Hospital indicators after implementation of bed regulation strategies: an integrative review

Indicadores hospitalares após implantação de estratégias relacionadas à regulação de leitos: revisão integrativa

Indicadores hospitalarios después de implementar estrategias relacionadas con la regulación de camas: una revisión integradora

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ABSTRACT

Objectives: to analyze the scientific evidence available in literature on hospital indicators after implementation of bed regulation strategies. **Methods:** this is an integrative review conducted with studies available in five databases and in the reference database of the Center for Study and Research in Nursing Services Management in October 2019. Articles on hospital bed management, available in full in English, Spanish or Portuguese, without temporal delimitation were included. **Results:** 1,118 eligible articles were found, of which 37 were duplicated. Among 1,081 pre-selected studies, 112 studies were eligible and 11 articles were included. Six studies addressed the emergency services. Three addressed hospital indicators in general, another focused on a psychiatric ward and one analyzed the indicators of two hospitals administered differently. **Conclusions:** the studies focused on emergency services, demonstrating the importance of organizing these services for health institutions.
Descriptors: Indicators; Management Indicators; Strategies; Bed Occupancy; Beds.

RESUMO

Objetivos: analisar as evidências científicas disponíveis na literatura sobre indicadores hospitalares após a implantação de estratégias de regulação de leitos. **Métodos:** revisão integrativa realizada com estudos disponíveis em cinco bases de dados e no banco de referências do Núcleo de Estudo e Pesquisa em Gestão de Serviços de Enfermagem em outubro de 2019. Utilizaram-se como critérios de inclusão artigos sobre gestão de leitos hospitalares, disponíveis na íntegra nos idiomas inglês, espanhol ou português, sem delimitação temporal. **Resultados:** encontraram-se 1.118 artigos elegíveis, desses, 37 apresentavam-se duplicados. Dentre 1.081 estudos pré-selecionados, 112 estudos eram elegíveis, sendo incluídos 11 artigos. Seis estudos abordavam os serviços de emergência. Três abordavam os indicadores hospitalares em geral; outro tinha como foco uma enfermaria psiquiátrica; um analisou os indicadores de dois hospitais administrados distintamente. **Conclusões:** o foco dos estudos concentra-se nos serviços de emergência, demonstrando a importância da organização desses serviços para as instituições de saúde.
Descritores: Indicadores; Indicadores de Gestão; Estratégias; Ocupação de Leitos; Leitos.

RESUMEN

Objetivos: analizar la evidencia científica disponible en la literatura sobre indicadores hospitalarios tras la implementación de estrategias de regulación de camas. **Métodos:** revisión integradora realizada con estudios disponibles en cinco bases de datos y en la base de datos de referencia del Centro de Estudios e Investigaciones en Gestión de Servicios de Enfermería en octubre de 2019. Los criterios de inclusión fueron artículos sobre manejo de camas hospitalarias, disponibles íntegramente en inglés, español o portugués, sin límite de tiempo. **Resultados:** se encontraron 1.118 artículos elegibles, de los cuales 37 fueron duplicados. Entre 1.081 estudios preseleccionados, 112 estudios fueron elegibles, incluidos 11 artículos. Seis estudios abordaron los servicios de emergencia. Tres indicadores hospitalarios abordados en general; otro centrado en un pabellón psiquiátrico; uno analizó los indicadores de dos hospitales administrados por separado. **Conclusiones:** el enfoque de los estudios está en los servicios de emergencia, lo que demuestra la importancia de organizar estos servicios para las instituciones de salud.
Descriptores: Indicadores; Indicadores de Gestión; Estrategias; Ocupación de Lechos; Lechos.

INTRODUCTION

Demand for health care in hospital services increases exponentially; however, the same is not the case with availability of resources. This causes hospital managers to have to work with rationalization of resources to assist the population[1-2].

Faced with the high demand for health services, there is insufficiency of hospital beds, culminating in delay in admission of patients in the emergency room, cancellation of elective surgeries, inappropriate use of beds and failure to flow transfers between care units, causing repercussion in intensive care units (ICUs)[2-3].

These problems contribute to increased hospital stay, decreased bed turnover, as well as the number of surgical procedures, among others, which may compromise the quality of health care[4].

