



Quality indicators of hip fracture management. A systematic review

Les indicateurs de qualité de la prise en charge de la fracture de la hanche. Une revue systématique de la littérature.

مؤشرات جودة علاج كسر الورك: مراجعة منهجية

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RÉSUMÉ

Objectif: Identifier les indicateurs de qualité de la prise en charge des fractures de la hanche dans la littérature médicale.

Méthodes: Nous avons effectué une revue systématique de la littérature sur les indicateurs de qualité de la prise en charge de la fracture de la hanche en utilisant la base Medline de 2001 à 2015. Les publications recueillies ont été étudiées par deux lecteurs pour collecter les différents indicateurs de qualité. Ces indicateurs ont été stratifiés selon leur type (processus ou résultat) et selon le temps de prise en charge (pré, per ou post-opératoire).

Résultats: Un total de 41 articles ont été inclus dont l'analyse a mis en évidence une prédominance des articles anglo-saxons, un taux de publication croissant au cours du temps, une prédominance des études évaluatives et une multiplicité des guidelines. Au total, 46 indicateurs ont été identifiés dont deux tiers ont été classés comme des indicateurs de procédure et 60% étaient en rapport avec la prise en charge post-opératoire de la fracture de la hanche. Les indicateurs les plus évalués, parmi ceux liés aux soins préopératoires, étaient le délai opératoire (34%) et l'évaluation de l'état clinique du patient (11%). Pendant l'opération, l'indicateur le plus évalué était la proportion de patients ayant subi une rachianesthésie (73%). Pour les soins postopératoires, les indicateurs les plus courants étaient la durée du séjour à l'hôpital (12%), la prescription de traitements de l'ostéoporose (8%), l'utilisation de matelas pour prévenir les escarres (7%), les escarres (7%) et la mortalité hospitalière (7%).

Conclusion : Cette revue systématique a permis d'identifier les indicateurs recommandés pour évaluer la prise en charge de la fracture de la hanche. Le monitoring continu de ces indicateurs devrait être généralisé dans les pays maghrébins moyennant des tableaux de bord stratégiques dans toute structure hospitalière prenant en charge cette pathologie.

Mots clés : Fractures de la hanche - Qualité des soins de santé - Indicateurs qualité santé - Revue systématique - Medline.

SUMMARY

Objective: Objective: To identify standards and quality indicators of hip fracture management from the medical literature.

Methods: We conducted a «systematic review» on the topic of quality indicators of hip fracture management using PubMed database, during 15 years from 2001 to 2015. The collected publications were studied by two readers to extract the different quality indicators of hip fracture management. These indicators were stratified according to their type (process or outcome) and to the time of health care (pre, per or post-operative).

Results: A total of 41 articles were included in the study: The analysis of these articles highlighted a predominance of Anglo-Saxon papers, an increasing rate of publication over time, a dominance of evaluative studies and a multiplicity of guidelines. A total of 46 quality indicators were identified through these articles. Two third were classified as procedural items and 60% were about post-operative hip fracture management. The most assessed indicators and standards, among those related to the preoperative care, were time to surgery (34%) and patient clinical condition assessment (11%). During the operation time, the most assessed indicator was the proportion of patients who have had spinal anesthesia (73%). For the postoperative care, the most common indicators and standards were length of hospital stay (12%), osteoporosis treatment prescription (8%), mattresses use to prevent pressure ulcer (7%), pressure sores occurring (7%) and in hospital mortality (7%).

Conclusion: This systematic review allowed to identify the main indicators recommended to evaluate the management of hip fracture. The continuous monitoring of these indicators should be generalized in maghrebian countries using strategic dashboards in all hospitals and clinics treating this pathology.

Key words: Hip fractures - Quality of Health Care - Quality Indicators - Health Care – Systematic Review - Medline

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مؤشرات جودة علاج كسر الورك: مراجعة منهجية

الهدف : تحديد معايير ومؤشرات الجودة لعلاج كسر الورك إنطلاقاً من النشريات الطبية

الطريقة: أجرينا مراجعة منهجية للكتابات التي تتمحور حول مؤشرات الجودة في مجال علاج كسر الورك باستخدام قاعدة بيانات مدلين لمدة 15 سنة من سنة 2001 إلى سنة 2015. وقد تمت دراسة هذه الكتابات من قبل قارئین اثنين لجمع مؤشرات الجودة المذكورة. تم تصنيف هذه المؤشرات وفقاً لنوعها (العملية أو النتيجة) (ووفقاً لمرحلة الرعاية (قبل، أثناء أو بعد العملية

