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Can ambulatory care sensitive condition hospitalizations be interpreted as an indicator of primary care performance during COVID-19? A scoping review

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Hospitalizations for Ambulatory Care Sensitive Conditions (ACSCs) are commonly used as indicators of primary care performance and have been widely employed to assess the impact of disasters on health systems; however, their use during pandemics has not yet been comprehensively mapped. This scoping review aimed to synthesize evidence on trends in ACSCs hospitalizations during the COVID-19 pandemic to evaluate their usefulness as an indicator of health system performance in health emergencies. The review followed the JBI methodology and included peer-reviewed studies published from 2020 onwards reporting hospitalization trends for ACSCs, with no language or geographic restrictions. Two reviewers independently screened studies, with disagreements resolved by a third reviewer, and data were extracted using a researcher-developed tool and descriptively synthesized. Sixteen quantitative studies based on secondary data met the inclusion criteria, most of which were conducted in North America. Overall, the evidence showed a reduction in ACSCs-related hospitalizations during the pandemic, although trends varied by age group and diagnosis, with the largest declines observed for respiratory conditions, particularly asthma and chronic obstructive pulmonary disease. Six studies also examined vulnerability factors, identifying racial/ethnic minority status, socioeconomic disadvantage, and mental health conditions as important determinants of hospitalization. The observed reduction in ACSCs hospitalizations is likely explained by changes in care-seeking behaviour, infection-control measures, and healthcare reorganization rather than improved primary care performance. Therefore, ACSCs hospitalizations should be interpreted cautiously during health emergencies, as declining rates may conceal unmet healthcare needs instead of reflecting better primary care system performance.

KEYWORDS
ambulatory care sensitive conditions (ACSCs), COVID-19, disaster, epidemic, health emergency, pandemic, primary care

1 Background

The COVID-19 pandemic generated widespread disruption of care provision across all health system levels (1–3). Health systems were required to respond to an acute shock while continuing to deliver essential services, a challenge that has been widely framed within the literature on health system resilience. Resilient health systems are commonly understood as those able to absorb, adapt, and, where necessary, transform in response to shocks, while maintaining core functions and protecting population health (4–7). The COVID-19 pandemic provides a critical empirical setting in which to examine these capacities, particularly at the primary care level.

Primary care represents the foundation of health systems and the main point of contact between people and health services (8). It plays a central role in prevention, early diagnosis, acute and chronic disease management, and care coordination, all of which are essential functions that should be preserved during health emergencies (8).

However, during the COVID-19 pandemic, primary care systems in many countries experienced substantial disruption, including reductions of in-person consultations, interruptions to routine monitoring, and delays in diagnosis (9). These disruptions were associated with marked declines in new diagnoses of non-communicable chronic diseases (10, 11) and with deterioration of health outcomes among patients with existing chronic conditions due to missed or delayed follow-up (12).

From a resilience perspective, such disruptions reflect limits in the absorptive capacity of primary care systems, defined as the ability to maintain service delivery using existing resources and structures during a shock. In both emergency and ordinary times, patients with chronic conditions require continuity of care to avoid deterioration of their health status (13). When this continuity is compromised, patients are more likely to seek care through emergency departments (EDs) or require unplanned hospital admissions, shifting demand to acute care services and amplifying system-wide stress (13–16). The extent to which primary care can prevent such spillovers also reflects its adaptive capacity, namely the ability to reorganize care delivery, adjust care pathways, and respond to changing patterns of need during a crisis. For this reason, the ability to quantify and evaluate the magnitude of this phenomenon is of paramount importance for the development and implementation of effective strategies to address it.

In this context, Ambulatory Care Sensitive Conditions (ACSCs) offer a well-established metric for examining how effectively primary care systems absorb and adapt to shocks. The concept of ACSCs was first introduced by Billings et al. (17) and later defined by the World Health Organization as "conditions for which access to appropriate primary care could prevent the need for the current admission to hospital" (18). This concept has been employed by different agencies, going through numerous slight changes in wording in its definition, but without substantial modifications in the overall meaning (18). There is no consensus among countries on the common set of medical conditions defined as ACSCs (18–20). These are usually divided into chronic, acute, and vaccine preventable ACSCs, and they encompass among others hypertension, diabetes, asthma, chronic obstructive pulmonary disease (COPD), chronic heart failure (CHF), and urinary tract infection (18, 21).

Hospitalization rates for ACSCs are widely employed as a proxy for primary care accessibility, quality, and effectiveness (18, 21–23). High or increasing rates of hospitalization for these conditions are generally indicative of deficiencies in primary care provision (22, 24). Inadequate chronic disease management and low-quality care delivery are associated with increased healthcare costs and higher patient morbidity (25). Within a resilience framework, changes in ACSCs hospitalizations during emergencies may signal failures or successes in the absorptive and adaptive capacities of primary care systems. A sudden increase may indicate an inability to maintain essential services or adapt care delivery, whereas sharp reductions may reflect suppressed demand and unmet need rather than improved performance.

