

Impact of multidisciplinary co-management on outcomes of patients with hip fracture

Impacto do comanejo multidisciplinar em desfechos de pacientes com fratura de quadril
Impacto del manejo conjunto multidisciplinario en desenlaces de pacientes con fractura de cadera


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Abstract

Objective: To assess the impact of the multidisciplinary co-management program on the outcomes of hospitalized patients with hip fractures.

Methods: This is an observational, before-and-after, retrospective study. Data were collected from patients hospitalized for hip fracture between 2015 and 2019, at a university hospital with a referral service for orthopedics. The intervention analyzed was the multidisciplinary co-management program, which started in 2017.

Results: The number of pressure injuries acquired during hospitalization decreased significantly ($p < 0.005$) after the implementation of co-management. Likewise, the length of hospital stay until surgery was reduced ($p < 0.046$), and national and international guidelines for fracture correction within 48 hours were complied with. Infections, readmissions and deaths have not had their impact confirmed.

Conclusion: The multidisciplinary co-management had a positive impact on the outcomes of patients hospitalized for hip fracture, resulting in a reduction in the number of pressure injuries and in the waiting time for surgery. Through this study, preliminary evidence was identified to support the implementation of this type of program.

Resumo

Objetivo: Avaliar o impacto do programa de comanejo multidisciplinar nos desfechos de pacientes com fratura de quadril hospitalizados.

Métodos: Estudo observacional, do tipo antes e depois, retrospectivo. Foram coletados dados dos pacientes hospitalizados por fratura de quadril entre 2015 e 2019, em hospital universitário com serviço referência para ortopedia. A intervenção analisada foi o programa de comanejo multidisciplinar, que iniciou em 2017.

Resultados: O número de lesões por pressão adquiridas na internação diminuiu significativamente ($p < 0,005$) após a implementação do comanejo. Da mesma forma, o tempo de internação até a cirurgia reduziu ($p < 0,046$), sendo cumpridas as diretrizes nacionais e internacionais de correção da fratura em até 48 horas. Infecções, reinternações e óbitos não tiveram seu impacto confirmado.

Conclusão: O comanejo multidisciplinar teve impacto positivo nos desfechos dos pacientes hospitalizados por fratura de quadril, resultando em redução do número de lesões por pressão e do tempo de espera para realizar a cirurgia. Através deste estudo, foram identificadas evidências preliminares que suportam a implementação desse tipo de programa.

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Conflicts of interest: nothing to declare.

Resumen

Objetivo: Evaluar el impacto del programa de manejo conjunto multidisciplinario en los desenlaces de pacientes con fractura de cadera hospitalizados.

Métodos: Estudio observacional, tipo antes y después, retrospectivo. Se recopilaron datos de pacientes hospitalizados por fractura de cadera entre 2015 y 2019, en un hospital universitario con servicio de ortopedia de referencia. La intervención analizada fue el programa de manejo conjunto multidisciplinario, que comenzó en 2017.

Resultados: El número de úlceras por presión adquiridas en la internación se redujo significativamente ($p < 0,005$) luego de la implementación del manejo conjunto. De la misma forma, el tiempo de internación hasta la cirugía se redujo ($p < 0,046$), cumpliendo las directrices nacionales e internacionales de corrección de la fractura en 48 horas como máximo. No se confirmó el impacto de infecciones, reinternaciones y fallecimientos.

Conclusión: El manejo conjunto multidisciplinario tuvo un impacto positivo en los desenlaces de los pacientes hospitalizados por fractura de cadera, lo que redujo el número de úlceras por presión y el tiempo de espera para realizar la cirugía. A través de este estudio, se identificaron evidencias preliminares que respaldan la implementación de este tipo de programa.

Introduction

Hip fracture (HF) incidence has been increasing worldwide along with population aging.⁽¹⁾ A study conducted in southern Brazil showed that almost 90% of HF cases occur in older adults over 70 years of age,⁽²⁾ and comorbidities and frailties of this age group are commonly present,⁽³⁾ raising the risk of postoperative complications.