النتائج: تضمنت هذه الدراسة 41 مقالة حول جودة الخدمات الصحية في مجال علاج كسر الورك وقد كشفت دراسة هذه المقالات عن وفرة المنشورات الأنجلو سكسونية، تزايد معدل الكتابة والنشر في هذا المجال، كثرة الدراسات التقييمية وتعدد المبادئ التوجيهية. وفي المجموع، تم تحديد 46 مؤشراً للجودة من خلال هذه البحوث. تم تصنيف الثلثين كمؤشرات إجرائية و 60% كانت متصلة بالرعاية ما بعد العملية. المؤشرات والمعايير الأكثر تقييماً، من بين تلك المتعلقة بالرعاية قبل الجراحة، اجاز إجراء العملية (34%) وتقييم الحالة السريرية للمريض (11%). خلال فترة العملية، كان المؤشر الأكثر تقييماً هو نسبة المرضى الذين خضعوا للتخدير النخاعي (73%). بالنسبة للرعاية اللاحقة للعملية الجراحية، كانت المؤشرات والمعايير الأكثر شيوعاً هي مدة الإقامة في المستشفى (12%)، وصفة علاج هشاشة العظام (8%) ، استخدام المراتب لمنع التقرحات (7%)، نسبة حصول تقرحات الضغط (7%) ومعدل الوفيات خلال فترة الإقامة بالمستشفى (7%)

الخلاصة: سمحت هذه المراجعة المنهجية بتحديد المؤشرات الرئيسية الموصى بها لتقييم جودة علاج كسر الورك. يجب تعميم المراقبة المستمرة لهذه المؤشرات في البلدان المغاربية باستخدام لوحات قيادة استراتيجية في جميع المستشفيات التي تعالج هذا المرض الكلمات المفتاحية: كسر الورك؛ جودة الرعاية الصحية؛ مؤشرات جودة الرعاية الصحية؛ مراجعة منهجية؛ مادلين

INTRODUCTION

The management of hip fracture is a major public health concern [1,2]. The incidence of this trauma continues to increase worldwide and especially in countries with elderly population [3]. It increases by 1 to 3% per year in most regions of the world [4]. In addition, it is considered to be among the most serious diseases due to the enormous mortality rates it causes [5]. Hip fracture is a burden to both the individual and the community given the severity of its patients with a lot of comorbidities and the need for a fairly expensive technical platform. The annual cost is estimated at \$ 12 trillion in the United States [6] and \$ 3 trillion in the United Kingdom [7]. In maghrebian countries, with the aging of the population, the magnitude of this problem is becoming increasingly important. In fact, in Tunisia for example, Hip fracture incidence rate is estimated at 214 fractures per 100 000 inhabitants per year and the number of osteoporotic hip fractures is projected to reach 5100 by 2020 and 8850 by 2039 [8].

Today, in order to better hip fracture management, orthopedic surgery societies have standardized clinical practices to guarantee the best results with as little waste as possible for the health system, by developing recommendations like: NICE guidelines [9] and AAOS guidelines [10]. The continuous assessment of these standards prompts quality of care improvement. That is why, hip fracture audits [11,12] have become a common practice in developed countries for years. However, in Tunisia as well as in many other arab countries, studies that deal with this problem remain purely descriptive [13],

limited to case series [14,15] and we note the absence of work to evaluate current clinical practice in this area.

A continuous monitoring of hip fracture management in our hospitals will certainly help managers to identify the gaps between standards of hip fracture care and current healthcare delivery. This will help policy makers to take decisions and implement appropriate interventions in order to improve hospital performance in this area.

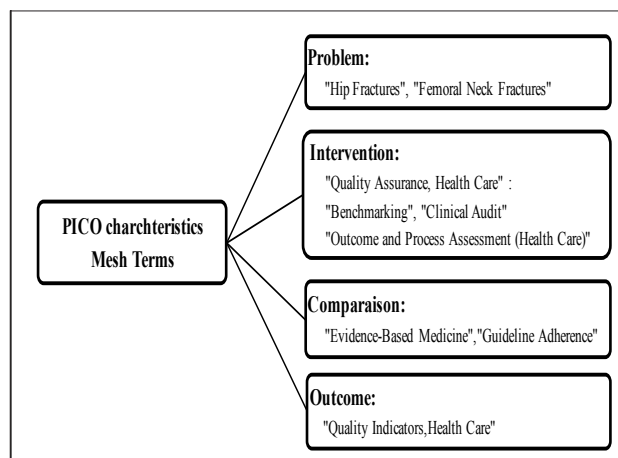
This systematic review was conducted to identify standards and quality indicators of hip fracture management in order to select among them the most appropriate for the professional and managerial context of maghrebian hospitals and to build a consensual dashboard auditing hip fracture management in the great Maghreb.

