ORIGINAL ARTICLE

Implementation of the Internal Regulation Center in a public university hospital: care and management interfaces

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ABSTRACT

Objective: to describe the implementation process of the Internal Regulation Center in a public university hospital and its interfaces in care and management processes. **Methods:** documentary, exploratory, and descriptive study carried out in a public teaching hospital in the north of the State of Paraná. Data collection took place between January and September 2020 in institutional documents. **Results:** The service was implemented in four stages following strategic actions. Stage 1 provided an insight into the interfaces of the bed management process. In stage 2, the strategies adopted in the implementation of bad management and their interfaces with the management and care sectors were elaborated. In stage 3, institutional performance indicators were monitored, and in stage 4, adjustments were made to the electronic monitoring system for hospital indicators. The biggest challenge faced was the training and acceptance of professionals from the multidisciplinary team in adhering to this new bed management model. **Conclusions:** The description of the implementation of the NIR in a public university hospital highlighted the importance of developing a strategic plan carried out prior to the implementation of the nucleus, as well as detailing all the actions to be adopted.

Keywords: Effective access to health services, Hospital administration, Total quality management, Bed occupancy, Delivery of health care.

INTRODUCTION

Health organizations face the challenge of establishing planning tools and actions that enhance and qualify hospital performance indicators[1] to guarantee universal health access and coverage[2]. According to the World Health Organization (WHO), universal access corresponds to the care of all people and communities, through the provision of comprehensive, timely, and quality health services, appropriate to the demands and needs of the target public[3].

Universal coverage encompasses the systems' ability to meet demands at all levels of health care, providing adequate infrastructure and staff numbers, as well as technologies, guaranteeing well-being without organizations suffering financial damage[3]. In 2013, the Ministry of Health (MoH), concerned about the organizational performance of the Health Care Network (HCN), drew up the National Hospital Care Policy (PNHOSP) within the scope of the Unified Health System (UHS), which was instituted by Ordinance No. 3,390/2013, to establish guidelines and interfaces with health services[4]. According to the provisions of this Ordinance, hospitals that provide actions and services for the UHS are linked

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to a reference population, with a defined territorial base, and regulated access, with care by referred and/or spontaneous demand.

It is therefore essential to manage processes to ensure that health needs are met through the interfaces between the various services and meet the demands of the population[4]. As such, the PNHOSP proposes the Internal Regulation Center (IRC) as a strategy for creating an interface between health services and the Regulation Centers, as well as outlining the complexity of care that health institutions represent within the UHS.

It also aims to provide outpatient consultations, diagnostic and therapeutic support services, as well as inpatient beds, according to pre-established criteria for the agreed care profile[4]. Bed management actions performed by a specific team allocated to the internal bed regulation nucleus enhance institutional management and optimize the use of vacancies in health services[5]. There is evidence of good results from the implementation of an IRC in a teaching hospital, showing an improvement in care and management indicators, with a correlation between management and bed regulation[6].

However, although IRC implementation improves hospital performance indicators, there is a need for greater investment by organizations to improve their management process[7]. It is important to note that the rules for implementing the IRC were only consolidated in 2018 when the Ministry of Health published the first manual to standardize the implementation of this service. As a result, several institutions that preceded this date implemented their centers without guidelines and in a disorganized manner, only following their organizational needs established by customized protocols and processes.

The IRC aims to organize actions such as diagnostic and therapeutic services, and it is extremely necessary to monitor the epidemiological profile of institutional care, as well as its processes to promote adjustments to HCN flows and also internally to the areas involved in bed management. It is important to establish an implementation policy with systematized benchmarks for steps, which can be delimited and measured using performance indicators, considering the difficulty of adherence by the areas involved, as well as the need to change the organizational culture, given that hospitals are complex institutions with deep-rooted routines and organizational cultures[8].

The manual for implementing the IRC proposed by the Ministry of Health minimally suggests that the stages include defining the objectives and duties and planning the actions to achieve the objectives and recommended actions so that the bed management process can be validated by senior management and the areas involved.

Given the need to qualify institutional management and the implementation of the IRC in public hospitals as a policy adopted by senior management, this study aimed to describe the process of implementing the Internal Regulation Center in a public university hospital and its interfaces with care and management processes.