Health care institutions have invested in implementing patient flow management systems, which allow demand to be taken care of through the addition of capacity, increasing the efficiency in the use of hospital beds, reducing the waiting time for hospitalization and optimizing surgical scheduling[1]. In this regard, it is noteworthy that implementing these systems contributes to monitoring and planning hospital occupation, enabling the optimization of admission processes up to discharge[3,5].

In Brazil, the Ministry of Health published two Ordinances to manage the high demand for health care. The first is Ordinance 1,663/2012, which provides for the SOS Emergencies Program, proposing strategies for organizing emergency services, with the objective of making assistance more agile and effective. In this Ordinance, the Internal Bed Regulation Committee (NIR - *Núcleo Interno de Regulação de leitos*) is presented as a management tool for the organization of emergency services[6-7].

On the other hand, Ordinance 3,390/2013 provides for the Brazilian National Hospital Care Policy (PNHOSP - *Política Nacional de Atenção Hospitalar*), which organizes the Health Care Network (RAS – *Rede de Atenção à Saúde*) that mentions NIR as a service responsible for institutional coordination, which should manage hospital beds centrally, and act with an interface between institution and corresponding Regulatory Centers[7].

Still in this context of tools and strategies for reorganization of services, the system designated as bed management emerges, which is an important part of planning operational capacity, controlling and efficient using resources. This system allows the accommodation of patients from emergency services without compromising the assistance to elective demand[2-3]. This management organizes the allocation of new admissions to vacant beds based on real-time knowledge of the hospital census and the demands for hospitalization. Additionally, it allows assessing and carrying out actions that optimize the entire hospitalization process until hospital discharge[8].

These strategies proposed by the Ordinances and management tools aim to improve the planning and control between bed supply and demand, allowing the maintenance of the viable occupancy rate for the use[3,8] and provision of assistance to the population without increasing human and structural resources.

OBJECTIVES

To analyze the scientific evidence available in literature on hospital indicators after implementation of bed regulation strategies.

METHODS

Ethical aspects

Considering that this study is an integrative review without involvement of human beings, there is no need for approval by a Research Ethics Committee.

Study design

This is an integrative review, in which there is meeting, assessment, and synthesis of research results on a given theme.

Methodological framework and steps

To carry out this research, the following steps were taken: review protocol preparation, primary study search, data extraction, assessment of included articles, interpretation of results, and review presentation[9].

To formulate the research question, PICO strategy (acronym for patient, intervention, comparison, outcomes) was used. The research question was: what scientific evidence is available in literature on hospital indicators related to the implementation of a service or bed regulation strategies? For the first item of the strategy, P stands for indicators; I represents service and bed regulation strategies. The two other elements of the strategy, C and O, were not used, considering that no comparison was defined nor the desired result.

Articles addressing the theme in hospital bed management, available in English, Portuguese or Spanish and available in full were included. Gray literature, secondary studies, literature review and tertiary studies were excluded from the study, and there was no temporal delimitation due to the scarcity of studies.

Study search took place in October 2019 in five databases: Cumulative Index to Nursing and Allie Health Literature (CINAHL), Latin American and Caribbean Literature on Health Sciences (LILACS), Medical Literature Analysis and Retrieval System Online (MEDLINE), Web of Science (WOS), and Scopus. Moreover, we used the database of organized references of the Center for Study and Research in Nursing Services Management of *Universidade Estadual de Londrina*, PR (NEPGESE - *Núcleo de Estudo e Pesquisa em Gestão de Serviços de Enfermagem*).

The descriptors used for search in LILACS were selected in the Descriptors in Health Science (DeCS) of the Virtual Health Library (VHL), which are: quality indicators in health care, basic health indicators, management indicators, health information management, service indicators, organization and administration, bed occupancy, beds, number of beds in hospital and hospital administration. The keywords used to search this database were: quality indicator, health system efficiency indicators, health risk estimation, health indicator, health risk measurement, health level indicators, health information management, management, management, management, hospital bed, hospital organization and administration, hospital management, bed regulation center, bed management, access to health services, and health regulation and supervision.