In a recent systematic review on the topic, Lamberti-Castronuovo et al. (26) proposed the use of ACSCs to evaluate the performance of primary care systems and their capacity to maintain continuity of care during disasters. A sudden increase in hospitalizations or admissions during, or in the aftermath of, a disaster may therefore be a symptom of systemic distress, even though some disasters seem to be associated with a reduction in the number of hospitalizations. Such increases may arise from disruptions in service delivery, reduced access to primary care, or surges in demand associated with the emergency response (26). However, other factors such as vulnerability status of patients connected to their social or economic characteristics also influence this indicator (27, 28). Since the onset of the COVID-19 pandemic in 2020, a growing number of empirical studies have used ACSCs as a proxy to assess the healthcare system performance as a whole or focusing on primary care. Despite some systematic reviews having been published on ACSCs and healthcare services use (26, 29), none of these aimed to summarize or map the characteristics of hospitalizations for ACSCs during the COVID-19 pandemic nor whether these can constitute a valid indicator during the pandemic.

The aim of this scoping review is to summarize evidence on trends and characteristics of hospitalizations for ACSCs during the COVID-19 pandemic, and to map the extent to which ACSCs function as an informative indicator of primary care absorptive and adaptive capacity during pandemic conditions. The review is guided by the research question: "What is known in the literature about the characteristics of ACSCs hospitalisations during the COVID-19 pandemic?". By addressing this question, the review could contribute to the health system resilience literature by clarifying if ACSCs hospitalizations can be used as a performance indicator for primary healthcare systems' resilience during pandemics, informing disaster preparedness strategies at the primary care level, and identifying the strengths and limitations of ACSCs as a tool for evaluating health system performance during pandemics.

Abbreviations

ACSC, ambulatory care sensitive condition; COVID-19, Coronavirus Disease 2019; COPD, Chronic Obstructive Pulmonary Disease; CHF, chronic heart failure; ED, emergency department; HPSA, health professional shortage area (s); ICS, international classification of diseases; JBI, Joanna Briggs Institute; NCD, non-communicable disease; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; PRISMA-ScR, Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews; PCC, population, concept, context; PPE, personal protective equipment; USA, United States of America; WHO, World Health Organization.

This scoping review represents the first step of the PRIN project *A Disaster Preparedness Capacity Development Program for Family and Community Nurses (DiPP-CoN) to Facilitate Access to Care and Reduce Avoidable Hospitalizations During Disasters*. The project's ultimate goal is the co-creation of an evidence-informed training program, including both frontal lectures and simulation-based learning, for Family and Community Nurses (FCNs) in the Piedmont Region, Italy, aimed at enhancing their preparedness for a broad range of disaster scenarios. By strengthening disaster-related competencies, the program seeks to improve the management of patients with ACSCs in disaster settings, thereby facilitating continuity of care, reducing disruptions in access to essential health services, and ultimately preventing avoidable hospitalizations.

2 Methods

A scoping review on the characteristics of avoidable hospitalisations for ACSCs in adult populations described in peer reviewed studies published from the start of the COVID-19 pandemic to the present day was performed.

2.1 Data sources and search strategy

This review was guided by the JBI methodology for scoping reviews (30). The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews (PRISMA-ScR) was used to report each stage of the review and findings (31). A comprehensive literature search was conducted on June 17, 2025, on three databases (PubMed, Scopus, Web of Science) to identify all relevant original peer reviewed studies addressing hospitalizations connected with ACSCs published from January 1, 2020 onwards. This timeframe was chosen to capture the situation after the start of the COVID-19 pandemic, as the SARS-CoV-2 virus was identified on January 9, 2020 by the Chinese authorities (32). The search strings combined two blocks of terms, related to ACSCs and the COVID-19 pandemic (Supplementary Material 1). Identified citations were downloaded and collated on the software Covidence (Veritas Health Innovation, Melbourne, Australia). After removal of duplicates, the titles and abstracts of the studies were screened by two independent reviewers and those found not eligible were excluded (FM, MB). The full text of the remaining articles was screened to determine those to be included (FM, MB). The references of the selected articles were also screened to find any other study eligible for inclusion (FM, MB). If discrepancies in the study selection emerged, they were solved after discussion with the whole team. In accordance with the recommendations of the JBI Manual for Evidence Synthesis, no critical appraisal of the methodological quality of the included studies was conducted.

2.2 Eligibility criteria

Studies were included if they met the following inclusion criteria, which were developed following the PCC mnemonic:

2.2.1 Population

This review considered studies that described ACSCs hospitalisations among individuals aged ≥18 years old. Studies including participants under 18 years of age were considered only if the age-specific data were disaggregated or if participants under 18 years of age belonged to the middle adolescent age group (e.g., aged 15–17 years) and represented a sufficiently small proportion of the study population that their inclusion was unlikely to influence the study results.

2.2.2 Concept

Eligible studies investigated hospitalizations for ACSCs during the COVID-19 pandemic. For the purpose of this review, ACSCs were defined as "health conditions/diagnoses for which timely and effective outpatient care can help reduce the risk of hospitalisation by either preventing the onset of an illness or condition, controlling an acute episodic illness or condition, or managing a chronic disease" (17).