METHODS

Data sources: We conducted a systematic review of all publications, which talk about quality of health care in hip fracture management using PubMed database, during 15 years from 2001 to 2015 (the last updated search was done on, February 02, 2017). Further research was conducted on websites of orthopedic surgery organizations to gather all the details on the guidelines identified in these publications.

Search strategy: The search strategy was according Problem, Intervention, Comparison, and Outcome (PICO) characteristics: Box 1 shows the key words of our search based on Medical Subjects Heading (Mesh).

Box 1 : Research strategy followed to collect articles indexed in Medline about quality of care in hip fracture management between 2001 and 2015.



The target publications were collected through Medline database using a search query associating these key words: ("Evidence-Based Medicine"[Mesh] OR "Guideline Adherence"[Mesh] OR "Quality Assurance, Health Care"[Mesh] OR "Outcome and Process Assessment (Health Care)"[Mesh] OR "Quality Indicators, Health Care"[Mesh]) AND "Hip Fractures"[Mesh] AND ("2001/01/01"[PDAT]: "2015/12/31"[PDAT]).

Eligible studies: We included all publications that fulfilled one or more of the following criteria: articles illustrating guidelines and standards about hip fracture management and papers that illustrate health care quality indicators. The search was restricted to English and French papers in which all the above Mesh terms were mentioned as Mesh Major Topics (Majr). We excluded papers if they were commentary or editorial publications and if they were studying surgical procedures guidelines.

Two independent investigators conducted data extraction using pre-specified inclusion and exclusion criteria. The analysis of the retrieved publications allowed the extraction of different performance items of the hip fracture management which were classified according to their type (process or output) and to the health care time (preoperatively, peroperatively or postoperatively).

RESULTS

Study of the included papers

Search results: A total of 2670 articles were initially identified using the research query mentioned above. After selection according Mesh major topics, language and article type filters, articles were screened according title and abstract and then were full text assessed for eligibility. Finally, 41 articles [10-12,16-53] which fulfilled the research criteria were included in the study (figure n° 1).

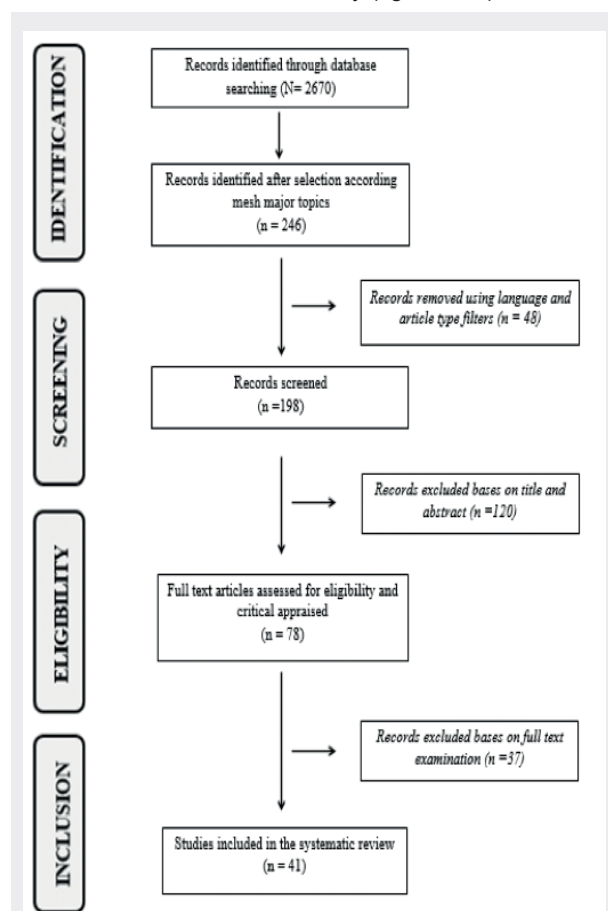


Figure 1. Flow chart of the study selection process for eligible studies in the systematic review about hip fracture quality of care (Medline, 2001-2015).