The descriptors used for searching the MEDLINE, WOS, CINAHL and Scopus databases were selected in the MeSh Database,

which were: quality indicators health care, health information management, bed occupancy, hospital administration, organization and administration, benchmarking. The keywords used in these searches were: global trigger tool healthcare, healthcare global trigger tool, quality indicators healthcare, administration hospital, hospital organization and administration, organization and administration hospital, benchmark, benchmarking Health Care, department of bed occupancy, access to health services, regulation and supervision of health.

In addition to the controlled descriptors, the term "bed management" was used in all studies. Chart 1 shows the search strategies performed in the databases.

To assess the level of scientific evidence of all studies, we used the type of study informed by the authors of the studies included in the sample and the concept of classification into seven levels was used: level 1 - systematic review or meta-analysis of randomized clinical trials; level 2 - well-delineated randomized clinical trials; level 3 - well-delineated clinical trials without randomisation; level 4 - well-delineated cohort and case-control studies; level 5 - systematic review of descriptive and qualitative studies; level 6 - descriptive or qualitative study; level 7– evidence from the opinion of experts[10].

Analysis of results was performed descriptively, presenting the synthesis of each study, highlighting the authors, database, level of evidence, objectives, indicators and the main results of the studies included in this review.

RESULTS

In the first phase of analysis, after reading all titles and abstracts (n=1,118), 37 were excluded because they were duplicated in the MEDLINE and WOS databases, another 969 because they were not related to the chosen theme (n=921), 29 case studies and 19 studies. In the second analysis, by reading the full article (n=112), 101 studies were excluded, of which 85 did not answer the research question and 16 were not found in full.

As for the 16 studies not available in full, it is noteworthy that the researchers sought them through the Federated Academic Community (CAFe - *Comunidade Acadêmica Federada*) of three educational institutions and also through Bibliographic Commutation (COMUT - *Comutação Bibliográfica*), and the studies were excluded only after not succeeding in these attempts.

Chart 2 below presents the main findings of studies included in this review.

It was found that the studies included in this review focused on bed regulation strategies, as well as on improving the quality and efficiency of services, especially beds. All studies showed evidence level 6[3,11-20].

Among the 11 studies found, six were directly related to bed regulation strategies in the emergency service[13-16,19-20]. Three others addressed the hospital service in general[3,12,18], another focused on a psychiatric ward[11] and one analyzed the indicators of hospitals administered distinctly[17].

As for the type of institutions, it was found that most were public (n=6)[3,13,16,18-20], three others also had the university character[14-15,17], one study included public and private hospitals[12] and another did not specify the character of the institution[11].
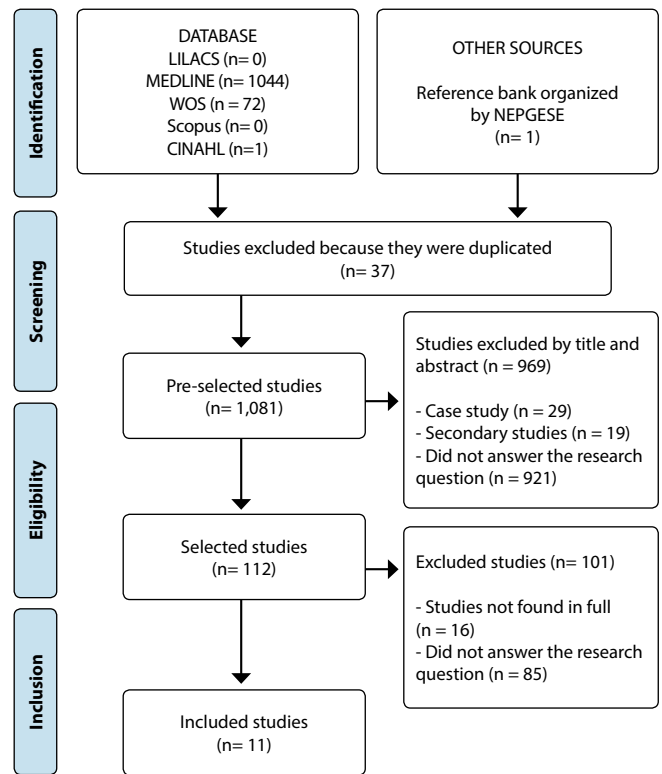