The review focused on evidence describing hospitalization trends, the contexts in which ACSCs were used as an indicator of healthcare performance, and the factors reported to influence hospitalization patterns, including patient vulnerability.

2.2.3 Context

This review considered studies conducted in any geographical setting. The review included original, peer-reviewed quantitative, qualitative, and mixed-methods studies published between 1 January 2020 and 17 June 2025. No language restrictions were applied.

2.3 Data extraction and analysis

Data extraction was performed using the Covidence software, where the data extraction tool developed by the researcher was uploaded (Supplementary Material 2). Titles and abstracts were screened independently by two reviewers (FM, MB) against the eligibility criteria. Full texts of potentially eligible studies were retrieved and assessed independently by the same reviewers for inclusion. Reference lists of included studies were screened manually to identify additional eligible sources. Any disagreements during the selection process were resolved through discussion within the research team.

Data extracted included general information about the article, study design, information about ACSCs and related hospitalization. Data focusing on patients' vulnerability and health system's disruption were extracted (FM, MB). In particular, we extracted information on the sociodemographic, racial, and economic characteristics of the study population, as well as on any disruptions to care delivery and its quality that affected the health system.

These were synthesized descriptively to map the characteristics and trends of ACSCs hospitalisations during the pandemic period. Quantitative findings were summarized using tables and narrative descriptions. Data about patient-related vulnerabilities, healthcare

system disruption and ACSCs definitions were synthesized using an inductive thematic analysis approach, with themes iteratively refined through team discussion to ensure analytical consistency.

3 Results

A total of 988 records were identified through the initial search strategy. Following the removal of duplicates, 535 unique records remained for title and abstract screening. Of these, 488 were excluded as they did not examine avoidable hospitalizations for ACSCs during the COVID-19 pandemic. Consequently, 46 full-text articles were assessed for eligibility. After full-text screening, 16 studies met the inclusion criteria. In cases where the study population included both adults and children (33–35), only data pertaining to individuals aged 18 years and older were extracted, provided the results were disaggregated. Studies in which the age of the study population was not explicitly reported were still included in the review assuming that were referring to an adult population. The study by Gwon, Han and Kim (36), which reported hospitalization data for individuals aged 15 years and older, was also included in the review. This decision was based on the assumption that the majority of the sample belonged to the adult population, and the small proportion of individuals under 18 was unlikely to have significantly influenced the results. A detailed account of the study selection process is depicted in the PRISMA flow diagram (Figure 1).

3.1 Characteristics of the studies

The key characteristics of the included studies are summarized in Supplementary Material 3. Since all included studies focused on the COVID-19 pandemic, they were conducted and published from 2020 onwards, with an increase in the number of publications in the years 2023 and 2024. All included studies used a quantitative approach analyzing secondary data. The data sources varied across studies: six used administrative data, five relied on hospital health records, two combined both administrative and hospital data, and three employed health insurance records.

Regarding the geographic distribution, five were conducted in the USA (37–41), five in Canada (34, 42–45), two in Japan (46, 47), two in South Korea (35, 36), one in Croatia (33), and one in the United Kingdom (27).

Most studies examined ACSCs-related hospitalizations during the COVID-19 period (2020–2022), typically comparing them with a pre-pandemic baseline year, most often 2019. Other studies included longer pre-pandemic periods, such as Marshall et al. (34), which included data from 2017 onwards; Kendzerska et al. (42, 43), which analyzed data from 2016; and Abe et al. (47), which included data starting from 2015. One study (36) extended this comparison to trends from 2008 onwards. The timeframe considered after the beginning of the pandemic varies across the studies: seven used data from 2020, eight extended until 2021, and only one until 2022.

Studies presented significant differences regarding the included cohort. The study population ranged from 23.5 million (27) to 12,089 individuals (40). All but one of the studies took into account direct patient data, while Mainous et al. (41) used a sample of 1,067 ED visits and made weighted estimations of a pool of around 140.6 million ED visits.

The study population varied considerably across the included studies. The majority focused on the general population (27, 33–36, 40, 41, 44–47). Two studies specifically examined individuals covered by particular health insurance schemes (37, 42), one study focused on older adults with Alzheimer's disease and dementia (38), and another examined medically underserved populations (39).

The primary objective of the studies, as described by the authors, focused on several thematic areas: changes in hospitalizations for ACSCs during the pandemic (33, 35, 37, 41–43, 46); hospitalizations for ACSCs in relation to vulnerability factors such as socioeconomic status or health inequities (27, 38–40); the performance of the primary care system in managing ACSCs during the pandemic (34, 36, 45); and changes in in-hospital mortality and hospital death rates associated with ACSCs (47).

Supplementary Material 4 shows the trend of hospitalization as described by each study.

3.2 ACSCs definition in the eligible studies

Despite minor variations in wording, all included studies adopted the definition of ambulatory care sensitive conditions (ACSCs) proposed by Billings et al. (17). This shared conceptual foundation provided a consistent baseline and supported inter-study comparability, yet substantial variations were observed in the specific clinical conditions classified as ACSCs across studies.

Supplementary Material 4 reports the definition of ACSCs used in each study.