Considering the complexity of demands patients with HF, it is necessary to implement and plan actions in a multidisciplinary manner,⁽⁴⁾ involving, in addition to surgical care, the early identification of patients' clinical, social and functional needs. The co-management of patients with this type of fracture can improve complications related to hospitalization, in addition to reducing hospital mortality rates,⁽⁵⁾ which highlights the need to review HF management protocols, considering the implementation of multidisciplinary programs in institutions.⁽⁶⁾

National and international guidelines⁽⁷⁻⁹⁾ point to the importance of the multidisciplinary team in the care of patients with HF. In agreement, international studies^(3,10) showed that multidisciplinary programs have an impact on reducing postoperative complications and waiting time to perform the surgery. However, at the national level, research on the subject is still scarce, and such gaps in scientific production justify the realization of this study.

Considering the above, this study aimed to assess the impact of the multidisciplinary co-management program on the outcomes of patients with HF hospitalized.

Methods

This is an observational, before-and-after,⁽¹¹⁾ retrospective study, conducted at the *Hospital de Clínicas de Porto Alegre* (HCPA), which has 919 beds, contracted to the Unified Health System (SUS - *Sistema Único de Saúde*) and has a reference unit for orthopedics.

The population studied were hospitalized patients diagnosed with HF from 2015 to 2019 (N=445). The inclusion criteria were to be hospitalized patients with a major diagnosis of HF, having undergone fracture correction surgery, older than 18 years. The criterion of age over 18 years is aligned with the British guideline regarding the target population for HF management in adults.⁽⁸⁾

Patients hospitalized by private agreement (n=104), who had pathological fracture (n=28), who did not meet the criteria for follow-up by co-management (n=10) and cases of HF in the period of three months before and three months after the implementation of co-management (n=46) were excluded. This criterion is due to the fact that the intervention analyzed began in October 2017, being considered adaptation period the three months before and that followed, in order to reduce bias. Patients suffering pathological fracture were excluded because it is a type of fracture related to a previously sick bone, common in cases of neoplasms, being attended by an oncology team.

The intervention analyzed was a multidisciplinary co-management program established based on international protocols,⁽⁹⁾ composed of clinical physician, orthopedic surgeon, anesthesiologist, nurses, pharmacist, physiotherapist, social worker

and nutritionist. An orthopedic surgeon determines whether the patient fits the following criteria of follow-up by co-management: risk of complications by age and/or having comorbidities; and then they trigger the rest of the multidisciplinary team at the time of patient hospitalization, triggering the initial assessments of each team member, and all professionals accompany the patient until the moment of discharge.

Prior to the implementation of co-management, in addition to the fact that part of professionals was only called upon by a specific demand from the patients, there was no systematic dialogue between them, causing fragmented behavior several times and, consequently, negative impacts on the outcomes and patient safety. After implementation, communication between this team began to happen through a structured round that takes place weekly. In this space, an interactive and inclusive environment is established, where team solutions are sought for issues that arise during hospitalization, in the pre and postoperative periods. Five sequential steps were established to be followed to discuss the cases:⁽⁴⁾

1. Medical team reviews the case, confers test reports, addresses clinical conditions and expected date of surgery/discharge.
2. Nurses update patients' recent clinical conditions (complaints, alteration of vital signs and eliminations) and expose care plan related to identified nursing diagnoses, addressing issues such as pain management and delirium, fall prevention and pressure injury (PI) and conditions of invasive pathways such as venous catheters, probes and drains.
3. Review of safety items by a pharmacist (drug therapy and reconciliation, infection prevention, antithrombotic prophylaxis and analgesia);
4. Physiotherapy (mobility and ambulation), social service (family situation and organization for discharge) and nutrition (diet offered and acceptance) treatment plan;
5. Definitions: clinical physician and anesthesiologist confirm or not conditions of patients for surgery (when preoperatively) and discharge

(when postoperatively). Surgeon summarizes the care plan, confirming the actions jointly defined by the team.

Data were collected by querying the electronic records of patients hospitalized for HF from 2015 to 2019. Information on sex, age, Body Mass Index (BMI), Braden scale, fracture mechanism, fracture type, fracture side, comorbidities, surgery type, Classification of the American Society of Anesthesiology (ASA), PI (specifying the injury site and stage), transfer to the Intensive Care Unit (ICU), readmission within 3 months, infection according to its focus, death within 3 months according to its cause and length of stay (total and time between admission and surgery) were collected. The outcomes analyzed were: transfer to ICU readmission, death, PI, infection, time between hospitalization and surgery, time between hospitalization and discharge.