METHODS

Study type

Documentary, exploratory, and descriptive study on the implementation of the IRC in a public university hospital in the north of the state of Paraná, which took place in July 2016, based on the principles and guidelines proposed in the National Hospital Care Policy[4].

Place

The purpose of the hospital under study is to serve and support the academic, care, and administrative activities carried out at the university in health. It has 409 beds fully available to the UHS, of which 252 are infirmary beds, 76 are Adult Intensive Care

Unit (ICU) beds, 10 are Pediatric ICU beds, 17 are Intensive Care Unit (ICU), and Neonatal ICU beds, 6 are Burn ICU beds (adult and child), and 45 are Emergency Room (ER) beds, distributed among the various medical specialties. In March 2020, due to the COVID-19 pandemic, the hospital became a reference in the care of patients with suspicion and diagnosis of the disease, going from 294 to 409 active beds, increasing its hospitalization capacity by 55%.

The hospital occupies a strategic position in the regional and state health system in the state of Paraná. It is a reference in medium and high-complexity care for the 17th Regional Health Department, the Northern Macro-regional, as well as several municipalities in the Northwestern Macro-regional, covering a population of approximately 1,625,012 people, who benefit from the services provided in almost all medical specialties[9].

Selection criteria

As a source of information, we selected the institution's official documents to support the actions required before, during, and after the IRC's implementation.

Data collection

Data was collected between January and September 2020 by analyzing institutional documents relating to the strategic planning carried out in 201610, as well as statistical reports on the hospital's production and performance produced by the Medical Archives and Statistics Sector, and data from the Hospital Management Information System covering the period from January 2016 to December 2019. It should be noted that the planning was developed through strategic and systematized meetings by senior management, together with the technical advisory team, employees from the directorates involved, and related areas. These strategies allowed those involved to pinpoint critical nodes to be worked on and modified, such as opportunities for improvement in the work process to be mobilized and implemented for bed management.

The instruments analyzed were: the Strategic Planning Spreadsheet for all the areas that make up the hospital, statistical reports for the period, and data from the information system, such as occupancy rate, average length of stay, bed turnover, replacement interval, hospital infection rate, number of admissions, discharges and deaths, number of emergency room visits, number of outpatient visits, number of surgeries, operating room occupancy rate, among others.

Data analysis and processing

The institutional data was analyzed to establish what actions would need to be taken to increase institutional productivity by using the available resources more efficiently to reduce hospitalization times without jeopardizing patient access to the necessary therapy. Given this premise, a Work Plan was drawn up and structured into four stages, ranging from identifying bottlenecks, implementing new practices, continuous monitoring and evaluation, and adapting the information system.

Ethical aspects

The development of the study complied with national and international research ethics standards, including approval by the Research Ethics Committee in April 2018, according to Opinion No. 2.618.220, under Resolution No. 466/12 of the National Health Council.

RESULTS

The IRC was implemented in July 2016 as an institutional policy, with the objectives of coordinating bed regulation within the hospital, controlling the supply of beds daily based on diagnostic and therapeutic resources, monitoring the

average length of stay by correlating it to the pathology to contribute to the hospital discharge plan, among other actions such as the flow of communication between the services incorporated into the hospital.

The service was implemented in four stages, according to the three pillars of the IRC, recommended by the Ministry of Health as strategic areas: regulation practices, articulation with the HCN, and monitoring[8], as shown in chart 1.

Chart 1: Description of the four stages and tactical and operational actions adopted in the implementation of the IRC in a public university hospital. Brazil, 2020.