Figure 1- Flowchart of the selection of articles included in this study, Londrina, Paraná, Brazil, 2019

Chart 1 - Search strategy used in databases, Londrina, Paraná, Brazil, 2019

Database	Strategy
LILACS	(*Indicadores de Qualidade em Assistência à Saúde*) OR (*Indicadores Básicos de saúde*) OR (*Indicadores de gestão*) OR (*Gestão da Informação em Saúde*) OR (*Indicadores de serviços*) OR (*Indicador de Qualidade*) OR (*Indicadores de Qualidade*) OR (*Indicadores da Eficiência do Sistema de Saúde*) OR (*Estimativa de Risco de Saúde*) OR (*Estimativa de Riscos para a Saúde*) OR (*Indicadores de Saúde*) OR (*Indicador de Saúde*) OR (*Medição de Risco em Saúde*) OR (*Indicadores do Nível de Saúde*) OR (*Gerenciamento de Informação em Saúde*) AND (*Organização e Administração*) OR (*Ocupação de leitos*) OR (*Leitos*) OR (*Número de leitos em hospital*) OR (*Administração Hospitalar*) OR (*Gerência*) OR (*Gerenciamento*) OR (*Gestão*) OR (*Leito Hospitalar*) OR (*Leitos Hospitalares*) OR (*Organização e Administração Hospitalar*) OR (*Organização e Administração de Hospitais*) OR (*Gestão Hospitalar*) OR (*Núcleo de regulação de leitos*) OR (*gerenciamento de leitos*) OR (*Núcleo interno de regulação de leitos*) OR (*acesso aos serviços de saúde*) OR (*regulação e fiscalização em saúde*) AND (Bed management)
MEDLINE WOS Scopus CINAHL	(Quality Indicators, Health Care OR Global Trigger Tool, Healthcare OR Healthcare Global Trigger Tool OR Quality Indicators, Healthcare OR Health Information management) AND (Bed occupancy OR Hospital Administration OR Administration, Hospital OR Hospital Organization and Administration OR Organization and Administration, Hospital OR Benchmarking OR Benchmarking, Health Care OR Benchmarking, Healthcare OR Departament of bed occupancy OR Access to health services OR Regulation and supervision of health) AND (Bed management)

Chart 2 - Distribution of studies included in the integrative review according to authors, year, database, level of evidence, objective, assessed indicators, main results, Londrina, Paraná, Brazil, 2019