Bibliometric characteristics: Table I describes the bibliometric profile of the included articles. About two fifths of them were published between 2011 and 2015. All of them were "journal articles". The most frequent affiliation was United Kingdom (25%). One quarter of the retrieved papers were published in specific journals of health care

quality; with 10 % published in « International journal for quality in health care ». The author's specialty was orthopedics in one-third of papers. The most frequent study type was evaluative studies (66%).

Table 1. Bibliometric profile of 41 Medline-indexed articles about quality of care in hip fracture management (2001-2015)

	n	%
Publication date		
2001-2005	12	29,3
2006-2010	12	29,3
2011-2015	17	41,4
Author speciality		
Orthopedics	12	29,3
Public health/Epidemiology/Preventive	8	19,5
Geriatrics	4	9,7
Others	17	41,5
Review		
International Journal for Quality in Health Care	4	9,7
BMJ Quality and Safety	2	4,9
Disability and Rehabilitation	2	4,9
Injury	2	4,9
Journal of Orthopaedic Trauma	2	4,9
The Medical Journal of Australia	2	4,9
The New Zealand Medical Journal	2	4,9
Scandinavian Journal of Caring Sciences	2	4,9
Others	23	56,0
Country		
United Kingdom	10	24,4
United States	9	21,9
Canada	4	9,8
Australia	3	7,3
Italy	3	7,3
New Zealand	3	7,3
Sweden	3	7,3
Finland	2	4,9
France	2	4,9
Others	2	4,9
Study Type		
Evaluative studies	27	65,8
Guidelines/ Systematic review	9	22,0
Analytic Studies	5	12,2

Study of the health care quality indicators

When reviewing these articles, 46 items of the quality of hip fracture management were identified. Two third were classified as procedural items and 60% were about post-operative hip fracture management. These items could be categorized into 10 dimensions of health care: care delivery time, clinical evaluation, analgesia, diagnosis, treatments and prescriptions, anesthesia, mobilization and physiotherapy, secondary prevention, hospital stay and evolution (table II). The total number of indicators' citations was 238. Table III shows the citation frequency according to the time of health care and depicts the recurrence of each indicator in the retrieved papers: The most recurrent items, among those related to the preoperative care, were time to surgery (34%) and patient clinical condition assessment (11%). During the operation time, the most assessed indicator was the proportion of patients who have had spinal anesthesia (73%). For the postoperative care, the most common indicators and standards were length of hospital stay (12%), osteoporosis treatment prescription (8%), mattresses use to prevent pressure ulcer (7%), pressure sores occurring (7%) and in hospital mortality (7%). Appendix 1 shows the list of publications included in this systematic review, as well as the number of health care indicators or standards per publication.

DISCUSSION

Assessing the quality of care becomes a major concern of the various health system actors, in response to growing demands for transparency of information, cost control and reduction of clinical practice variations [54]. However, there is a gap between the developed countries (North America and Europe) where the concept of evaluating hospital performance goes back more than ten years [54] and developing countries where the Ministries of Health have paid attention to this concept only recently[55].

Several high-risk, high-cost, high-prevalence conditions, which are still poorly managed despite the standardization of diagnostic and therapeutic strategies, such as hip fracture, acute coronary syndrome, acute respiratory failure...require the development of dashboards to monitor clinical performance. It would be, first of all, through the collection of the various recommendations and quality indicators of the management of these pathologies through the international literature.

Table 2. Classification of standards and quality indicators of hip fracture management (Systematic review, Medline 2001-2015).

(Part A)

