



Validation study : Secondary research questions

National surveillance of ICU-acquired
nosocomial infections

Ann Versporten,
Ingrid Morales, Carl Suetens





Belgian National ICU surveillance

- 1996: Start National Surveillance of ICU acquired infections (Pneumonia & Bacteraemia)
 - ICU acquired : admitted >48h in ICU
 - patient-based surveillance: 1 file by patient, + infection file if ICU-acquired PN or BAC



Validation study: objectives

- **Determination of Sensitivity & Specificity** of reported ICU-surveillance data (PN & BAC) against a reference gold standard.
- Evaluate the **accuracy** of all data reported to the surveillance.
- **Exhaustiveness** (completeness) of the denominator.



Secondary research questions

- Assessment of workload associated with data collection and entry.
- Identification of factors influencing the Sens. & Spec. of the infection data
- Profile of hospitals refusing to participate to the validation study:
 - Bias in the validation results?



Methods - 1

- Descriptive analyses of hospital questionnaire data
- Study of risk factors of sens en spec :
 - hospital data (Questionnaire)
 - Surveillance data (patient level)
- Analysis at patient level (correction factor for hospital size) using logistic regression
- Reasons of refusal: same profile ?



Global results

- 35 hospitals included in the analysis
- 906 validated records \in 4097 patient files (LOS \geq 2 days)

- 5 hospitals refused to participate to the validation study
- 5 hospitals : participation not possible

Results (ongoing, n=35 hosp.)

	Se % (95%CI)	Sp % (95%CI)
Pneumonia	53,3 (45,2-61,3)	98,6 (97,8-99,1)
Bacteraemia	61,9 (45,6-76,0)	99,4 (98,9-99,7)

Completeness of denominators : 81,2% for all patients staying >48h in ICU



Global results

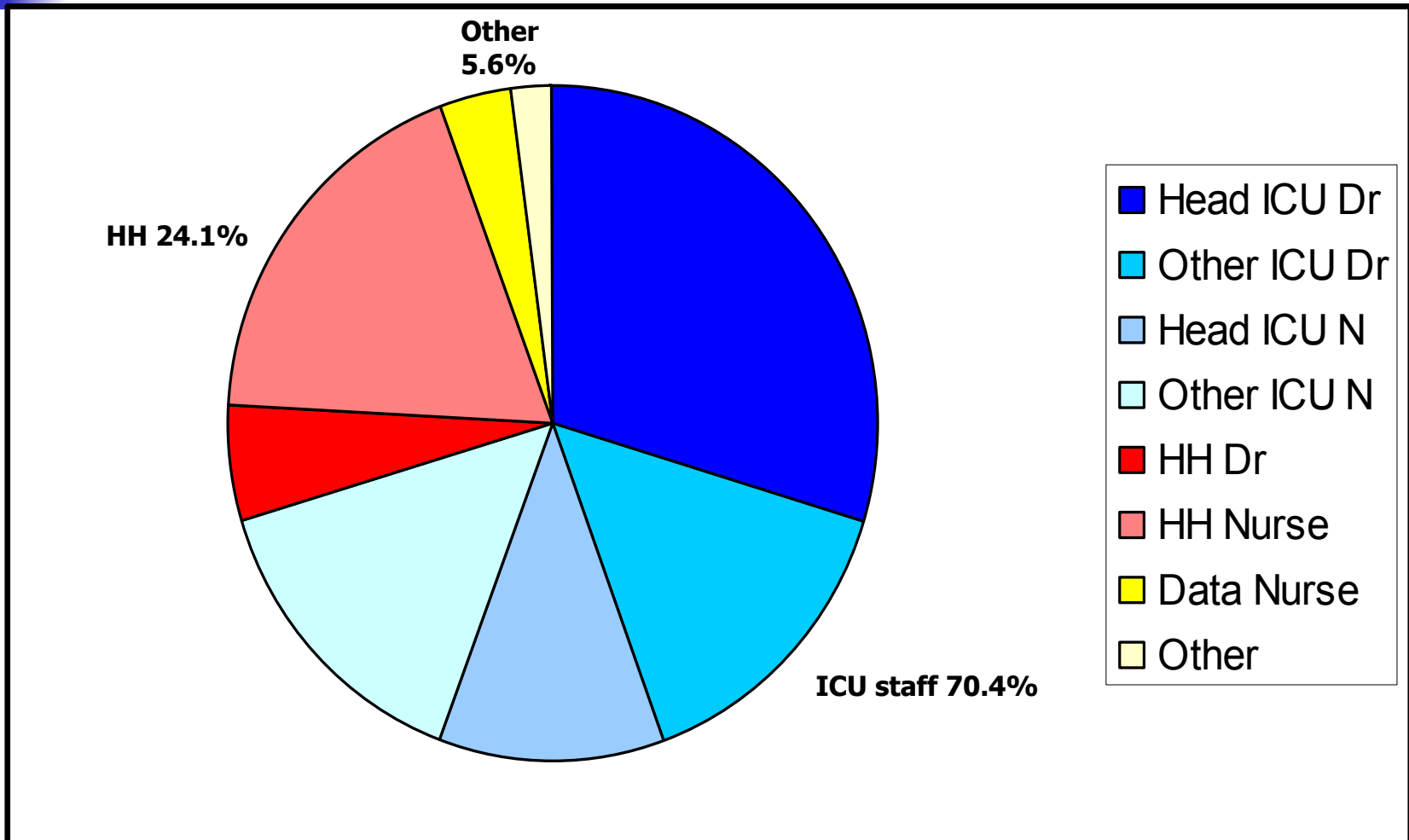
- ICU type :
 - 88,6% polyvalent
 - 2,9% coronary unit
 - 5,7% surgical unit
 - 2,9% medical unit
- Mean ICU size = 11 beds (range 4-32)
- Mean length of stay = 7 days (range 3-222)