Stage 1 - Identifying the care and administrative processes that interfaced with the bed management process.	
1. Identify the administrative and care services and processes that interface with bed management - 2nd quarter/2016	
Objectives	To enhance the IRC's actions regarding the efficient use of beds.
Expected results	Centralization of the scheduling of surgical procedures; Identification of the services that interfaced with bed management; Integration of the services involved: hospital hospitality, transport, scheduling, inpatient units, ER and operating room, Diagnostic and Therapeutic Support Services (DTSS) and release of high-cost procedures.
2. To conduct a pilot test on the electronic medical record to verify the functionality of the bed cleaning and maintenance management system - 3rd quarter/2016	
Objectives	To evaluate the applicability of this module to the hospital's reality.
Expected results	Pilot test of the bed cleaning and maintenance management system.
Stage 2 - Systematic definition of the strategies for implementing bed management and their interrelationships.	
1. Implement an internal/external transportation service linked to the IRC - 3rd quarter/2016	
Objectives	To organize internal/external transport actions in accordance with the IRC's strategic priorities.
Expected results	Collaborate to increase bed turnover; speed up the flow of patients on discharge or transfer from the unit.
2. Implement the IRC's Elective Scheduling Center and integrate actions with inpatient units, the Orthotics, Prosthetics and Special Materials Sector (OPSM), the Diagnostic and Therapeutic Support Service (DTSS) - 3rd quarter/2016	
Objectives	To ensure that test results and special materials are available on the scheduled date for procedures.
Expected results	Manage the scheduling of tests from outside the institution, with a view to shortening discharge, which depends on reports for diagnostic and therapeutic confirmation; Manage the scheduling of surgical risks in order to guarantee the procedure within the validity period of the tests; Rationalize the use of available resources; Provide special materials, orthoses and prostheses in good time and before the scheduled procedure; Reduce hospital stays.
3. Set up a housekeeping and hotel service in adult inpatient units - 3rd quarter/2016	

Objectives	To organize actions that can reduce the time it takes to sanitize and release beds.
Expected results	Collaborate with the increase in the bed utilization factor; Make beds available for new admissions as quickly as possible.
4. Implement the scheduling service for elective procedures - 3rd quarter/2016	
Objectives	To maximize the use of the institution's physical structure, human resources and surgical equipment;To rationalize the use of internal resources.
Expected results	Ensure the necessary conditions for elective surgery scheduling to be carried out; Manage the issuing and processing of Hospital Admission Authorizations (HAA); Manage the queue of patients waiting for elective surgeries at the institution, according to specialties; Managing hospitalization schedules according to the time of the scheduled elective surgery, so that patients are in the hospital up to two hours before the surgery; Qualifying the filling out of HAAs, by checking procedure codes; Structuring and implementing the preoperative service; Reducing the suspension of elective surgeries; Reducing patient absenteeism.
5. Institutionalize the multidisciplinary round, with the participation of the IRC nurse and social worker, in the care units with the highest demand for inpatient beds and which house the clinics with the highest volume of patients (cardiology, ER, and orthopedics) - 3rd quarter/2016	
Objectives	To improve operational efficiency and reduce costs; To prioritize and direct administrative, care and/or social demands; To raise awareness among care unit teams of the importance of the process developed by the IRC in achieving institutional objectives.
Expected results	Identifying opportunities for scheduled discharges, according to institutional protocols for de-hospitalization, based on the levels of overcrowding in the HC unit, guaranteeing the necessary conditions for continuity of treatment at outpatient or home level; Standardizing and articulating important information for the development of the proposed therapy for inpatients, together with the members of the multi-professional team.
6. Centralize bed regulation at the IRC via the State Bed Regulation Center - 3rd quarter/2016	
Objectives	To align the flow of admissions for regulated patients, according to the availability of vacancies and the conditions necessary to guarantee continuity of treatment.
Expected results	Monitoring and evaluating transfer requests based on what is established in the Regionalization Master Plan in the contractualization carried out with municipal and state health managers; Optimizing communication between HCN points.
7. Implementation of the “SBAR” tool (Situation, Brief History, Assessment and Recommendation) for use in patient transfers from the emergency room to inpatient units - 2nd quarter/2017	
Objectives	To improve formal institutional communication mechanisms, with a view to making them more effective.
Expected results	Ensure that information essential for continuity of care is not lost when patients move between care units.
8. Directing the work of the professional Social Worker in supporting the IRC multi-professional team - 2nd quarter/2018	