Supplementary Material 5 shows the type of conditions reported and their frequency in the retrieved studies.

Asthma, arterial hypertension, COPD, CHF, and diabetes mellitus were included in all 16 studies, while other conditions such as angina, influenza and/or pneumonia, epilepsy, kidney/urinary tract infections, were included in less than half of the studies and several others (e.g., ear, nose, and throat infections, gastric ulcer, and nutritional deficiencies) were reported as ACSCs and included in less than a quarter of the papers.

3.3 Trend of hospitalizations for ACSCs

The trend in hospitalizations reported by all but one study from the USA (41) indicated a significant decrease in ACSCs-related admissions during the COVID-19 pandemic. Mainous et al. (41) reported an increase in the proportion of ACSCs-related visits that resulted in hospitalizations, rising from 39% in 2019 to 41.7% in 2021. Additionally, one study from Japan (46) found that the change in the number of hospitalisations for ACSCs during the pandemic was not statistically significant and that there was no significant change between the geographic areas with higher and lower rates of COVID-19 infection. Marshall et al. (34) from Canada reported that the reduction in hospitalization rates was less pronounced among older adults (e.g., aged 65 and above), although this figure was still lower

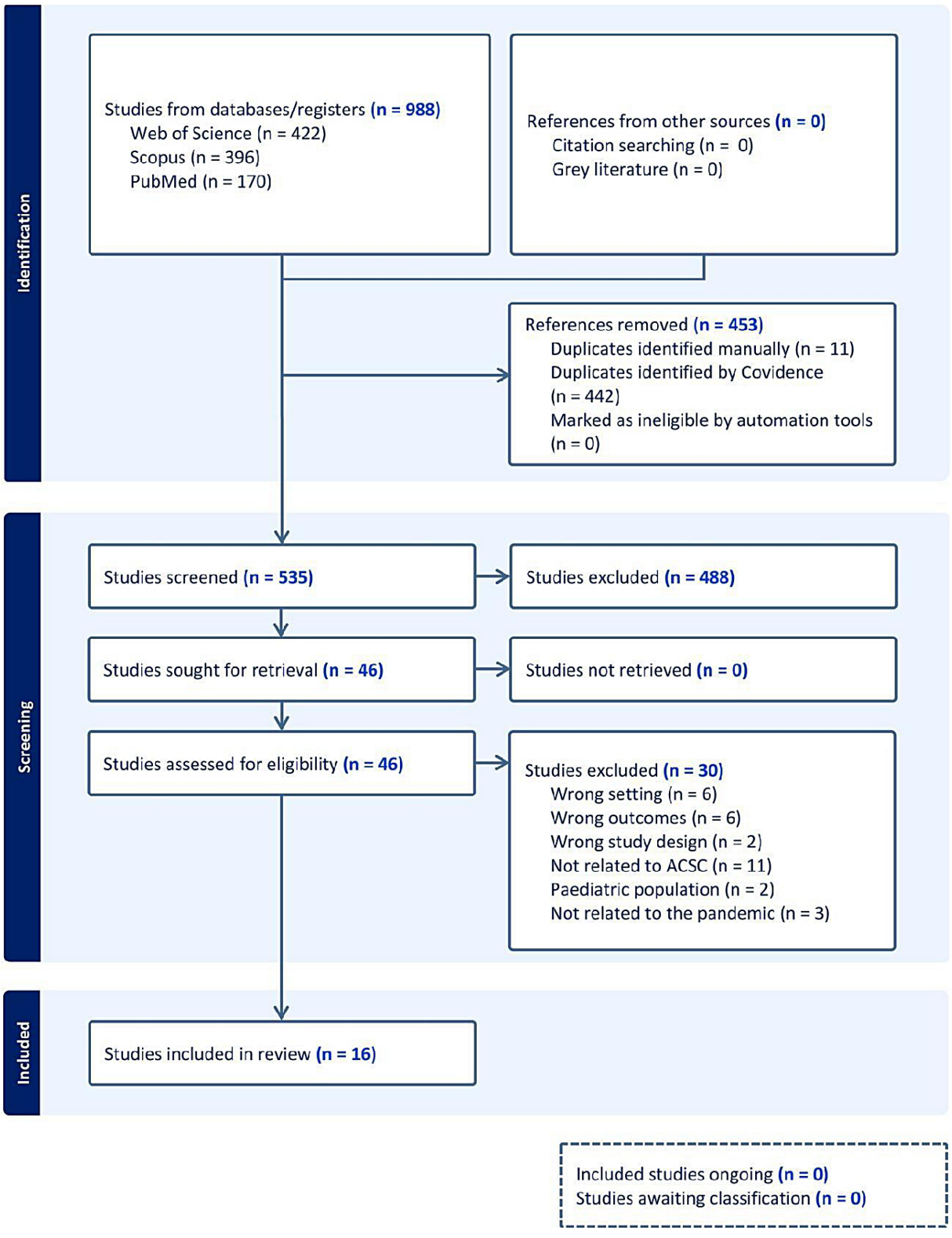


FIGURE 1
PRISMA flow diagram.

compared to the pre-pandemic period. Kim and Lee (35) from South Korea reported that, despite an overall decrease in the number of hospitalizations for ACSCs, these did not exhibit any significant changes in the older population (e.g., over 65 years). Chumbler, Ogunsanmi and Surbhi (39) and Green et al. (27), respectively from USA and UK, reported marked declines in ACSCs-related hospitalizations, particularly during periods of national lockdowns that coincided with major waves of the

pandemic. However, while an increase was observed in hospitalization rates during the inter-wave and post-wave periods, these did not return to pre-pandemic levels.