Secondary research questions

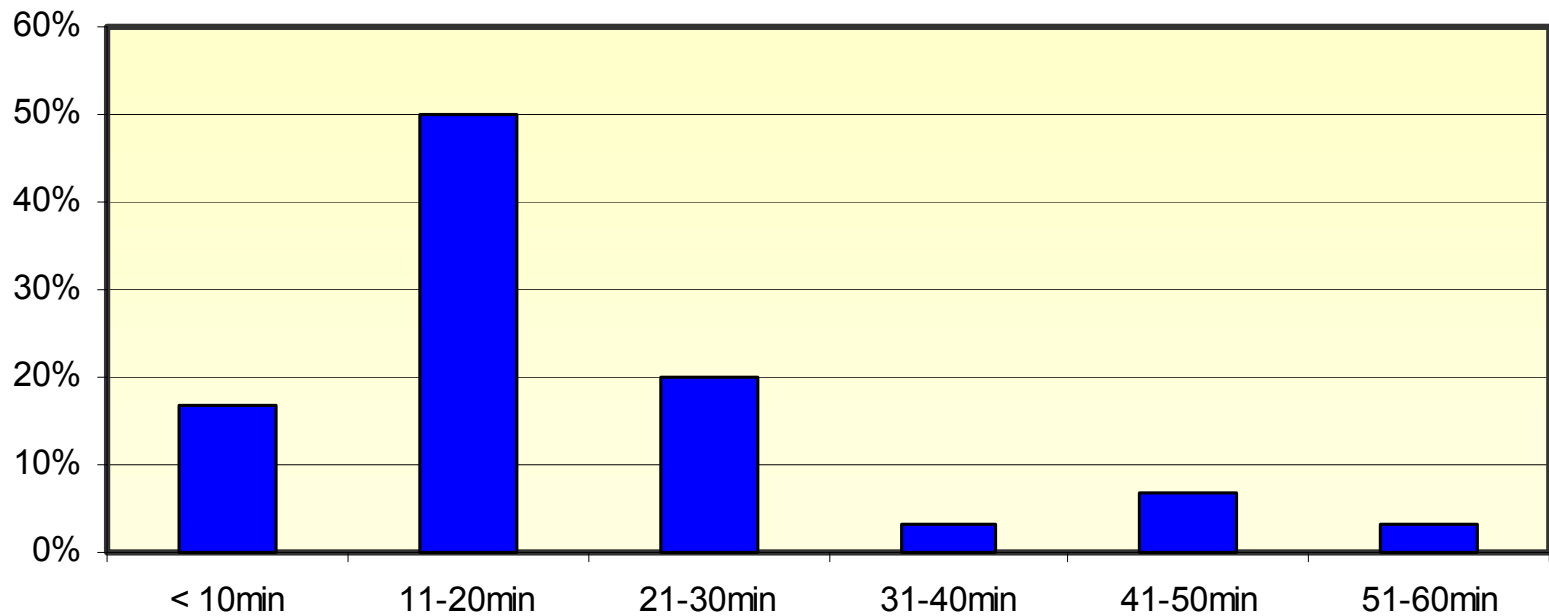
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Who collects ICU data?