Dimensions	Sub-dimensions	Items	Type	
Care delivery time	<i>Time of admission</i>	1. Time of admission (within four hours)	Process	Preoperative
	<i>Time to surgery</i>	2. Time of surgery (within 24 to 48 hours)	Process	Preoperative
Patient evaluation	<i>Patient evaluation</i>	3. Patient clinical condition assessment	Process	Preoperative
		4. A formal recording of weight and size	Process	Preoperative
		5. Pain assessment	Process	Preoperative
		6. Mental status evaluation (Risk of delirium and dementia)	Process	Preoperative
		7. Pressure ulcer risk assessment	Process	Preoperative
		8. Serum level of albumin	Process	Preoperative
Anelgesia	<i>Preoperative Anelgesia</i>	9. Preoperative analgesia (immediately and regularly)	Process	Preoperative
		10. Time of analgesia first offered	Process	Preoperative
	<i>Postoperative Anelgesia</i>	11. Postoperative analgesia (regularly)	Process	Postoperative
Diagnosis	<i>Radiological Diagnosis</i>	12. Hip X-rays examination	Process	Preoperative
		13. X-rays within one day	Process	Preoperative
		14. Magnetic resonance imaging (or tomography) examination if X-rays were negative	Process	Preoperative
Treatments and prescriptions	<i>Prophylactic antibiotic treatment</i>	15. Prophylactic antibiotic treatment	Process	Preoperative
	<i>Thromboprophylaxis</i>	16. Thromboprophylaxis	Process	Postoperative
	<i>Transfusion</i>	17. Postoperative transfusion if Hemoglobin <8 g /dL	Process	Postoperative
	<i>Prescription of a nutritional supplement</i>	18. Prescription of a nutritional supplement	Process	Postoperative
	<i>Pressure ulcer prevention</i>	19. Mattresses use to prevent pressure ulcer	Process	Postoperative
20. Repositioning		Process	Postoperative	
Anesthesia and Surgery	<i>Anesthesia</i>	21. Type of anesthesia (Spinal anesthesia)	Process	Peroperative
		22. Trainee anesthetists supervision by senior staff	Process	Peroperative
	<i>Surgery</i>	23. Trainee surgeons supervision by senior staff	Process	Peroperative
		24. Surgery by trainee surgeons	Process	Peroperative

Table 2. Classification of standards and quality indicators of hip fracture management (Systematic review, Medline 2001-2015). (Part B)

Dimensions	Sub-dimensions	Items	Type	Time of health care
Mobilization and physiotherapy	<i>Mobilization</i>	1. Mobilisation within 24 to 48 hours after surgery	Process	Postoperative
		2. Mobilisation every day	Process	Postoperative
	<i>Physiotherapy</i>	3. Physiotherapy prescription	Process	Postoperative
Secondary prevention and post-hospital rehabilitation	<i>Falls prevention and osteoporosis treatment</i>	4. Evaluation and diagnosis of osteoporosis	Process	Postoperative
		5. Osteoporosis treatment	Process	Postoperative
		6. Fall risk assessment before discharge	Process	Postoperative
	<i>Multidisciplinary rehabilitation</i>	7. Multidisciplinary rehabilitation	Process	Postoperative
Hospital stay	<i>Time to first getting up</i>	8. Delay between surgery and first getting up	Output	Postoperative
	<i>Length of stay</i>	9. Length of stay	Process	Postoperative
Evolution	<i>Complications</i>	10. Postoperative pressure sores	Output	Postoperative
		11. Pressure sores grades	Output	Postoperative
		12. Postoperative infection (urinary infection, pneumonia ...)	Output	Postoperative
		13. Thrombosis	Output	Postoperative
		14. Post operative embolism	Output	Postoperative
		15. Congestive heart failure	Output	Postoperative
		16. Ahythmia	Output	Postoperative
	<i>Mortality</i>	17. Myocardial infarction	Output	Postoperative
		18. In-hospital mortality	Output	Postoperative
		19. 30-day mortality	Output	Postoperative
		20. Six-month mortality	Output	Postoperative
<i>Readmission</i>	21. One-year mortality	Output	Postoperative	
	22. Readmission	Output	Postoperative	

Table 3. Distribution of standards and quality indicators of hip fracture management according to their citation frequency. (Systematic review, Medline 2001-2015).

