample size were limited in order to allow for the use of qualitative research methods. This was a first, experimental approach to explore data. More research is needed to develop a reliable information system that adequately fits with the current epidemiologic scenario.

CONCLUSIONS

Our study confirms the existence of FUs in our local context. FUs constitute a much vulnerable population burdened with complex and mainly chronic health conditions, strongly influenced by biological, social, and psychological determinants. Most of these conditions do not strictly need urgent care and could be more properly addressed in other settings (for example, primary healthcare). The ED routinely collects a large amount of data regarding FU admissions, but the standard way to process them, mainly relying on quantitative disease-based variables, showed several limitations. The adoption of a multidimensional and person-focused approach, oriented towards chronic conditions, multimorbidity, and SDHs, as well as the implementation of qualitative methods of investigation, could result in much richer information.

The knowledge resulting from such an approach can have a strong role in developing strategies for the abatement of ED overcrowding, the reorganization of primary healthcare services, the implementation of inter-sectoral networks of care, and the education of health professionals.

FUNDING

CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

ETHICAL CONSIDERATIONS

Approval by the local ethics committee was not needed since the data used was routinely collected by the health services and all the information had been anonymized and de-identified prior to access and analysis. Data is presented in aggregate and anonymous form.

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