Objectives	To shorten the time it takes to resolve the social and/or family demands presented by hospitalized patients; To maximize the efficiency of the group's work, bearing in mind the social issues involved in speeding up discharges.
Expected results	Shorten the medical discharge; Ensure that the family is able to receive the patient at the time of discharge; Ensure that the patient stays in hospital only as long as is necessary for their recovery; Optimize the length of hospital stay.
9. Change in the routine of emergency room examinations and implementation of a differentiated stamp - 1st quarter/2018	
Objectives	To improve the identification of tests referred to the emergency laboratory that require priority in the report.
Expected results	Improve medical conduct.
10. Adhere to the Unified Health System Institutional Support and Development Program and implement the “Lean in Emergencies” project in the emergency room - 1st quarter/2018	
Objectives	To optimize the use of the resources available in the institution; To reduce overcrowding in the HC; To reduce the boarding time of patients in the HC.
Expected results	Defining the list of laboratory tests released for request in the Urgent and Emergency Care unit; Designing flows for all care and administrative processes, identifying bottlenecks and potential for improvement; Standardizing procedures for good bed management practices at an institutional level, under the coordination of the IRC; Reducing the time it takes for the Clinical Analysis Laboratory to release test results from the Urgent Care unit.
11. Implement a mixed surgical bed unit - 4th quarter/2016	
Objectives	To improve operational efficiency and reduce costs - high turnover beds
Expected results	Implementation of a mixed surgical bed unit.
Stage 3 - Systematic monitoring of institutional performance indicators, such as average length of stay, bed turnover index and bed replacement interval.	
1. Identify the administrative-assistance indicators related to institutional performance to be monitored by the IRC - 3rd quarter/2016	
Objectives	To measure and monitor the performance of indicators.
Expected results	Obtain metrics as a reference for the decision-making process and the creation of strategies to improve bed management.
2. Apply the bed replacement interval calculation on a monthly basis - 3rd quarter/2016	
Objectives	To obtain quantitative information on the bed replacement interval.
Expected results	Obtain information on the bed replacement interval.
3. Carry out a qualitative assessment of the data obtained by calculating the monthly bed replacement interval - 3rd quarter/2016	
Objectives	To obtain qualitative information on the bed replacement interval.
Expected results	Promote monitoring of the efficient use of beds.

4. Develop time measurement instruments - Reception with Risk Classification (RWRC) - 1st service, medical discharge, physical transfer - 3rd quarter/2016	
Objectives	To assess the critical points in patient flow within the hospital under study.
Expected results	Time measurement tools developed.
Stage 4 - Adaptation of the electronic hospital data monitoring system.	
1. Knowledge of the information system available at the institution, which stores patient information from admission to discharge - 2nd quarter/2016	
Objectives	To understand the reality and detect the system's strengths and weaknesses in terms of the information needed for bed management.
Expected results	To support the implementation of the IRC.
2. Development of a digital “boarding” monitoring tool, according to the assumptions of the Kanban Model - visual management methodology - 1st quarter/2018	
Objectives	To provide important information about hospitalized patients in a single information module, freely accessible to senior management; Facilitating the monitoring of length of hospital stay; Optimizing the daily planning of regulatory actions, based on the availability of strategic information electronically and in real time.
Expected results	Establish priorities in the daily planning of interventions with a view to responsible and timely discharge, based on expected length of stay scores by specialty.

All these steps were planned to maximize bed occupancy, reduce patient waiting times for appointments, surgeries, internal transfers, and bed maintenance, improve operational efficiency by increasing productivity without increasing beds, increase turnover by reducing costs with idle staff capacity, infrastructure, and wasted time, improve communication between areas, predictability of discharge, creation of references for the patient flow management process and guarantee accessibility, quality of care, and patient satisfaction.

To develop the IRC implementation project, the team was structured in such a way as to enable the centralization of institutional activities directly related to patient flows in the institution. From this perspective, the IRC was structured to carry out all internal patient transportation between units and external transportation for tests not available at the hospital.

The IRC team was made up of a nurse coordinator, appointed by the Superintendent Board; two nurses who regulate beds; an administrative technician who helps manage patient flow; a nurse who regulates surgical programming; an administrative technician to help manage surgical programming; a nurse who regulates UHS authorization reports; an administrative technician to help manage UHS authorization reports; a social worker; two nursing technicians responsible for patient check-in and check-out; three nursing technicians responsible for internal patient transport and three nursing technicians responsible for external patient transport.

DISCUSSION

The implementation of the IRC and the actions provided for in the strategic planning developed highlighted the challenge faced by hospital service managers in effectively managing the resources available and identifying strategies for improving access to health services, especially in making beds available.