Authors Year Database Level of Scientific Evidence (LoE)	Objective (s)	Rated indicators	Main results
ADLINGTON et al.[11] 2018 MEDLINE LoE: 6	Demonstrating the results of the implementation of a project to reduce length of stay and occupancy rates of the Leadenhall ward.	Average length of stay, occupancy rate, number of beds occupied per day, number of admissions per week and readmission rate in 28 days.	In the first year, the average length of stay decreased from 47 to 30 days. The occupancy rate went from 77% to 55%. The number of admissions did not change, but the number of occupied beds decreased due to the reduction of the average length of stay and stable admission and readmission rates.
SAJADI et al.[12] 2017 MEDLINE LoE: 6	Comparing the performance indicators of all types of hospitals before and after implementing the Hospital Care Transformation Plan (HCTP).	Occupancy rate, average length of stay, turnover rate, days of occupied beds, internal care, outpatient care, emergency care, hospital mortality rate, number of surgery and normal delivery rate.	The average occupancy rate went from 62.79 to 68.5. The average length of stay was 2.82 to 2.65 days. The average turnover rate went from 6.7 to 8. The average number of occupied beds increased from 116,405 to 130,804. Regarding the average number of inpatients, outpatients and emergency patients, it went from 39,791 to 46,463, 606,068 to 639,086, and from 125,185 to 127,910, respectively. The mean hospital mortality rate decreased from 13.2 to 11.1. The average number of surgeries increased from 17,388 to 21,097 and the mean normal delivery rate went from 34 to 38. Occupancy rate, turnover rate, bed occupancy, care of hospitalized patients and the number of surgeries increased in all types of hospitals. Outpatient care increased in all institutions, except in private ones. The results revealed that length of stay and mortality rate decreased in all types of hospitals, while the mortality rate had a higher decrease in public hospitals and a smaller decrease in semi-public hospitals.
RICHARDSON et al.[13] 2017 MEDLINE LoE: 6	Determining the impact of a multimodal hospital intervention, supported by management, on measures of accommodation and quality of emergency service.	Number of emergency room visits, average number of patients in the emergency department, number of bed admissions, number of admissions slated for short-stay, number of patients who do not wait for care, percentage of patients seen within 4 hours, average hours for accommodation and resubmission rate within 72 hours.	During the intervention period, the emergency service increased by 9.1% compared to the previous year. It increased care for older adults. The number of admissions to the ward and short-term hospitalization increased 13.0% and 42.3%, respectively. The average occupancy fell to 22.6%. There was a significant increase in relation to care within 4 hours. The readmission rate showed no significant difference.
KHALIFA[14] 2015 MEDLINE LoE: 6	Assessing the effects of the training program of nurses of the emergency service and accessibility of information on the length of stay of patients.	Time between arrival at the service and screening, time between sorting and transfer to bed, time between transfer to bed and medical care, time between care and conduct (discharge or hospitalization), length of stay in the emergency service.	Comparing the indicators of the first quarter of 2015 and the first quarter of 2014, there were reductions of 25.5% in the time interval between patients' arrival and screening, of 17.7% between screening for transfer to bed, an improvement of 16.1% in the interval between transfer to bed and medical care and 13.2% improvement in the interval between the doctor and the conduct (discharge or hospitalization).
CRILLY et al.[15] 2015 MEDLINE LoE: 6	Implementing the Patient Admission Prediction Tool (PAPT) and assessing its effects on decision-making strategies and daily and weekly patient flow results.	Number of patients in the emergency service awaiting ward bed, level of operational safety in the emergency service, forecasts for the number of total hospitalizations in the emergency service and elective surgery.	The average number of daily visits increased between pre- and post-intervention in hospital A and decreased in hospital B. The number of hospital admissions did not increase significantly in hospital A, but increased in hospital B. The average number of hospital admissions to both hospitals did not differ significantly before and after the intervention. In hospital A, total occupation increased, with no change in functional occupation; in hospital B, total occupation decreased while functional occupation increased. All hospital occupancy rates exceeded 90% in 125 of 179 days.