For the sample calculation, the time between hospitalization and surgery was considered as the main outcome. The sample size was calculated to detect differences between the Y proportions between Treatment and Control, using an online PSS Health version tool.⁽¹²⁾ Considering power of 80%, significance level 5% and a proportion of Y in treatment of 55.1% and control of 38.3%,⁽¹³⁾ being estimated the total sample size of 298 subjects, 149 in each group. Considering the behavior of the outcomes in the population studied, the sample was statistically sufficient in 257 patients.

Categorical variables were presented by means of relative and absolute frequencies and numerical variables by measures of central tendency (mean or median) and dispersion (standard deviation or interquartile intervals). The association analyses were performed using Pearson's chi-square test, t-test or Mann-Whitney test, according to the distribution of variables (submitted to the Shapiro-Wilk normality test to verify the distribution of variables, asymmetry values and shortness). The Statistical Package for the Social Sciences (SPSS[®]) was used, and $p < 0.05$ values were considered significant.

All ethical precepts provided for by Brazilian legislation for research with human beings were respected. This research was approved through Opinion

4.095.550 and CAAE (*Certificado de Apresentação para Apreciação Ética* - Certificate of Presentation for Ethical Consideration) 30842520.5.0000.5327.

Results

The sample consisted of 257 patients, 128 before and 129 after the implementation of multidisciplinary co-management, characterized mostly by women (67%, n=173) and with a mean of 73.92 years (± 11.51), as shown in table 1.

Table 1. Distribution of patients with HF from the pre-co-management group and the co-management group according to sociodemographic and clinical characteristics

Variables	Pre-co-management group n=128 n(%)	Co-management group n=129 n(%)	p-value	All patients n=257 n(%)
Sex ^a			0.112 ^t	
Female	80(62.5)	93(72.1)		173(67.3)
Male	48(37.5)	36(27.9)		84(32.7)
Age ^b	73.83(± 11.58)	73.81(± 11.4)	0.992 ^t	73.92(± 11.51)
BMI ^b	24.56(± 5.28)	23.91(± 4.62)	0.310 ^t	24.22 (± 4.94)
Fracture mechanism ^a			0.005 ^t	
Fall from own height	115(89.8)	125(96.9)		240(93.4)
Automobile accident	6(4.7)	4(3.1)		10(3.9)
Fall from height	7(5.5)	-(-)		7(2.7)
Fracture type ^a			0.004 ^t	
Intracapsular	46(35.9)	73(56.6)		119(46.3)
Extracapsular	79(61.7)	54(41.9)		133(51.7)
Multiple fractures	3(2.3)	2(1.5)		5(1.9)
Fracture side ^a			0.080 ^t	
Left	52(40.6)	67(51.9)		119(46.3)
Right	76(59.4)	62(48.1)		138(53.7)
Surgery type ^a			0.001 ^t	
Osteosynthesis	92(71.8)	64(49.6)		155(60.3)
Arthroplasty	35(27.3)	63(48.8)		100(38.6)
Girdlestone	1(0.8)	2(1.5)		3(1.2)
ASA classification ^a			0.143 ^t	
I - Healthy patients	-(-)	1(0.8)		1(0.4)
II - Moderate disease	7(5.5%)	55(42.6)		126(49)
III - Severe disease	55(42.9)	70(54.3)		125(48.6)
IV - Constant threat to life	2(1.6)	3(2.3)		5(1.9)
Comorbidities ^a				
Hypertension	79(61.7)	82(63.6)	0.797 ^t	161(62.6)
Diabetes Mellitus	31(24.2)	34(26.3)	0.774 ^t	65(25.3)
ND/Dementia	20(15.6)	34(26.3)	0.46 ^t	54(21.0)
Heart disease	23(17.9)	27(20.9)	0.637 ^t	50(19.5)
Stroke	19(14.8)	18(13.9)	0.861 ^t	37(14.4)
Osteoporosis	12(9.4)	11(8.5)	0.831 ^t	23(8.9)
Dyslipidemia	12(9.4)	10(7.7)	0.663 ^t	22(8.6)
Hypothyroidism	5(3.9)	10(7.7)	0.287 ^t	15(5.8)
COPD	7(5.5)	7(5.4)	1.00 ^t	14(5.4)

^a n (%); ^b Mean (\pm SD); ^t Pearson's chi-square test; ^t - Student's t-test; ND - neurological disease; COPD - chronic obstructive pulmonary disease

Table 2 presents the differences in the outcomes of patients in the pre-co-management group and the co-management group.