Notably, none of the included studies examined or compared hospitalization trends to the post-COVID-19 pandemic period.

Trends in hospitalisation for disaggregated diagnosis sometimes differed from the overall pattern. Where data on specific conditions were available, reductions in hospitalisations for respiratory diseases, such as asthma and COPD, were more pronounced compared to other chronic conditions like diabetes, hypertension, and chronic heart failure (33–37, 43).

3.4 Vulnerability factors identified

Six out of the 16 included studies described vulnerability factors, namely characteristics of the population that were identified as either increasing or decreasing the likelihood of hospitalisation for ACSCs by exacerbating barriers to access to care or by acting as risk factors that increase the likelihood of hospitalisation.

Leuchter et al. (40) and Cai et al. (38) identified racial disparities, being part of an ethnic minority, and migrant status as vulnerability factors, that despite the overall decreasing trend, can lead to higher hospitalisation rates compared to other groups (e.g., non-Hispanic white). In the same study, ethnic and racial minorities were associated with greater severity of disease and comorbidities due to cumulative exposure to socioeconomic disadvantage and discrimination. In contrast, Kendzerska et al. (42) found that immigrants' status led to lower presentations for ACSCs than in the general population. Authors related this to hindered care-seeking behaviours related to difficulties in access to virtual care services due to underlying socioeconomic factors. In the study conducted by Green et al. (27), individuals of Asian ethnicity experienced a greater reduction in avoidable hospitalizations compared to those from the white ethnic group.

Chumbler, Ogunsanmi and Surbhi (39) identified residing in Health Professional Shortage Areas (HPSA, namely a geographic area, population group, or health care facility having a shortage of health professionals 48) and low-income areas as a vulnerability factor showing a positive association with the reduction in ED visits. However, no correlation was found with hospitalization for ACSCs.

Kendzerska et al. (42) reported that individuals with mental health conditions experienced a reduction in ACSCs-related hospitalizations during the pandemic; however, hospitalization rates in this group remained higher compared to individuals without mental health conditions.

Cai et al. (38) found Black and Hispanic population groups more likely to be Medicare-Medicaid dual-eligible and to belong to low-income populations. This was associated with greater reductions in ACSCs-related hospitalizations during the COVID-19 pandemic, despite having a higher baseline risk of hospitalization and ACSCs admissions.

Concerning sex and gender, minimal disparities were described and reported as carrying no statistical significance, leading many studies to report findings without specific sex-disaggregated analysis. As an example, Green et al. (27) reported that limited sex-related differences were observed, thereby justifying their decision to present their results in aggregate form. Overall, sex and gender were not described in the eligible studies as variables that could significantly influence ED utilization and/or hospitalization.

Only two of the studies reported sex-based differences. Marshall et al. (34) reported a divergence in healthcare utilization patterns, observing that female patients exhibited a slightly higher rate of ED access, while male ones showed elevated rates of hospitalization for ACSCs. Similarly, Kendzerska et al. (42) documented that the number of hospitalizations in the female cohort was lower than what would have been expected in pre-pandemic trends.

Supplementary Material 4 shows the vulnerability factors identified by each study and Supplementary Material 6 illustrates the correlations between the vulnerability factors and the impact on hospitalization for ACSCs.

3.5 Primary care reorganization

Although the included studies were primarily focused on changes in ACSCs hospitalizations rather than on healthcare-system reorganization itself, several changes in primary and outpatient care delivery were also described. In Ontario, Canada, outpatient visits for ACSCs decreased during the first pandemic wave, with an observed monthly rate of 4,299.57 per 100,000 population, compared with a projected rate of 5,060.23, before returning to expected levels by June 2020 (42). This decline coincided with a major transition to remote care: specific billing codes for telephone and video consultations were introduced in March 2020, and by the second pandemic wave virtual visits reached 3,026.95 per 100,000 population, compared with a projected rate of 49.87 (42). A subsequent analysis focusing on patients with asthma or COPD confirmed an initial reduction in outpatient activity followed by recovery and subsequent increases above projected levels; however, pulmonary function testing remained substantially below expected levels throughout the first pandemic year, with rates during the period September 2020-March 2021 of 1,247 versus 2,526 per 100,000 among patients with asthma and 1,703 versus 3,355 among those with COPD (43). The same study described restrictions on in-person ambulatory care, substitution with virtual care, and closure of in-person pulmonary rehabilitation programmes, with counselling and self-management support delivered remotely (43). In Japan, access pathways for patients with fever or catarrhal symptoms were also reorganized: whereas before the pandemic patients could attend almost any outpatient clinic without an appointment, during the pandemic they were directed to designated clinics through local public health centres, with limited bed capacity and restrictive PCR-testing criteria contributing to difficulties in accessing care (47). In England, general-practice visits fell markedly but were partly replaced by online consultations. Elective treatments decreased by approximately three million in 2020 compared with 2019, while cancer screening programmes, non-essential surgery, and diagnostic procedures were postponed or cancelled and waiting lists increased (27). In the United States, the Centers for Medicare and Medicaid Services expanded telemedicine coverage to maintain access to ambulatory services, although the extent to

which increased telehealth use compensated for reductions in face-to-face care remained uncertain, particularly among socioeconomically disadvantaged populations (38).

