

## Introduction

Hip or knee arthroplasty (HKA) infection is an important indicator of surgical site infections (SSI), due to heavy medical consequences even if rare. To survey HKAI, effective surveillance systems are used but failures and flaws have appeared after 3-decade surveillance. The study aim was to assess the routine use of a validated hospital discharge (HD) algorithm for HKAI detection and surveillance, and study outcomes and risk factors.

## Materials and Methods

- Retrospective cohort study of HKA was built in one French region (2.5 M inhab), using HDD 2008-11: stays with HKA code + corresponding prosthetic material, with linkage to patient database due to the anonymous patient number (Fig. 1).
- HKAI occurrence was tracked in the HD follow-up (minimal duration 1 year, 2008-12), by a HD algorithm built by a multidisciplinary team: ICD-10 codes and surgical procedures in the hospital discharge resumes according to their position. The algorithm was previously assessed by checking 1,000 medical charts as the gold standard in the same region (Se 97%, Spe 95%, PPV 87%, NPV 98%) (ePoster eP022 ECCMID 2014 Barcelona)
- HKAI incidence was estimated and risk factors and outcomes were analyzed using a survival model (Cox regression) for HKAI and death after HKA.

### Metric

- Global in-hospital stays:**  
2 M. hospital stays
- Primary replacement of hip or knee:**  
32,678 patients
- First Hip/knee infections:**  
828 stays/603 patients

### Method of Detection

Regional Hospital Discharge Database (HDD), 2008-11

French Common Classification of Medical Act (FCCMA) Codes

- Hip replacement (NEKA010-NEKA021, NEMA018, NEMA020)
- Knee replacement (NFKA006-NFKA009, NFMA013)

+ one specific code of prosthetic material (Implant)

Stratification by unique patient identification number (ANO)

Defined by the presence in the resume and their associations or not of:

- International Classification of Diseases-10 (ICD-10) or FCCMA codes, 2008-11

Prosthetic joint specific infection or inflammation (T845, T846, T847, Z76800)

Infection codes

- Septic arthritis (M000-002, M008, M866, M868, M869, M900, M902)
- Osteomyelitis (M860- M866, M868, M869, M900, M902)
- Sepsis codes (A, B, R)
- Abscesses (L022 L024 L980)

+/- FCCMA Specific Surgical Procedure

debridement, prosthesis removal, exchange, or implant revision

Figure 1. Detection of primary HKAI occurring in adults at 39 hospitals in Region Centre, France

## Results

- Overall HKAI incidence = 1.84%
- One-year HKAI incidence = 1.31% (N = 418)
- Incidence density = 2.3/100 pers-year [95%CI 2.0-2.6] (Fig. 2):
  - 2.2 for hip infection [95%CI 2.0- 2.6]
  - 2.5 for knee infection [95%CI 2.1- 2.9]
- 30.3% of HKAI occurred the first 30 days after replacement, but 29.4% of HKAI occurred more than one year after joint replacement (Fig. 3)
- 1/3 of HKAI patient had a microorganism coded
  - 45% *Staphylococcus sp.*
- 33% had at least one comorbidity coded. Risk factors of HKAI were liver diseases, ulcer sore, obesity, undernutrition, chronic renal failure, male gender (Table I)
- HKAI case fatality was 11.4%
- Risk factors of death after HKA were age over 75, cancer, HKAI, male, knee location (Table II)

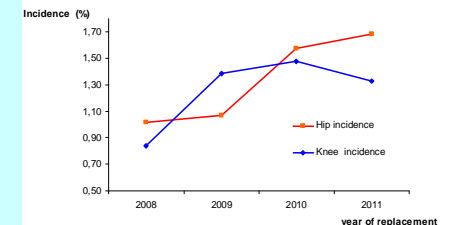


Figure 2 - Year Incidence of Surgical Site Infection, by location

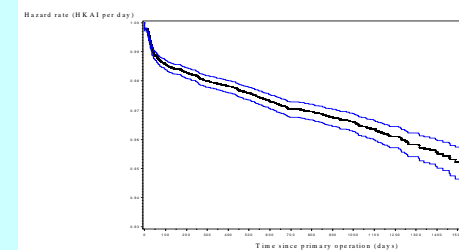


Figure 3 - Risk of HKAI over the period 2008-12, with its confident interval

Table I - Multivariate Cox proportional hazards model of HKAI

Variables	Multivariate analysis*			
	Hazard ratio	(95% CI)	p	
Gender	Female	1	Reference	NA
	Male	1.32	[1.12 - 1.55]	10<sup>-3</sup>
Ulcer sore	no	1	Reference	NA
	yes	2.55	[1.94 - 3.35]	<10<sup>-3</sup>
Chronic renal failure	no	1	Reference	NA
	yes	1.53	[1.11 - 2.10]	0.01
Urinary tractus disorders	no	1	Reference	NA
	yes	1.85	[1.44 - 2.39]	<10<sup>-3</sup>
Chronic liver diseases	no	1	Reference	NA
	yes	2.88	[1.88 - 4.42]	<10<sup>-3</sup>
Alcohol abuse	no	1	Reference	NA
	yes	2.47	[1.67 - 3.63]	<10<sup>-3</sup>
Obesity	no	1	Reference	NA
	yes	1.70	[1.38 - 2.80]	<10<sup>-3</sup>
Undernutrition	no	1	Reference	NA
	yes	1.59	[1.16 - 2.20]	0.01

Table II - Univariate and multivariate Cox proportional hazards models of mortality after hip or knee arthroplasty

Variables	Univariate analysis			Multivariate analysis*			
	n	Mortality rate (%)	p	Hazard ratio	(95% CI)	p	
Age	≥ 75	15,251	8.65	10<sup>-3</sup>	3.37	[3.00 - 3.80]	<10<sup>-3</sup>
Gender	Male	13,078	5.87	10<sup>-3</sup>	1.19	[1.08 - 1.32]	<10<sup>-3</sup>
	Female	11,025	2.52	10<sup>-3</sup>	0.41	[0.36 - 0.47]	<10<sup>-3</sup>
Location	Hip	605	11.4	10<sup>-3</sup>	1.30	[1.02 - 1.67]	0.04
	Knee	1,120	18.66	10<sup>-3</sup>	2.19	[1.86 - 2.57]	<10<sup>-3</sup>
HKAI		12,627	5.83	0.02	0.81	[0.73 - 0.90]	10<sup>-3</sup>
Ulcer sore		889	13.61	<10<sup>-3</sup>	1.30	[1.07 - 1.58]	0.01
Hypertension		889	27.3	<10<sup>-3</sup>	2.86	[2.46 - 3.32]	10<sup>-3</sup>
Cardiological device		1,259	27.9	<10<sup>-3</sup>	3.97	[3.51 - 4.50]	<10<sup>-3</sup>
Chronic renal failure		229	23.14	<10<sup>-3</sup>	1.89	[1.39 - 2.58]	<10<sup>-3</sup>
Cancer		408	15.20	<10<sup>-3</sup>	1.78	[1.34 - 2.37]	<10<sup>-3</sup>
Chronic liver diseases		3,917	3.47	<10<sup>-3</sup>	0.81	[0.68 - 0.97]	0.03
Alcohol abuse		933	20.79	<10<sup>-3</sup>	1.67	[1.42 - 1.98]	10<sup>-3</sup>
Obesity							
Undernutrition							

## Conclusions

Incidence density estimation was 2.3/100 pers-years. HDD long-term follow-up showed that 1/3 of HKAI occurring 1 year after joint replacement. Hospital discharge database could represent an effective tool for epidemiologic studies and evaluation.