Table 2. Outcomes of patients in the pre-co-management group and the co-management group

Variables	Pre-co-management group n=128 n(%)	Co-management group n=129 n(%)	All patients n=257 n(%)	p-value
Hospitalization until surgery, days ^b	3(2-5)	2(2-4)	2(2-4)	0.046 ^U
Hospitalization until discharge, days ^b	8(6-11.75)	7(6-10)	8(6-11)	0.265 ^U
Pressure injury ^a				
Yes	34(26.6%)	16(12.4)	50(19.5)	0.005 ^t
No	94(73.4%)	113(87.6)	207(80.5)	
Postoperative infection ^a				
Yes	25(19.5)	20(15.5)	45(17.5)	0.41 ^t
No	103(80.5)	109(84.5)	212(82.5)	
Transfer to ICU ^a				
Yes	5(3.9)	6(4.6)	11(4.3)	0.50 ^t
No	123(96.1)	123(95.3)	246(95.7)	
Readmission (within 6 months) ^a				
Yes	19(14.8)	14(10.8)	33(12.8)	0.358 ^t
No	109(85.1)	115(89.1)	224(87.2)	
Death (within 3 months) ^{to}				
Yes	11(8.6)	9(7.0)	20(7.8)	0.65 ^t
No	117(91.4)	120(93.0)	237(92.2)	

^an (%); ^bMedian (IQR); ^U - Mann-Whitney U test; ^t Pearson's chi-square test

Regarding the results that deal with PI, it should be added that the risk of developing PI was the same in both groups, since in both the median of the Braden scale was 15 (14-16). Among the PI, 27 (54%) were in the sacral region, eight (16%) in the gluteus region, four (8%) in the calcaneus, one (2%) on the dorsum and ten (20%) patients had more than one PI in different sites. We identified 15 (30%) stage 1 PI, 31 (62%) stage 2 PI, one (2%) stage 4 PI and three (6%) without registration.

Of the 45 patients who developed some infection during hospitalization, 17 (37.7%) were urinary tract (UTI) and 17 (37.7%) were respiratory. Another six (13.3%) had infection at the surgical site or prosthesis. In addition to these, three (6.6%) had concomitant UTI and respiratory infection, and two others (4.4%) had no defined focus in the medical records. Of the 20 patients who died within 3 months after surgery, eight (40%) were due to respiratory infection, five (25%) due to septic shock, two (10%) to cardiorespiratory arrest and five (25%) to other reasons.

Discussion

The group similarity regarding sociodemographic and clinical characteristics reinforce sin that the im-

plications of co-management on the outcomes assessed are not related to changes in patients' profile. Most are women, according to the literature.^(6,14,15) The mean age is similar to the results of another study,⁽¹⁶⁾ as well as comorbidity with higher prevalence resembled the results found in a Brazilian research.⁽¹⁷⁾ The most prevalent comorbidities identified in patients with HF are hypertension,⁽¹⁸⁾ Diabetes Mellitus, osteoarthritis, heart diseases, stroke and dementia, agreeing with the findings. This patient profile is justified by the natural aging process.⁽¹⁹⁾ The mean BMI has also been described similarly in the literature,⁽¹⁴⁾ and most HF occur in people with BMI within the normal range.⁽²⁰⁾

Most patients had ASA II classifications in the pre-co-management and ASA III group in the co-management group, and these two classifications were the most commonly found in the literature.^(15,17) The ASA classification demonstrates to be an independent risk factor for the development of delirium in older adults in the postoperative period, which in turn contributes to increased mortality, clinical complications, hospitalization time and readmissions.⁽²¹⁾ The joint planning of the multidisciplinary team assists in postoperative delirium prevention.⁽²²⁾

The most common mechanism of trauma was the fall from one's own height, reinforcing the fact that HF are associated with low-energy trauma and advanced age.⁽²⁾ The overall incidence of extracapsular fractures was higher than intracapsular fractures, as in international research,^(3,16) although, in the co-management group alone, intracapsular fractures were more frequent. Osteosynthesis was the most performed surgery, followed by arthroplasty, according to the literature.^(10,17) However, in the group that did not have co-management intervention, the osteosynthesis index was almost three times higher than that of arthroplasties, while in the co-management group the indices were very similar. Arthroplasty has already been related to a higher readmission rate, but in the co-management group, readmission decreased.⁽²³⁾