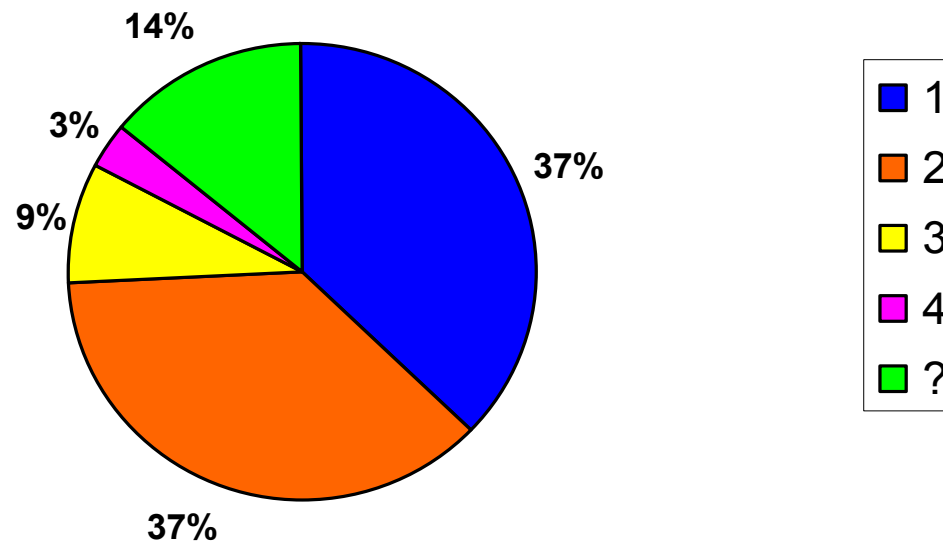


Workload

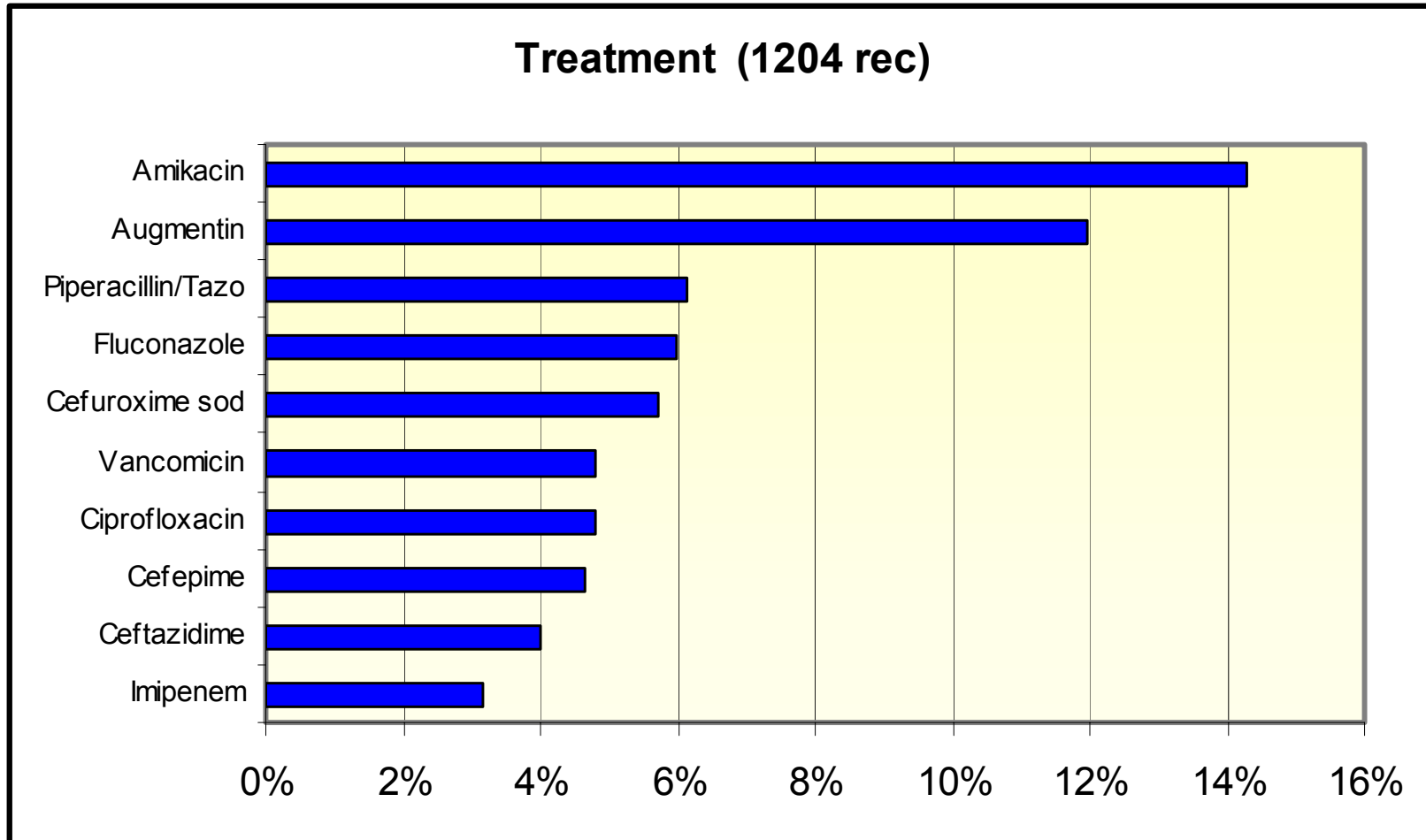
Necessary time per patient (mean 20')