The regulation practices adopted were cross-cutting actions to regulate access with the other healthcare points to optimize care resources. Articulation with the HCN made it possible to interface with hospital regulation centers and access networks, and monitoring made it possible to evaluate indicators, the flow of care, and length of hospital stay, under the IRC implantation and implementation manual for general and specialized hospitals[8].

The MoH recommends that the IRC be made up of a multi-professional and multi-sectoral team, with the following professionals: medical coordinator, nurse coordinator, assistant nurses, nursing technicians, assistant doctors of the specialties, heads of adjacent units, and administrative technicians. However, it allows this team to be customized according to the organization of the institution[4]. Therefore, in the service studied, the team was made up according to the availability of qualified staff to meet the demands of the IRC and its proposed actions.

According to the guidelines in the IRC Implementation Manual, it is recommended that a horizontal or per diem doctor be part of the team. However, in the hospital studied, the decision was made to start work on the IRC even without the temporary availability of this professional, as the administrative processes related to providing a doctor to work on bed regulation would be time-consuming and this would delay the implementation of the Center. However, the importance of the medical professional on the team is recognized, since the IRC's work with the institution's clinical staff is a strategic action for the development of effective management of institutional resources.

As such, actions planned and implemented by the hospital's technical staff and senior management must be developed collectively and tailored to the reality of each institution. However, this study shows that the implementation of the IRC and the other actions mentioned have had a direct impact on organizational practice, as they have revised old practices, systematized uncoordinated processes, and, above all, enhanced institutional objectives by improving management efficiency, promoting a change in organizational culture to the extent that better results have been obtained with the investment of the same resources, which are now managed in such a way as to rationalize their use.

The challenge of setting up and implementing IRC actions is related to the specific needs of each institution, which are generally associated with legal issues, bed shortages, and overcrowding in hospitals, especially in the emergency sector[1]. As for overcrowding in hospitals, it should be noted that this is a documented worldwide problem, and among the variables associated with this factor is the number of beds offered by hospitals. In Brazil, there was a reduction of 11,938 beds[1] between 2008 and 2013, as well as a downward trend in the number of beds available of 8.4% since 2009[11].

The hypothesis is that dysfunctional routines and the observed lack of increase in beds have an impact on overcrowding and compromise the dynamics of hospital management, especially in terms of the length of stay indicator. The consequences of overcrowding include prolonged waiting times, patient dissatisfaction, reduced quality of care, difficulty in allocating beds, and their actual availability. Thus, using quality tools and strategies for bed and process management, such as the IRC, makes it possible to monitor and improve

decision-making, especially in the emergency sectors[12].

It should be noted that actions capable of monitoring the length of stay in the emergency department are necessary to measure the quality of care, corroborating one of the IRC's objectives of monitoring the waiting time for emergency care and its outcomes[13-14]. The growth in hospital occupancy and emergency room occupancy rates is one of the main concerns of health managers, as there is a need to increase the capacity of emergency services and manage the availability of beds with existing demands[15].

There is a need to establish institutional policies for implementing IRCs with objective benchmarks that can be measured and allow their development to be monitored over time[7]. In this sense, one of the stages in the implementation of the IRC at the institution under study used tools to measure indicators, such as inserting an innovative tool into the hospital information system that allows data to be consulted that has already been stratified according to the classification of care, based on the Kanban methodology. This strategy helps to manage priorities in terms of the length of time patients are hospitalized and the impact on hospital bed management.

Planning and managing bed capacity efficiently makes it possible to minimize the costs of health services and can be an essential action for hospitals, especially public ones[16-17]. These actions highlight the complexity of managing resources and beds based on variable factors such as the number of patients seen per day, length of hospital stay, time to discharge, shortage of staff and hospital resources, inadequate communication, cooperation, and transparency between services and inpatient units[5].

The implementation of the IRC makes it possible to efficiently manage the installed capacity in public hospitals in Brazil since, according to the PNHOSP, the IRCs in hospitals aim to organize access to consultations, complementary exams, diagnostic and therapeutic services, and inpatient beds, according to the medical profile and specificities[1], confirming the importance of the stages described in this study for its implementation.