The total hospitalization time decreased by one day after co-management intervention as well as in another study that analyzed the impact of multidis-

ciplinary intervention.⁽¹³⁾ A median of 7 (6-10) days of hospitalization in the co-management group was found, and hospitalization above 7 days is related to increased mortality.⁽²⁴⁾

The group that received co-management intervention had a one-day decrease in the time between hospitalization and surgery, complying with the recommendations of national and international guidelines for performing the surgery within 48 hours.⁽⁷⁻⁹⁾ This is an important finding, since performing the surgery within 2 days after hospitalization demonstrates to reduce postoperative complications, hospitalization time and mortality^(7,25), and such outcomes were in fact more favorable in the co-management group. It can then be inferred that a multidisciplinary team committed to solving patients' clinical problems with agility and comprehensiveness helps to perform the surgery safely and as soon as possible.

Prolonged hospitalization time and delay in performing surgery are often associated with readmission, although such relationship may also be due to the severity of cases.⁽²⁶⁾ In this context, the literature shows that patients receiving multidisciplinary care reiterate less.⁽²⁷⁾ In co-management, domestic situation, social support, patient rehabilitation needs and clinical problems are already evaluated and referred for resolution from the moment of hospitalization. However, in the present study, no benefit of the intervention in readmission was identified.

The number of PI developed during hospitalization decreased by less than half after the implementation of co-management, reinforcing findings that analyzed the impact of multidisciplinary actions.⁽¹⁰⁾ In similar evidence, stage 2 PI was the most frequent as well as PI located in the sacred region.⁽²⁸⁾ PI is a widely used care indicator for patients with HF, and is one of the main indicators of the quality of nursing care, and this profession is essential in the management of these patients.⁽²⁹⁾

As it is an independent risk factor for mortality in patients with HF,⁽²⁸⁾ is crucial that PI is avoided and handled in the best possible way. In the postoperative period, change in decubitus, early physiotherapy and the use of airflow mattress with motor demonstrate to be protective practices against the

development of PI,⁽³⁰⁾ being all these practices of the co-management team. It is important to point out that before the implementation of co-management, it was believed to be contraindicated the use of airflow mattress in patients with HF. However, after reviewing the literature conducted by the nursing team and the space that the round provided for these discussions, it was started to be used, leading to an evidence-based practice. This further reinforces the importance of effective communication between health teams and how much it has the potential to improve quality of care.⁽⁴⁾ The results obtained may be related to this implementation, an aspect that deserves to be deepened.

Clinical complications are usually more frequent than postoperative surgical complications, mainly infections such as UTI and pneumonia,⁽¹⁹⁾ as in the present study. The risk of death increases considerably after developing infection in the postoperative period, especially if the scenario is sepsis or pneumonia.^(19,31) In this study, no differences were identified from the intervention on infections, deaths and transfers to ICU. However, the prevalence found to be found that these are outcomes that can be further explored.

Findings of this study support that the health team's multidisciplinary action demonstrates to promote a more effective rehabilitation and minimize patients' clinical worsening, and there may be significant improvement in outcomes of patients who are followed up in multidisciplinary systematized interventions.⁽¹⁰⁾ The results found in the present investigation reinforce that multidisciplinary programs can reduce the time to surgery and postoperative complications in patients with HF.⁽³⁾

The design used can be considered a limitation, with greater force being a randomized controlled study, which does not exclude other potential factors that may have changed at the same time that the intervention was performed, limiting the certainty that the outcomes observed in the study are fully attributed to the intervention. Another limitation is that it was not possible to determine through the quantitative measures used in this study which components of the intervention worked or not, since it was not possible to relate them.

Conclusion

The multidisciplinary co-management program had a positive impact on PI reduction and the waiting time until surgery, contributing satisfactorily to the hospitalization and treatment of patients with HF. It is noteworthy that nurses are a fundamental member of this team, because they have the perspective of continued follow-up by the nursing team on patients' evolution, with a more comprehensive view of daily needs and risks related to the hospitalization and treatment process. The results presented here advance in knowledge as this is the first study that assessed the impact of a multidisciplinary co-management program on patients hospitalized with HF in a public hospital in Brazil. Through this, preliminary evidence was identified that support the implementation of such programs, which may contribute to the qualification of care processes in SUS.

Collaborations

Ferreira NWG, Guzinski C, Boufleuer E, Finckler PVPR, Lopes ANM and Dal Pai D declare that they contributed to study design, data analysis and interpretation, article writing, critical review of relevant intellectual content and approval of the final version to be published.

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