4 Discussion

4.1 General discussion

This scoping review has highlighted an overall decreasing trend in hospitalizations for ACSCs, consistent with the previous findings from Lamberti-Castronuovo et al. (26). Notably, some studies covering longer time periods before the beginning of the pandemic reported an already ongoing decline in hospitalization rates for ACSCs (36, 47). This is consistent with the literature (49, 50) and attributable to the continuous efforts implemented to strengthen primary care access and performance through the integration and funding of primary care services in implementing the primary healthcare approach.

When the overall trend was disaggregated by clinical conditions, different patterns of hospitalization trends were observed. For asthma and COPD the reduction in the number of hospitalizations was greater than in other conditions. This can be related to the beneficial influence derived from the use of Personal Protective Equipment (PPE), social distancing, reduction of air pollution, and decrease in transmission of other respiratory viruses (51, 52).

Trends by age, especially among older adults, show opposite hospitalization patterns in different studies (34, 35). Therefore, deriving clear conclusions or consistent trends based on patient age is challenging. Comorbidities associated with ACSCs and COVID-19 may have influenced hospitalization rates among individuals of 65 years of age and older.

Another determinant to consider when interpreting these results is the hospital bed availability. Hospitalization rates can be heavily influenced by the number of available beds, which in turn affects the likelihood of patient admission (53). During the pandemic a significant portion of hospital capacity was reallocated to COVID-19 cases, thereby reducing the number of beds available for other conditions. This can be an important bias and confounding factor when analyzing hospitalization rates with the aim of interpreting them to the performance of other services.

Many studies reported a shift from in-person to telehealth services (38, 42–45). This shift may have influenced the reduction of hospitalization rates and it is consistent with the finding from Kim and Lee (35). Telehealth contributed to preventing the expected increase in hospitalizations, compensating the disruption of the in-person primary care system assistance (54, 55). However, barriers connected to availability or literacy on the use of technologies could have had a negative impact on care access (56). Migrant status and other vulnerability factors (e.g., Black ethnicity, mental health conditions, and presence of barriers related to type of health insurance, employment type, and transportation services access) were reported as hindering access to care.

None of the studies analyzed data up to or after May 5, 2023, when the WHO declared the end of the pandemic (57). Therefore, it remains unclear how and if these trends changed in the post-pandemic period. However, studies that included a longer timeframe showed a continuous decrease in hospitalization rates for ACSCs. It is noteworthy that Chumbler, Ogunsanmi and Surbhi (39) and Green et al. (27) showed a slight increase in the hospitalization between the pandemic phases and lockdown but without overcoming pre-pandemic rates. Marshall et al. (34) suggested that seasonality may have played as a confounding factor in these trends.

All of the 16 eligible studies were conducted in high income countries located in the northern hemisphere (of these, six were conducted in the USA and five in Canada), indicating that the available evidence predominantly derives from high-income countries in the Global North. While this could be explained by a publication bias (e.g., findings from low- and middle-income countries not being represented in the scientific literature), this could also be related to the focus of public health initiatives in high income countries being on non-communicable diseases (NCDs) while low- and middle-income countries' efforts are still pressed by other priorities (e.g., HIV, malaria, neonatal and maternal mortality, communicable disease and food and water security) despite an increase in NCD incidence (58).

All the retrieved papers used definitions for ACSCs that, besides slight changes, are consistent with each other. This aligns with reports from WHO (18) where different definitions have been analyzed showing an overall uniformity of the meaning.

However, despite an overall consistency in the definitions, the heterogeneity of the conditions included limits the comparability of ACSCs hospitalization rates across countries and studies. As highlighted by Purdy et al. (20) and Pinto et al. (59), there is no consensus on the conditions that should be classified as ACSCs, hindering the possibility of making valid inter-study and inter-country comparisons (60). A core set of diseases, namely hypertension, asthma, congestive heart failure, chronic obstructive pulmonary disease, and diabetes is common to all studies, with additional conditions included at the discretion of individual authors. Most of the studies used the International Classification of Diseases (ICD), ninth or tenth revision (ICD-9 or ICD-10) code to define the conditions included for the analysis, though they sometimes created macro-categories, each including different ICD-9/ICD-10 codes.