Chart 2

Authors Year Database Level of Scientific Evidence (LoE)	Objective (s)	Rated indicators	Main results
SULLIVAN et al.[16] 2014 MEDLINE LoE: 6	Describing the process of development and implementation of the reform of access to emergency services, assessing the effects on patient flow and indicators at Princess Alexandra Hospital over 12 months.	Percentage of patients who left the emergency department; length of stay in the emergency service; unadjusted hospital mortality and standardized hospital mortality rate; readmission fee in service in 48 hours; call rate of the rapid response team on admission; number of complaints from the emergency department and employee perception of the reform National Emergency Access Target (NEAT).	Care within 4 hours increased for all emergency room patients (from 32% to 62%). The mean length of stay in the emergency department was reduced from 7.2 to 4.4 hours and for patients who were hospitalized went from 9.7 to 6.7 hours. Each phase of patient care in the emergency service decreased by approximately 30%. Mortality decreased from 2.3% to 1.7% (p=0.045) and the standardized hospital mortality rate for all acute hospitalizations decreased from 93 to 72 (p <0.001). The reduction in the standardized hospital mortality rate was inversely correlated with increased compliance with neat access (p <0.001). The number of patients who did not wait for care decreased (from 6.9% to 1.9%; p <0.001) as well as the number of complaints (from 12 to 6 per month). There was an increase in resubmissions to the emergency department within 48 h among patients discharged (from 3.1% to 3.8%; p=0.023) without additional increase in maintenance period. The annual number of attendance increased by about 5%. The perception of resistance to changes in practice and interaction with other professionals and uncertainty regarding the relevance of NEAT stood out. Communication, collaboration between units, reduction of overcrowding and greater patient satisfaction were positive aspects highlighted.
GHOLIPOUR et al.[17] 2013 MEDLINE LoE: 6	Assessing the performance of Tabriz obstetrics and gynecology hospitals using the Pabon Lasso model to make comparisons between Al-Zahra and Taleghani hospitals and determine whether Al-Zahr Hospital performed better.	Occupancy rate, turnover rate and average length of stay.	The length of stay at Al-Zahra Hospital is 3.15 (2.15) days, 1.88 (0.97) days for prenatal wards and 6.13 (0.97) days for neonatal wards while at Hospital Taleghani it is 3.37 (3.09) days 1.74 (0.14) days for perinatal wards and 5.96 (3.55) days for neonatal wards. The maximum occupancy rate at Hospital Al-Zahra was 86.92% for Taleghani was 70.09%. The lowest occupancy rate was at Hospital Taleghani (68.44%) (p <0.001). Regarding the performance of hospitals in a Pabon Lasso Model, Hospital Taleghani remains mainly in zone 1 and some cases in zone 2, while the indicators of Hospital Al-Zahra fall in zones 2 and 4 of the graph. Al-Zahra Hospital faces overload and Taleghani Hospital does not fully use its capacity. Hospital Al-Zahra performed better.
SULKU[18] 2011 MEDLINE LoE: 6	Investigating the impact of the Health Transformation Programme (HTP) on the efficiency and productivity of public hospitals in Turkey.	Number of outpatient care, number of hospitalizations, number of surgeries, number of beds (general and specialty), total number of surgeries, bed occupancy rate, mortality rate, length of hospital stay.	There was an increase in the number of outpatient care, number of hospitalizations, number of adjusted hospitalization cases per case and surgeries increased between 2001 and 2016, as well as the number of surgeries, 78%, 30.3%, 20% and 122%, respectively. The total number of beds, specialties and general practitioners increased by 18%, 26% and 27.7%, respectively. The occupancy rate remained unchanged (55%). Ministry of Health (MoH) hospitals, on average, showed growth in total factor productivity. HTP has generally been successful, boosting productivity due to advances in technology and technical efficiency, but in socially and economically disadvantaged institutions, productivity gains have not been achieved.
DE FARIA, et al.[3] 2010 Other source (NEPGESE) LoE: 6	Maximizing the use of hospital beds as well as increase surgical production with the implementation of Internal Bed Management and Surgical Agenda (GILAC).	Total hospital admissions per specialty, replacement interval, turnover rate, occupancy rate per specialty, average length of stay per specialty, number of surgeries, number of operating rooms, operating room occupancy rate, number of surgeries per working day, number of surgeries per room per working day.	One year after the implementation of GILAC, the number of hospitalizations increased from 390 to 825. The number of beds increased from 165 to 225. The turnover index increased from 3.06 to 3.40, and the substitution interval went from 2.94 to 1.5. Occupancy rates for clinical and surgical beds increased from 77 and 57% to 87 and 79%. The average length of stay for clinical patients decreased from 9.88 to 8.7 days, while for surgical patients, it increased from 4.05 to 5.0 days. The number of procedures increased from 209 with three operating rooms to 483 operations with eight operating rooms. The occupancy rate of the surgical center went from 71 to 82%.
KINSMAN et al.[19] 2008 MEDLINE LoE: 6	Assessing the impact of a streaming model, previously validated in metropolitan emergency services, on selected performance indicators in a regional emergency service.	Percentage of emergency patients admitted to an inpatient bed within 8 h of emergency patients not admitted with a length of stay of less than 4 hours of emergency patients who left without being seen by a doctor or nurse.	After 12 months the streaming was implemented, there was a 9% increase in emergency care. Approximately 47% of the visits were allocated to the gold stream (complex treatment), while 53% were allocated in the blue stream (less complex treatment). After the intervention (streaming), the service in less than 8 hours increased on average 0.30% per month, representing a net reversal in the trend of 0.62% per month (p=0.008). After the intervention, the upward trend in 4 hours was reversed, increasing on average 0.20% per month, representing a net reversal in the trend of 0.54% per month (p=0.004). There was no significant trend in the indicator "not waiting for care" of the doctor or the nursing team after the intervention.