Concerning optimizing the interfaces between the various services in the same institution, a study[18] carried out in an Australian hospital with 600 beds showed that proper internal and external management can significantly minimize overcrowding, improving the flow of patients in emergency units without compromising the quality of care provided, with a focus on effective and efficient communication as an essential tool for bed management[7].

As for the hospital regulation flow, improving it implies ensuring efficiency in directing and transferring patients where hospitals that have prioritized strategic actions related to it show satisfactory results in quality care, user satisfaction, and also in the appropriate use of the institution's financial resources[19]. Managers and health professionals need to know the epidemiological profile of the units that make up hospital institutions[7], as well as the operational capacity of each care and hospitalization unit, intending to improve the quality of health services and, consequently, the humanization of the services provided[20].

Actions to improve bed management, based on an understanding of the organizational context, make it possible to plan for the future and make efficient use of a hospital's resources. Expanding bed allocation optimizes installed capacity and balances the number of patients in the emergency department and inpatient units, as well as organizing elective surgical procedures and hospital discharge[21-22]. By analyzing health service indicators, IRC implementation can increase the number of hospital discharges, and reduce hospital infection rates, hospitalization days, and bed replacement intervals[22].

In Porto Alegre, Brazil, the use of situation science in the area of bed

management, through the use of the Multilayer Perceptron Artificial Neural Network technique, has shown that the use of technology and IT resources allows bed managers to have real information on the number of patients entering and leaving the hospital continuously, enhancing the management and flow of patients cared for[21], which was also observed in the institution under study.

It should be noted that the use of technology has proved to be efficient in regulating beds and providing essential information such as occupancy time, hospitalization costs, and discharge monitoring, and is considered a solution for decision-making and the smooth running of the IRC[23].

Based on the trajectory experienced with the implementation of the IRC at the public university hospital, it is possible to affirm that the implementation of hospital hotel services, governance, internal and external transport directly linked to the IRC and which takes into account the institutional epidemiological profile, in addition to improving the performance of care and management indicators, enhances humanizing actions and the quality of the services provided.

It should be added that the IRC has made it possible to implement a new bed management model, which was conceived to integrate clinical practice into the admission and discharge process to optimize bed occupancy and improve the use of installed capacity, thereby improving care. Therefore, it is believed that the strategic, tactical, and operational planning actions that culminated in the implementation of the IRC at the public university hospital under study resulted in improved hospital performance, improving the interfaces between the various services in the institution and, consequently, improving the quality of care provided to the population.

With the development of internal and external bed regulation actions and continuous monitoring and evaluation activities, the IRC's importance was recognized by the internal institutional community, and new challenges related to the efficient use of resources were established, such as the creation of an outpatient clinic to reassess patients awaiting elective surgery, an outpatient surgical risk clinic, an outpatient pre-anesthetic consultation clinic, all managed by the IRC of the hospital studied and, more recently, it was possible to incorporate a doctor into the IRC team, which has brought numerous benefits to the development of work related to guaranteeing access to health care within the institution.

CONCLUSION

The implementation of the Internal Regulation Center at the public university hospital took place in four stages through strategic actions and their interfaces with all the hospital's services, starting in July 2016, based on the three pillars proposed by the Ministry of Health for the implementation of the Center: regulation practices, articulation with the Healthcare Network, and monitoring of bad management indicators.

With the development of this study, which aimed to describe the process of implementing the Internal Regulation Center in a public university hospital and its interfaces in care and management processes, we hope to contribute to other health institutions whose goal is to increase efficiency in the use of available resources and guarantee access to health services with quality and safety, demonstrating that the implementation of the IRC can be customized according to institutional possibilities and that improvements can be implemented gradually as the results of the IRC's work begin to prove its importance to the institution.

Considering the improvements in processes and flows achieved at the hospital studied with the implementation of the IRC, it is suggested that further studies be carried

out to analyze the impact of the Center's actions on the institution's financial perspective.

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Authors' contribution

VBRF - Substantial contribution to the study outline and data interpretation;
- Participation in the drafting of the preliminary version;
- Participation in the review and approval of the final version;
- Compliance with being responsible for the accuracy and integrity of any part of the study.
DWV - Substantial contribution to the draft study;
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MFCB - Substantial contribution to the study outline and data interpretation;
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