Our results are consistent with the findings from Lamberti-Castronuovo et al. (26). In their study, ACSCs were described as a proxy for evaluating health care system performance under disaster conditions. Their literature review included five studies on slow-onset disasters, such as epidemics or pandemics, and others on sudden-onset events, including earthquakes and chemical spills. Findings showed an increase in the number of hospitalizations only in sudden onset disasters while a decrease has been shown in the ones with slow onset (i.e., epidemics and pandemics). According to the study by Lamberti-Castronuovo et al., this difference in the number of hospitalizations between slow and sudden onset disasters can be related to the ability of the health system in adapting and reacting more efficiently over time to a slow onset disaster, rather than being overwhelmed by the impact of a sudden onset disaster in a shorter period of time.

This scoping review poses questions on whether ACSCs could be employed as a proxy for measuring the primary care system performance during or after an event of the magnitude of a

pandemic. Confounding factors such as prolonged changes in social behaviour, widespread use of PPE, and profound lifestyle modifications have significantly influenced patterns of access to care (3). Furthermore, during the pandemic, health facilities were often perceived as environments at high-risk of COVID-19 contagion, increasing the reluctance of people in accessing care (61). Moreover, differently from short term disasters, the healthcare systems had to readapt themselves to new conditions where an "emergential approach" was not sustainable in the long-term. Hence, it is difficult to relate the hospitalization rates for ACSCs with the performance of the primary care system. During pandemics, declining ACSCs hospitalizations may represent unmet healthcare needs rather than improved system performance, paradoxically indicating worsening access to care.

Despite it being one of the outcomes of the research sub-question, this scoping review was not able to capture clear and detailed data documenting an overall disruption of the healthcare system or of any specific medical service dedicated to patients with ACSCs during the pandemic. This could be related to challenges in drawing direct and clear correlations between the ACSCs hospitalization and any disruption in the primary care delivery system.

In addition to the published literature search, a grey literature review was conducted by the research team across several major international institutional databases. No relevant policy documents were identified from NICE (National Institute for Health and Care Excellence), ECDC (European Centre for Disease Prevention and Control), CDC (Centers for Disease Control and Prevention), NIH (National Institutes of Health), the World Bank, or the WHO (World Health Organization). This shows that this topic is also underrepresented in the grey literature. Several reasons may contribute to this underrepresentation. As reported in the literature, the high heterogeneity of conditions classified as ACSCs, together with the context-dependent nature of their treatment and care, may hinder their use for large-scale, worldwide comparison and representation.

This review reports and discusses several vulnerability factors that contributed to disparities in healthcare access and outcomes. In this context, vulnerability factors were intended as elements hindering an appropriate and timely access to the healthcare services and are also related to an elevated risk for hospitalization. Specific socioeconomic and demographic disparities (27), ethnic minority status, racial disparities, and migration status (38, 40), and health-related characteristics of populations significantly influence both health services utilization rates during routine activity and during public health emergencies, such as an epidemic outbreak. These factors adhere with those described by Agabiti et al. (62), that highlighted the higher risk of hospitalization in individuals from disadvantaged socioeconomic groups, leading to the assumption that having a better health status or a more favorable socioeconomic position is associated with a lower risk of hospitalization. Moreover, this review sheds light on how immigrants' status or the presence of mental health conditions led to lower access to primary care services, which likely led this cohort to greater access to ED and hospital services. This conclusion reflects what Hudon et al. (63) describe, namely that sociodemographic, as well as physical and mental comorbidities constitute predictor factors for frequent ED use and hospitalization.

Regarding primary healthcare delivery reorganization, the findings indicate that healthcare disruption during the pandemic involved not only reduced service utilization but also substantial changes in the organization and modality of ambulatory care, including rapid expansion of telehealth, restriction of face-to-face access, modification of referral pathways, reduction of diagnostic testing, and postponement or suspension of routine and elective services. However, these organizational changes were inconsistently reported across the included studies, limiting systematic comparison across healthcare systems. Moreover, the shift to telemedicine was met with disparities in access to care due to limited technological literacy of patients and due to barriers in accessing devices. Nevertheless, the transformative capacity of healthcare systems is particularly evident in the institutionalization of telehealth infrastructure, the restructuring of primary healthcare services, and the development of new models of care during the COVID-19 pandemic, which extended beyond short-term adaptations to existing arrangements and contributed to reshaping the future delivery of healthcare services in the aftermath of the pandemic.

The effects of pandemic-related healthcare reorganization may have persisted beyond the acute phase and continued to influence healthcare quality and hospitalization patterns. Recent evidence showed that healthcare-associated infection rates remained elevated after the COVID-19 pandemic, with these changes associated with persistent health-system disruption, delayed care, and greater patient complexity (64). This suggests that pandemic-related reorganization should not be considered only as a temporary response to the outbreak. Persistent changes in hospital capacity, infection-control practices, care pathways, unmet healthcare needs, and continuity of chronic disease management may continue to influence the risk and threshold for hospitalization in the longer period. In the context of ACSCs, these long-term effects further complicate the interpretation of hospitalization rates, which may reflect not only primary care accessibility and effectiveness but also residual systemic changes across the wider healthcare system.