To be continued

Chart 2 (concluded)

Authors Year Database Level of Scientific Evidence (LoE)	Objective (s)	Rated indicators	Main results
COBELAS et al.[20] 2001 MEDLINE LoE: 6	Focusing on teams' perceptions about changes in performance indicators between 1995 and 1998, the possible factors that helped or slowed performance changes, and to what extent the Emergency Services Enhancement Program (ESEP) contributed to changes in patient care.	Changes after the introduction of the ESEP: ambulance diversion rates, emergency waiting time, access to the bed, perceived general change and factors that aid or delay change.	One hundred one employees participated in focus groups. Participants noticed an improvement of 20% in waiting times and 0.5% in access to the bed. In statistical analysis of real changes in access to the bed, there was a tendency for improvement; however, it did not show statistical significance. Most respondents (43%) reported that there was improvement over the 3 years with ESEP. The factors cited as capable of bringing improvements were changes in the profile team, managing patient flow through the emergency service, changes in administrative policies, changes in work practices and changes in the number of employees. There was considerable disparity between the perceptions of managers and employees of the emergency service as well as the hospital type in relation to the change and the perceived contribution of ESEP.

In relation to the locations of the research, it was found that half of the studies were from Australia (n=5)[13,15-16,19-20], two from Iran[12,17] and the other four from Turkey[18], Brazil[3], United Kingdom[11], and Saudi Arabia[14].

DISCUSSION

A health system, like any other system in society, constantly changes, and may have its stability threatened. Therefore, it is necessary to make adjustments and improvements concomitantly. It is in this sense that tools, programs and services that reorganize care flow in health institutions emerge in order to organize and improve the quality of care and the overall result[12].

These strategies are presented as an alternative to meet the high demand in the face of insufficient resources in most hospital institutions[1]. From the Brazilian perspective, they are presented as a measure to overcome the reduction in the number of beds, considering that between 2008 and 2013 the Unified Health System (*Sistema Único de Saúde*) presented 11,938 fewer hospital beds[21]. However, they are also related to the use of the maximum capacity of available resources, considering that the inefficient use of beds impacts hospital revenue[22].

Maximum capacity is not only related to the number of beds available, but to the ability to manage them regarding the admission, treatment and discharge of adequate patients[23].

Five Australian studies included in this review specifically address regulatory strategies in the emergency service[13,15-16,19-20], demonstrating the relevance of this theme in the country. The first Australian survey included in this review addressed ESEP, introduced in 1995, with the aim of contributing to improving the delivery of care, infrastructure and bed management in Victoria state emergency services. It addressed the team's perception of the changes in the indicators after the implementation of ESEP, demonstrating that, in general, the strategy presented positive results regarding waiting time, access to beds and potential factors of change[20].

It is observed that in Australia the emergency service is an important focus of study and attention of health institutions, because it is known that overcrowding and inadequate patient flow are able to delay care, contributing to exposure to avoidable risks[16]. In 2000, another strategy appears in the Australian literature, the Victorian Patient Management Task Force, which addressed the flows of Victoria's metropolitan hospitals in general, discussing above all the emergency services[24]. Then, at Bendigo Health, the streaming model appears, which replaced the traditional emergency service risk classification system and was the focus of the study conducted by Kismann et al.[19]. In this study, the authors found that the percentage of patients who required hospitalization and were referred to a bed in less than 8 hours increased as well as the percentage of patients who were seen within 4 hours and were discharged[19].

Subsequently, in 2012, NEAT, another strategy established in hospitals, aimed at organizing care and improving hospital indicators related to emergency services[16]. Sullivan et al.[16] described NEAT development and implementation processes in a Brisbane tertiary hospital; in addition, it assessed the effects of this reform on patient flow and indicators. In another Australian study, the authors implemented an emergency service care prediction tool called PAPT, which was used in two hospitals with distinct capabilities and served as a decision-making tool for bed management, initially for the two institutions in the study and subsequently made available to all 31 public hospitals in Queensland that use the Emergency Department Information System[15].

The Australian institution Canberra and Health Services (CHS), after the introduction of NEAT, developed a hospital intervention supported by management to improve emergency service quality indicators[13]. In this regard, it is observed that Australia has implemented strategies in emergency services, in order to organize patient care flow and improve quality of care.