	n	%	Cumulative %
Preoperative Time (79)			
Time to surgery (within 24 to 48 hours)	27	34.2	34.2
Patient clinical condition assessment	9	11.4	45.6
Prophylactic antibiotic treatment	8	10.1	55.7
Time of admission (within four hours)	7	8.9	64.6
Preoperative analgesia (immediately and regularly)	6	7.6	72.2
Serum level of albumin	5	6.3	78.5
X-rays examination	4	5.0	83.5
Magnetic resonance imaging (or tomography) if X-rays were negative	4	5.0	88.5
Pressure ulcer risk assessment	3	3.8	92.3
Mental status evaluation (Risk of delirium and dementia)	2	2.5	94.8
A formal recording of weight and size	1	1.3	96.1
Pain assessment	1	1.3	97.4
Time of analgesia first offered	1	1.3	98.7
X-rays within one day	1	1.3	100.0
Peroperative time (11)			
Type of anesthesia (Spinal Anesthesia)	8	72.7	72.7
Trainee anesthetists supervision by senior staff	1	9.1	81.8
Trainee surgeons supervision by senior staff	1	9.1	90.9
Surgery by trainee surgeons	1	9.1	100.0
Postoperative time (148)			
Length of stay	17	11.5	11.5
Osteoporosis treatment	12	8.1	19.6
Thromboprophylaxis	10	6.8	26.4
Mattresses use to prevent pressure ulcer	10	6.8	33.2
Pressure sores	10	6.8	40.0
In-hospital mortality	10	6.8	46.8
Postoperative infection (urinary infection, pneumonia ...)	8	5.4	52.2
Prescription of a nutritional supplement	6	4.0	56.2
Mobilisation within 24 to 48 hours after surgery	6	4.0	60.2
30-day mortality	6	4.0	64.2
One year mortality	6	4.0	68.2
Fall risk assessment before discharge	5	3.4	71.6
Multidisciplinary rehabilitation	5	3.4	75.0
Readmission	5	3.4	78.4
Evaluation and diagnosis of osteoporosis	4	2.7	81.1
Thrombosis	4	2.7	83.8
Arythmia	4	2.7	86.5
Myocardial infarction	4	2.7	89.2
Physiotherapy prescription	3	2.0	91.2
Postoperative analgesia (regularly)	3	2.0	93.2
Repositioning	2	1.3	94.5
Mobilisation every day	2	1.3	95.8
Postoperative transfusion if Hemoglobin <8 g/dL	1	0.7	96.5
Delay between surgery and first getting up	1	0.7	97.2
Pressure sores grades	1	0.7	97.9
Post operative embolism	1	0.7	98.6
Congestive heart failure	1	0.7	99.3

This systematic review summarizes standards and quality indicators of the management of one of the aforementioned pathologies: “the quality indicators of hip fracture management”.

This study has some limitations that need to be stated: Medline was the only used database to identify articles about quality of hip fracture management. In addition, the research only considered articles in English and French and excluded editorial and commentary articles. Moreover, the applied documentary query restricted the search to articles whose keywords were mesh major topics. These and other limitations are commonly found in this type of studies, but “Medline” remains the most representative database of international biomedical science and filters were used to target the literature that best fits the research question. To collect the maximum results and to guarantee the most sensitivity possible, the keywords were multiplied in the search query. On the other hand, the analysis of the articles captured by the documentary request, in order to identify the quality indicators of hip fracture management was carried out by a monospecialized team of preventive and community medicine. To overcome this limit, orthopedic surgeons were secondarily involved through brainwriting and direct discussion.

BIBLIOMETRIC CHARACTERISTICS

The analysis of the results of this systematic review highlighted a predominance of Anglo-Saxon papers: (United Kingdom, America ...), an increasing rate of publication over time, a dominance of clinical audits and a multiplicity of guidelines.

Predominance of Anglo-Saxon publications: The majority of the retrieved articles were from Anglo-Saxon countries. This can be explained by the reporting procedures of the Medline database, which systematically indexes all American journals, regardless of their quality. In addition, this would also be explained by the birth of the concept of quality of care, hospital performance and evidence based medicine in these countries.

An increasing rate of publication: This study found that about half of the selected articles were published in the last five-year period of the study, demonstrating that quality of care and evidence-based medicine are topical issues today particularly in the field of hip fracture management.

Predominance of clinical audits: Most of papers identified

were clinical audits which underline the importance of the continuous assessment of health care quality provided in the field of hip fracture management. The NHFD (National Hip Fracture Database) [5,56,57] is one of the most known audits of hip fracture care. Six main key standards of hip fracture management are assessed every year: delay of admission, time to surgery, risk assessment of pressure ulcer and use of mattresses to prevent them, preoperative assessment by an orthogeriatrician, discharge on bone protection medication and fall assessment prior to discharge.

Another audit which was developed since the 1990s , the Standardized Audit for Hip Fractures in Europe (SAHFE), was supported by the European Union and carried out to evaluate the effectiveness and differences of hip fracture care throughout Europe [43,58]. Elsewhere, many other countries tried to implement similar clinical audits. In New Zealand, for example, an audit of patients with hip fractures was carried out at Middlemore Hospital in 2008 and repeated in 2012. Then comparisons were made nationally with Auckland hospital and internationally with data published in the 2012 NHFD report [25].