Number of persons involved in surveillance

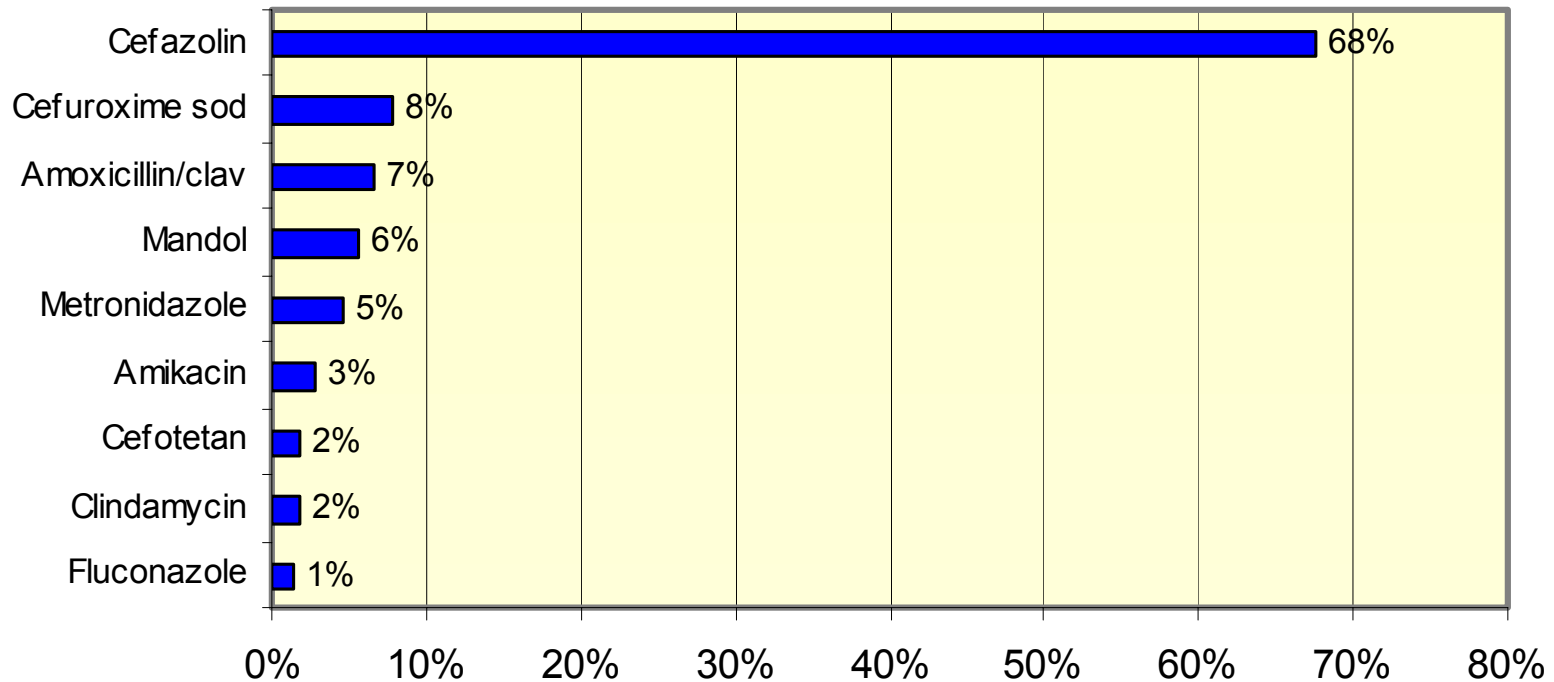


Most used antimicrobials (1)



Most used antimicrobials (2)

