Multidisciplinary concertation in decision making for complex bone and joint infections

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Introduction

- Bone and joint infections (BJI) are a significant cause of morbi-mortality, especially with the increasing ageing population.

- The most severe BJI cases represent a key issue for orthopaedists and physicians specialised in infectious diseases due to complex management and outcome ➜ **Complex BJI (CBJI)**.

- To enhance CBJI knowledge and management, CBJI reference centres (RC) have been implemented in France. Each potential CBJI must be assessed in a multidisciplinary concertation in one RC in order to provide recommendations +/- management guidelines.

- However, CBJI definition has been designed by Health Ministry without concordance validation.

Objective: to assess the agreement in CBJI diagnosis, between experts of one RC and between six RC

Methods

Selection of **20 BJI cases** in the Hospital Discharge Database (HDD) of one RC, using a validated algorithm.
Four non-BJI stays in orthopaedic unit were added in order to also check non cases.
Grammatico-Guillon L et al. Bone and joint infections in hospitalized patients in France, 2008: clinical and economic outcomes. J. Hosp. Infect. 82, 40–48 (2012)

Step 1: inter- and intra-rater agreement in one RC

- Exploratory validation
- Five raters of the same RC
- **Individual classification** using electronic patient record
- **Second classification** after a one-month delay
- Rate of agreement:
  — Inter-rater: Fleiss' kappa coefficient for multiple raters
  — Intra-rater: Cohen's simple kappa coefficient

Quality of agreement

Color code

Agreement	
Almost perfect	(green)
Substantial	(light green)
Moderate	(white)
Fair	(yellow)
Slight	(orange)
No agreement	(red)

Landis, J.R. and Koch, G.G. (1977)

Step 2: inter-RC agreement

- Standardised information and reporting form for the same 24 cases
- Submitted to the **six RC** of the West of France area (CRIOGO)
- Cases classified in a **multidisciplinary concertation**, gathering at least: infectious diseases specialist, orthopaedic surgeon, microbiologist (legal quorum)
- Data collected on RC members: number, age, status, medical specialty
- Rate of agreement: Fleiss' kappa coefficient

Results

Step 1

All physician raters agreed on the 4 non-cases.
These cases were therefore excluded from the analyses.

	min		max
Orthopaedist vs Orthopaedist	0.00	-	0.50
Infectiologist vs Infectiologist	0.06		
Orthopaedist vs Infectiologist	0.13	-	0.50
Professor vs Professor	0.21		
Senior vs Senior	0.21		
Professor vs Senior	0.06	-	0.26
Professor vs Fellow	0.00	-	0.40
Senior vs Fellow	0.05	-	0.40

Inter-rater 0.23

Figure 1 *Inter-rater agreement*

Intra-rater 0.50

Professor 1	0.47
Professor 2	0.27
Senior 1	0.90
Senior 2	0.31
Fellow	0.50

Figure 2 *Intra-rater agreement*

Step 1 results

Inter-rater agreement: Fair
not better within specialty or status

Intra-rater agreement: Moderate
not better with experience

Figure 3 *RC classifications*

Complex BJI / Simple BJI / Non BJI

Step 2

Table 1 — RC members characteristics

RC members	Reference center					
	A	B	C	D	E	F
Number of participants	5	4	5	4	3	3
Age*	40 (39-63)	44,5 (31-60)	46 (33-51)	-	57 (53-67)	44 (51-60)
MD exercise*	12 (10-30)	14 (2-31)	16 (3-22)	17,5 (5-20)	38 (25-40)	>20 (14->20)
Participation in multidisciplinary concertations*	8 (8-8)	5,5 (2-8)	8 (3-8)	8 (5-8)	20 (7-26)	6 (6-6)

* years, median (min-max)

Table 2 — Inter-RC agreement (κ coefficient)

Reviewed charts in the reference centres (RC)	RC (n)	All (n=24)	BJI* (n=21)	BJI** (n=19)
All RC	6	0.58	0.40	0.45
3 members	2	0.47		
4 members	2	0.41		
5 members	2	0.45		
Professor	3	0.65		
No professor	3	0.51		
Median time/case ≥ 4mn	3	0.60		
Median time/case < 4mn	3	0.47		

* excluding 3 non-BJIs recognized by all RC
** excluding 2 cases with an issue in the case presentation

Step 2 results

Inter-RC agreement: Moderate
Better in RC including professor(s) and/or with longer median time

NB: agreement for non-BJI / BJI: **Almost perfect** (κ =0.87)

Discussion

This study is the first evaluation of concordance of CBJI classification within and between RC. Despite its limitations (non-standardised medical charts for the first step), analyses showed:
- heterogeneity of CBJI classification (first step):
  – between raters: infectiologists and orthopaedists have probably a different interpretation of the official definition.
  – for one rater: no trend for intra-rater agreement increasing with experience.
- moderate inter-RC agreement (second step).

The better inter- than intra-RC results enhance the place of the RC for the CBJI classification, which should be linked to adapted management.
Multidisciplinary concertation must be performed to avoid heterogeneous CBJI management, potentially increasing the costs.