In France, the comparison of performance between hospitals in the field of hip fracture management was the subject of a multicenter clinical audit conducted in three French public hospitals, based on a set of indicators chosen by a multidisciplinary team of orthopedic surgeons, anesthetists, specialists in physical medicine and geriatricians. The main indicators were: surgical time, frequency of physiotherapy, nutritional supplementation, pressure sores, length of stay, prevention of falls, treatment of osteoporosis, mortality and readmission [31].

Multiplicity of guidelines: Studies illustrating international guidelines and recommendations in the field of hip fracture management represented the second type of paper identified. This type of paper illustrated mainly procedural dimensions covering all stages of the management of hip fracture from admission to post-hospital rehabilitation. A consensus on many recommendations seems clear between the various American, English, Canadian and Australian orthopedic surgery societies. Indeed, many standards such as operating time within 48 hours, regular administration of analgesics pre and postoperatively, early and regular mobilization after surgery, use of anti-decubitus mattresses and secondary prevention of osteoporosis are almost recommended by all these societies [10, 21, 30].

TYOLOGY OF INDICATORS

The analysis of the 46 items of care quality found in this systematic review revealed a dominance of “process” indicators compared to “outcome” indicators in terms of number and recurrence. This result highlights that the evaluation of the care process takes precedence over the evaluation of the results obtained, since good management can only lead to good results, especially in the context of such a delicate pathology which short-term and long-term consequences are closely linked to the quality and rigor of care procedures. Moreover, outcomes are not only related to the quality of health care but also to many other factors like patient comorbidities, age, nutrition and environment [59]. That is why process measures are more sensitive to differences in the quality of care and are considered as direct measures of quality [59].

In the context of hip fracture management, many procedural factors are determinant of therapeutic success such as: wait time for surgery, prevention of pressure sores, prevention of infectious and thromboembolic complications, mobilization and postoperative physical rehabilitation ... That is why, the six indicators evaluated annually by the NHFD are all procedural [56].

This predominance can also be explained by the birth in the last two decades of the Evidence Based Medicine (EBM) paradigm, which requires, first and foremost, the application of diagnostic and therapeutic guidelines [60].

Based on the indicators found among the international literature through this systematic review, a selection of the most applicable and relevant for the maghrebien health systems would be very useful to build in a consensual way between the different maghrebien experts a strategic dashboard containing a set of indicators: evidence based, specific, relevant, measurable, reproducible and quantifying the degree of hospital performance in this area.

STRATEGIC DASHBOARD

A performance dashboard is a summary document that includes data on the structures (hospitals, services or units), procedures and outcomes [61]. It combines multidimensional indicators that enable organizations to measure, monitor, and manage performance more effectively [62].

The abundance of performance indicators related to the

management of hip fracture in this study (46 indicators), requires the establishment of a monitoring unit specific to this pathology formed by a multidisciplinary staff (qualified in hospital management and statistics) and with easy access to hospital databases to continuously assess the quality of care provided in this area through a specific dashboard. This dashboard should include the most relevant and applicable indicators for the maghrebien health system and should cover managerial and clinical dimensions of health care for all the steps of hip fracture management. It should, then, be validated by practitioners, patient representatives and decision-makers. In addition to continuous monitoring of hospital performance, this dashboard will lead in the short and long term to an improvement of health care quality in health institutions, by rapidly detecting the level of failure of the healthcare system. It will allow, also, to set up a benchmarking evaluation system between our hospitals.

In conclusion, this systematic review, carried out on Medline database allowed to identify 46 indicators recommended to evaluate the management of hip fracture as a tracer example of health problems whose management should be continuously assessed. This work should be completed by a selection, among these indicators, of those that are most relevant and most applicable for the maghrebien health systems. A consensual performance dashboard should then be elaborated to continuously monitor hip fracture management in our hospitals with a benchmarking approach. It would be an evaluative tool on the one hand, based on current scientific data and on the other hand adapted to the particularities of professional hospital practice in the great Maghreb.

Conflict of interest: Authors declare no conflict of interest.