Patient vulnerability should also be considered in relation to the capacity of primary and community care services to safely monitor and manage patients outside hospital settings. Sila et al. (65) found that older age and specific comorbidities, including cardiovascular and neurological diseases, were associated with an increased risk of clinical deterioration and subsequent hospital referral among patients managed through home- or community-isolation pathways. These findings highlight how patient-level vulnerability and limitations in monitoring and referral systems may interact in determining whether deterioration can be identified and managed before acute hospital care becomes necessary. This is particularly relevant for patients with ACSCs, who often require continuous monitoring, timely recognition of clinical deterioration, and rapid escalation of care. During disasters or other major health-system disruptions, difficulties in home-based monitoring, in communication with healthcare professionals, in access to diagnostic resources, or to referral pathways may therefore increase the likelihood of ED attendance or hospitalization. FCNs may play an important role in risk stratification, home-based assessment, continuity of chronic disease management, patient education, and early identification of deterioration.

Strengthening these competencies and establishing clear escalation pathways may therefore contribute to disaster preparedness strategies aimed at reducing avoidable hospitalizations among patients with ACSCs.

4.2 Strengths and limitations

This scoping review has important strengths. To our knowledge, it is the first review summarizing data on the hospitalization trends for ACSCs during the COVID-19 pandemic. Moreover, it provides important insights on the validity of the use of ACSCs as a proxy to assess the performance of the primary care system and describes confounding factors that should be taken into account when interpreting these data.

This study also has few limitations. A considerable heterogeneity in the populations and in the conditions classified as ACSCs was found, limiting comparability of ACSCs hospitalization rates across countries and studies. Since the focus was on understanding and describing hospitalizations for ACSCs, studies that examined only ED admissions were excluded. Further reviews that solely include ED visits could provide a more comprehensive overview of this phenomenon.

Another limitation concerns the timeframe of the study, including studies published up to June 17, 2025. The scoping review was conducted as a preliminary phase aimed at informing interviews with nurses and physicians working in the ED and Internal Medicine, as well as with Primary Care professionals, investigating avoidable hospitalizations due to ACSCs and difficulties in maintaining continuity of care during the COVID-19 pandemic as well as in ordinary times. The interviews were conducted in late 2025. Therefore, the literature search was intentionally conducted up to June 17, 2025, in accordance with the timing and objectives of this preliminary phase. A later search update conducted during the peer review phase, using the timeframe June 17, 2025 - August 24, 2026, identified a few additional papers on the topic. However, none reported hospitalization data extending into the post-pandemic period or analyzed a longer follow-up period than the studies already included.

4.3 Recommendations

To ensure comparability across future research studies, the conditions considered as ACSCs and all the related ICD-9/10 codes should be reported extensively and more precisely in original studies. Disaggregated data for each condition should be provided to ensure inter-study and inter-country comparability. Population sample characteristics such as age and socio-economic status also need to be included. Overall, our main recommendation is to establish and adopt a standardized, agreed-upon set of ACSCs to facilitate more consistent and meaningful comparisons for researchers and policymakers. This effort to standardize ACSC reporting needs to be comprehensive and adaptable in different settings according to local priorities.

From a policy perspective, the risk of overgeneralization is a challenge as utilizing ACSCs hospitalization data to inform system evaluation and implementation has its limits when applying ACSCs in large-scale projects characterized by substantial heterogeneity in the included population. Future research that includes the analysis of data from the years 2022 and 2023 until the present time is warranted to better assess the long-term effects of the pandemic on ACSCs hospitalizations. This could be achieved by conducting longitudinal studies comparing the pre-pandemic, pandemic, and post-pandemic periods.

5 Conclusion

This scoping review mapped the current evidence on hospitalizations for ACSCs during the COVID-19 pandemic. Across the 16 included studies, most findings pointed to an overall decrease in ACSCs-related hospitalizations, particularly for respiratory conditions such as asthma and COPD. However, substantial heterogeneity in the included conditions, data sources, and healthcare contexts limited comparability across studies.

Changes in health-seeking behaviour, infection-prevention measures, and the reorganization of healthcare systems influenced hospitalization patterns. As a result, evidence remains fragmented and essentially derived from high-income countries only. Few studies explicitly analyzed primary care disruptions or post-pandemic trends, indicating a major gap in the literature especially concerning low- and middle-income countries.

During pandemics, ACSCs hospitalizations may become a misleading indicator of primary care performance because changes reflect not only care quality but also altered health-seeking behaviour, hospital reorganization and public health restrictions.

Author contributions

FM: Conceptualization, Data curation, Formal analysis, Writing – original draft. MB: Conceptualization, Data curation, Formal analysis, Writing – original draft. ER: Conceptualization, Data curation, Formal analysis, Writing – original draft, Methodology. EB: Methodology, Supervision, Validation, Writing – review & editing. EP: Conceptualization, Data curation, Formal analysis, Writing – review & editing. FT: Supervision, Validation, Writing – review & editing. MR: Funding acquisition, Supervision, Validation, Writing – review & editing. AD: Funding acquisition, Supervision, Validation, Writing – review & editing. LR: Funding acquisition, Supervision, Validation, Writing – review & editing.

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Conflict of interest

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/femer.2026.1954292/full#supplementary-material

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