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Original article

Key features of bone and joint infections following the implementation of reference centers in France^{☆,☆☆}

Points clés des infections ostéoarticulaires depuis la labellisation des centres de référence en France

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Abstract

Objectives. – French reference centers for bone and joint infections (BJI) were implemented from 2009 onwards to improve the management of complex BJIs. This study compared BJI burden before and after the implementation of these reference centers.

Patients and methods. – BJI hospital stays were selected from the 2008 and 2013 national hospital discharge database using a validated algorithm, adding the new complex BJI code created in 2011. Epidemiology and economic burden were assessed.

Results. – BJI prevalence increased in 2013 (70 vs. 54/100,000 in 2008). Characteristics of BJI remained similar between 2008 and 2013: septic arthritis (50%), increasing prevalence with age and sex, case fatality 5%, mean length of stay 17.5 days, rehospitalization 20%. However, device-associated BJIs increased (34 vs. 26%) as well as costs (€421 million vs. €259 in 2008). Similar device-associated BJI characteristics between 2008 and 2013 were: septic arthritis (70%), case fatality (3%), but with more hospitalizations in reference centers (34 vs. 30%) and a higher cost per stay. Among the 7% of coded complex BJIs, the mean length of stay was 22.2 days and mean cost was €11,960.

Conclusions. – BJI prevalence highly increased in France. Complex BJI prevalence assessment is complicated by the absence of clinical consensus and probable undercoding. A validation of clinical case definition of complex BJI is required.

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Keywords: Bone and joint infection; Reference center; Hospital discharge database

Résumé

Introduction. – Les centres de référence pour les infections ostéoarticulaires (IOA) complexes ont été labellisés en France en 2009. L'objectif du travail était de comparer le poids des IOA avant et après labellisation des centres.

Patients et méthodes. – Les séjours ont été extraits des bases PMSI nationales 2008 et 2013 par un algorithme validé, en ajoutant le code d'IOA complexe créé en 2011. L'épidémiologie et le poids économique des IOA ont été étudiés.

Résultat. – La prévalence des IOA augmentait en 2013 (70 vs 54/100 000). Pour les IOA, était retrouvé comme en 2008 : arthrite septique 50 %, prévalence augmentant avec l'âge et chez l'homme, létalité hospitalière 5 %, durée moyenne de séjour 17,5 jours, ré-hospitalisation 20 %. Cependant, les IOA sur matériel augmentaient (34 vs 26 %) ainsi que les tarifs (259 à 421 millions €). Pour les IOA sur matériel, était retrouvé comme en 2008 : arthrite septique 70 %, létalité 3 %, mais par contre augmentation des hospitalisations en centres de référence (34 % vs 30 %) et des tarifs par séjour. Parmi les 7 % d'IOA complexes codées, la durée moyenne de séjour était de 22,2 jours et le tarif moyen de 11 960 €.

[☆] This study has been approved by the French Data Protection Authority (French acronym CNIL), Paris, France, on March 2015 (No. AE151046).

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Conclusion. – La prévalence des IOA a fortement augmenté de 2008 à 2013. L'évaluation de la part des IOA complexes est compliquée en l'absence de consensus clinique et en raison d'un probable sous-codage. Une validation de la définition clinique des IOA complexes sera indispensable pour évaluer les centres de référence.

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Mots-clé : Infections ostéoarticulaires ; Centre de référence ; PMSI

1. Introduction

Bone and joint infections (BJI), including septic arthritis, osteomyelitis, and spondylodiscitis, both with or without device, have an increasing incidence in Western countries due to an ageing population and an increasing incidence of arthroplasties. In France they are a growing public health concern [1–4].

A first 2008 French study estimated the incidence of hospitalized septic arthritis to be 29 per 100,000 population, osteomyelitis 19/100,000, and spondylodiscitis 5/100,000 population [5]. BJIs can be native or device-associated. Most of the current BJI literature deals with arthroplasty complications, showing an increasing number of device-associated BJI arthroplasties, especially in the elderly [6,7]. The overall length of stay for patients who develop BJI after arthroplasty is estimated to be more than two-fold greater than that of patients undergoing uninfected procedures [8,9]. Although device-associated BJIs are often more complex, native BJIs can also require complex medical care with frequent rehospitalizations [5,10].

The high burden of BJI is associated with more frequent and prolonged hospitalizations, high morbidity, and complexity of care. In this context, 21 French reference centers and their affiliated centers for BJI were implemented in 2009 to manage patients presenting with complex BJIs, including the most severe cases of native and device-associated BJIs [11,12]. The goal of these reference centers is to improve medical care, research, and organization of complex BJI care. In France, unlike other Western countries, no national arthroplasty register has been set up for the surveillance of complications; especially healthcare-associated infection control [13–16]. However, in France, each hospital discharge whether from the public or private sector, must be registered in the National Hospital Discharge Database (French acronym PMSI). Several recent studies demonstrated that this database can be used for robust epidemiological and medico-economic surveys on native and device-associated BJIs [5,17–19].

We aimed to assess the clinical and financial burden of BJIs, before and after the implementation of these reference centers, comparing the 2008 and 2013 BJI epidemiology. We secondarily focused on complex BJIs in 2013.

2. Methods

The clinical definition of complex BJI was nationally defined on the basis of several criteria, alone or associated:

comorbidities, antimicrobial resistance or particular micro-organism, complex surgery (amputation, skin flap surgery, etc.), and outcome (failure of surgery or antibiotic treatment) [11].

A retrospective national before/after study comparing complex BJI in 2008 and 2013, was conducted on the basis of the French Hospital Discharge Database.

We used the previous algorithm built by our team, which showed a high internal validity in the first 2008 epidemiological analysis, to select hospital stays of persons over 15 years of age presenting with native or device-associated BJIs [5]. This algorithm combines diagnosis codes according to the International Classification of Diseases, Tenth Revision (ICD-10) and surgical procedure codes according to the French Common Classification of Medical Acts. A specific ICD-10 code for complex BJI (Z76800) was included in 2011 in the French Hospital Discharge Database, providing a higher valorization of the hospital stay, if the multidisciplinary consultation team of a reference center validates the complexity of the patient history and case. The BJI algorithm was updated for the 2013 analysis by adding this specific code, allowing to focus on complex BJIs.

2.1. Study variables

Hospital data was used to describe hospitalizations and economic outcomes. Using the unique and encrypted patient number, multiple patient hospital stays were linked to obtain the patient database. The epidemiology of BJI patients was described. Prevalence rates were standardized on sex (French National Institute of Statistics and Economic Studies - INSEE 2010). The rehospitalization rate was defined as the number of patients readmitted more than one day after discharge within the year divided by the total number of people who were discharged alive.

The identification of comorbidities, causative agents and their resistance levels was carried out using specific ICD-10 diagnosis codes. However, no information about the isolation site of the causative agent was available in the coding system. Hospital costs were measured by overall costs before reimbursement by the National Health Insurance, taking into account various components: fixed charges for each diagnosis-related group, modulated by the length of stay and intensive care supplementary charges.

The statistical analysis was performed using SAS version 9.3 software for Microsoft Windows (SAS Institute, Cary, NC).

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