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Appendix 1 : List of 41 articles indexed in Medline about quality of care in hip fracture management between 2001 and 2015. (Part A)

Article	Author	Journal	Year	Country	Study Type	Number of indicators
1	Brox WT et al ¹⁰	J Bone Joint Surg Am	2015	United States	Guidelines	13
2	Neuburger J et al ¹⁶	Med Care	2015	United Kingdom	Evaluative study	8
3	Desai SJ et al ¹⁷	Can J Surg	2014	Canada	Evaluative study	9
4	Holly C et al ¹⁸	Orthop Nurs	2014	United States	Evaluative study	1
5	Ward RJ et al ¹⁹	J Am Coll Radiol	2014	United States	Guidelines	2
6	De Silva CU et al ¹¹	N Z Med J	2013	New Zeland	Evaluative study	9
7	Patel NK et al ¹²	Injury	2013	United States	Evaluative study	9
8	Collinge CA et al ²⁰	J Orthop Trauma	2013	United States	Evaluative study	7
9	Palmer JS et al ²¹	Br J Hosp Med (Lond)	2013	United Kingdom	Review/ Guidelines	1
10	Taylor R et al ²²	Int Emerg Nurs	2012	United Kingdom	Evaluative study	8
11	Moja L et al ²³	PLoS One	2012	Italy	Meta-analysis	1
12	Leigheb F et al ²⁴	Calcif Tissue Int	2012	Italy	Systematic Review	12
13	Fergus L et al ²⁵	N Z Med J	2011	New Zeland	Evaluative study	9
14	Pinnarelli L et al ²⁶	BMJ Qual Saf	2011	Italy	Evaluative study	1
15	Mayor S et al ²⁷	BMJ	2011	United Kingdom	Guidelines	15
16	Sund R et al ²⁸	Annals of Medicine	2011	Finland	Evaluative study	6
17	Goodwin SJ et al ²⁹	Scott Med J	2011	United Kingdom(Scotland)	Evaluative study	1
18	Mak JC et al ³⁰	Med J Aust	2010	Australia	Systematic Review	14
19	Merle V et al ³¹	Int J Qual Health Care	2009	France	Evaluative study	12
20	Youde J et al ³²	Injury	2009	United Kingdom	Evaluative study	4
21	Teixeira A et al ³³	Age Ageing	2009	France	Analytic study (Cohort Study)	2
22	Baumgarten M et al ³⁴	Gerontologist	2009	United States	Evaluative study	1
23	Sooahoo NF et al ³⁵	Orthopedics	2009	United States	Evaluative study	7
24	Shiga T ³⁶	Can J Anaesth	2008	Japan	Meta-analysis	4
25	Novack V et al ³⁷	Int J Qual Health Care	2007	United States	Analytic study	1

Appendix 1: List of 41 articles indexed in Medline about quality of care in hip fracture management between 2001 and 2015. (Part B)

Article	Author	Journal	Year	Country	Study Type	Number of indicators
26	Verbeek DO et al ³⁸	Int Orthop	2007	Netherlands	Analytic study	10
27	Beaupre LA et al ³⁹	Qual Saf Health Care	2006	Canada	Evaluative study	9
28	Fisher AA et al ⁴⁰	J Orthop Trauma	2006	Australia	Evaluative study	14
29	Petrella RJ et al ⁴¹	BMC Fam Pract	2006	Canada	Evaluative study	1
30	Beaupre LA et al ⁴²	J Gen Intern Med	2005	Canada	Systematic Review/Guidelines	9
31	Heikkinen T et al ⁴³	Disabil Rehabil	2005	Finland	Evaluative study	7
32	Currie CT et al ⁴⁴	Disabil Rehabil	2005	United Kingdom	Evaluative study	9
33	Peich S et al ⁴⁵	Int J Health Care Qual Assur	2004	United States	Evaluative study	2
34	Guryel E et al ⁵³	Ann R Coll Surg Engl	2004	United Kingdom	Evaluative study	1
35	Chilov MN et al ⁴⁶	Med J Aust	2003	Australia	Systematic Review/Guidelines	13
36	Follin SL et al ⁴⁷	Pharmacotherapy	2003	United States	Evaluative study	2
37	Hommel A et al ⁴⁸	Scand J Caring Sci	2003	Sweden	Evaluative study	3
38	Freeman C et al ⁴⁹	Int J Qual Health Care	2002	United Kingdom	Evaluative study	16
39	Gunningberg L et al ⁵⁰	Int J Qual Health Care	2001	Sweden	Evaluative study	4
40	Gunningberg L et al ⁵¹	Scand J Caring Sci	2001	Sweden	Evaluative study	2
41	Gillespie WJ et al ⁵²	BMJ	2001	New Zeland	Review/Guidelines	5