In Brazil, care flow organization and improvement of quality of care in emergency services began with the Reception with Risk Stratification, contemplated in the *HumanizaSUS* policy of the Ministry of Health. This strategy was implemented to classify patients who needed emergency care according to their risk or degree of suffering, organizing the queues of this service, usually overcrowded, ensuring that the most urgent cases do not get worse in the queue due to lack of adequate care[25].

Also on specific developed strategies in the emergency sector, in Saudi Arabia, the King Faisal Specialist Hospital and Research Center Saudi Arabi, together with the departments of informatics, emergency and information technology, conducted a training program for emergency service nurses regarding accessibility to information related to patient length of stay, which demonstrates a variety of measures and/or strategies with a common objective of improving care and hospital indicators[14].

Studies that addressed hospital bed regulation strategies in general[3,11-12,18] presented basically the same indicators: length of stay, number of patients or care, occupancy rate.

Care flow organization in Brazil was initiated in emergency services and expanded through PNHOSP, in which RAS were organized and NIR was defined[7].

Subsequently, the publication of the manual of implementation and implementation of NIR by the Ministry[26] clarified the role of the service in hospital institutions, highlighting the three pillars of action: regulation practice, articulation with RAS and monitoring of indicators. Furthermore, it addressed the human resource necessary for the activities.

Although there are public policies and strategies regarding organization of care and regulation of beds implemented in Brazil, many studies that specifically addressed this theme were not found. This scarcity of research makes it difficult to compare indicators between institutions with similar profiles, especially not demonstrating the effectiveness of implementing NIR.

In Iran, since 2013, a new reform has been initiated in the country's health system, called HTP, which includes several programs interventions in primary and hospital care SAJADI et al.[12]. This plan, in relation to hospital care, developed seven programs, aiming to increase access to the health service. Among these actions were the reduction of hospital costs, availability of professionals and specialized care, improvement of hospitality, incentive to natural delivery, financial support to patients most in need and improvement of the quality of outpatient care[27]. A first study that assesses the effectiveness, efficiency and productivity of this plan showed that the turnover rate, average length of stay and occupancy rate improved, which may be related to the improvement of hospital efficiency after implementing HCTP. However, the authors stated that this was not an objective of the plan, but it was a finding that should not be ignored and deserves more detailed studies[12].

HTP began in 2003 in Turkey and emerged as a reorganization of the country's health system, culminating in an agreement of a global budget for all hospitals of the Ministry of Health. Moreover, later, the Social Security Institution (SSI) developed aggregate values for inpatients and outpatient services through a coding system. This program was successful, especially in relation to increased productivity due to advances in technology and technical efficiency; however, in socially and economically disadvantaged institutions, there was no improvement in productivity[18].

It was found that all strategies and programs[3,11-20] presented in the studies included in this review presented positive results in part of the indicators addressed. Among the indicators that showed improvement, we highlight length of stay, occupancy rate, mortality rate, and length of care.

Study limitations

In addition to limiting the number of studies on the subject, it was observed that the level of evidence of these studies is low, demonstrating the need for research with methods of level of scientific evidence considered higher. Another limitation was the inclusion of a Brazilian study not located in the selected databases, which was part of the reference database organized by NEPGESE, demonstrating the scarcity of national studies.

Contributions to nursing, health, and public policies

Although most studies assess the indicators mentioned above, it is noteworthy that health institutions present numerous others that could be analyzed, allowing the expansion of service assessment.

CONCLUSIONS

This integrative review showed that strategies and/or services related to bed regulation are more frequently related to emergency services. However, there was a scarcity of literature on the subject, especially at the national level, considering that most of the articles in this review are international, mainly from Australia.

Despite the scarcity of national studies on the subject, it is believed that this is not related to specific national problems or characteristics, considering that Brazil has a public health system presenting a large number of public health institutions as well as the hospitals presented in the studies of this review. Furthermore, the country presents several programs aimed at organizing care flow and improving hospital indicators. Therefore, it is believed that Brazilian institutions are developing strategies and services on the subject, however, they are not described in the literature.

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