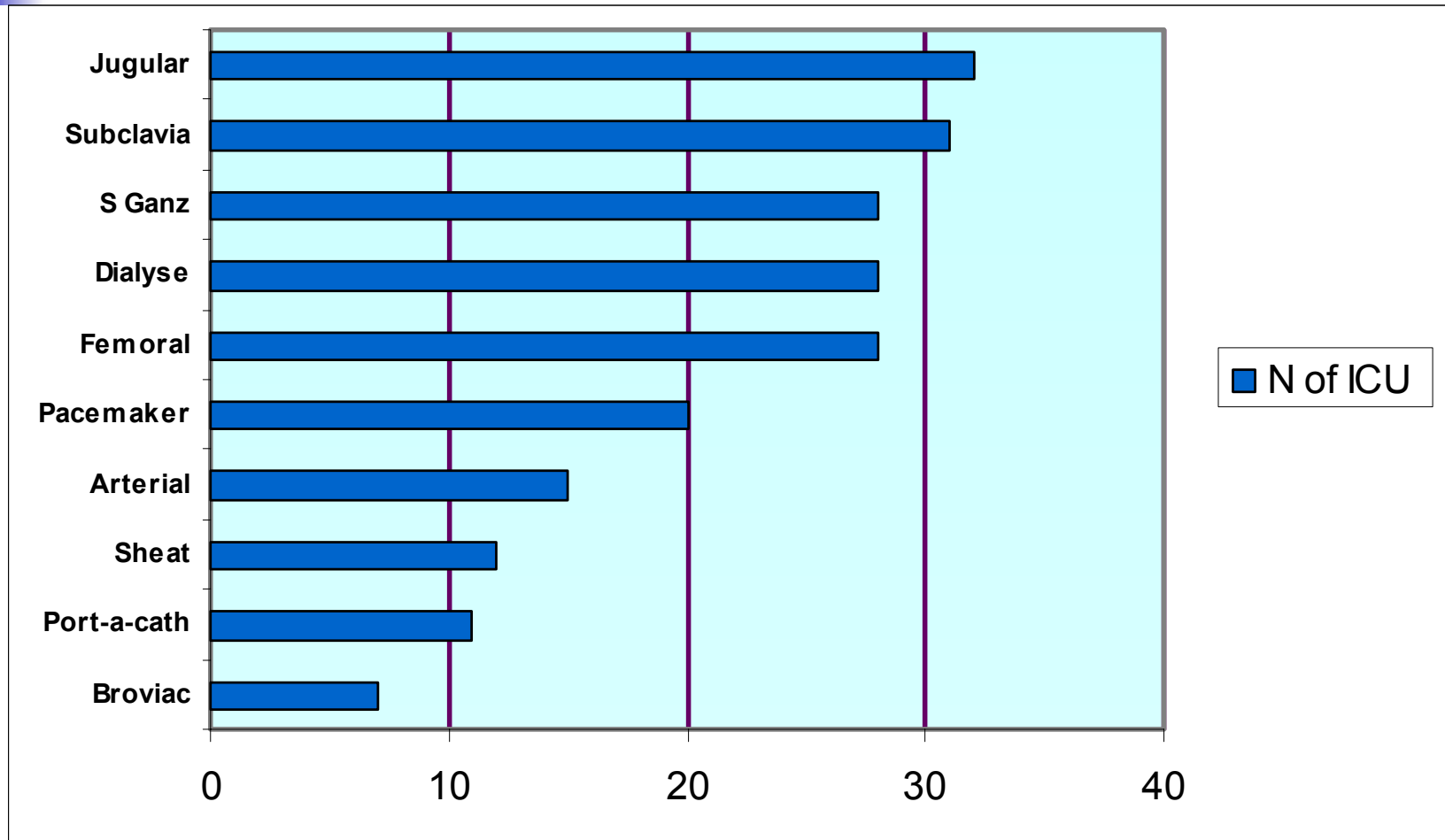
Prophylaxis (309 records)



Standard procedures for HC

<i>Criteria</i>	<i>Frequency</i>	<i>Percent</i>
Fever	9	31,0%
Temp. Specified	7	24,1%
Doctors' opinion	5	17,2%
Unknown	5	17,2%
Other	3	10,3%
Total	29	100%

Registered catheters by Belgian ICUs





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Recapitulation

	Results validation study		
Results surveillance	a (TP)	b (FP)	a+b (PV+)
	c (FN)	d (TN)	c+d (PV-)
	a+c (Se)	b+d (Sp)	a+b+c+d

Factors influencing Sensitivity of PN in ICU surveillance

	Se % +	Se % -	OR (cluster by hosp.)	P-value
Stand. procedures for prev. PN <i>(more vs less)</i>	51.7	61.6	0.6	NS
Person responsible for data collection <i>(Intens. vs ICP)</i>	55.0	52.9	1.1	NS
Who decides when PN is reported <i>(Intens. vs ICP)</i>	60.2	38.6	2.4	NS
Initiative to participate to surveillance <i>(Intens. vs ICP)</i>	44.4	66.1	0.4	0.09
Comply with protocol definitions <i>(best vs worst practice)</i>	63.2	54.6	1.4	NS
Occupancy rate Ratio ICU size/tot. FTE nurses <i>(higher vs lower)</i>	45.5	58.4	0.6	NS



Independent risk factors for FN & FP Pneumonia: *decision to participate*

	OR	95% CI	P-value
In ICU, intensivist involved	1		
In ICU, intensivist not involved	0.6	(0.4-0.9)	0.008
Outside ICU, intensivist involved	0.7	(0.5-0.9)	0.019
Outside ICU, intensivist not involved	6.4	(3.7-11.1)	<0.001
Other (non-med) personnel involved	0.7	(0.5-1.0)	0.057

Independent risk factors for FN & FP

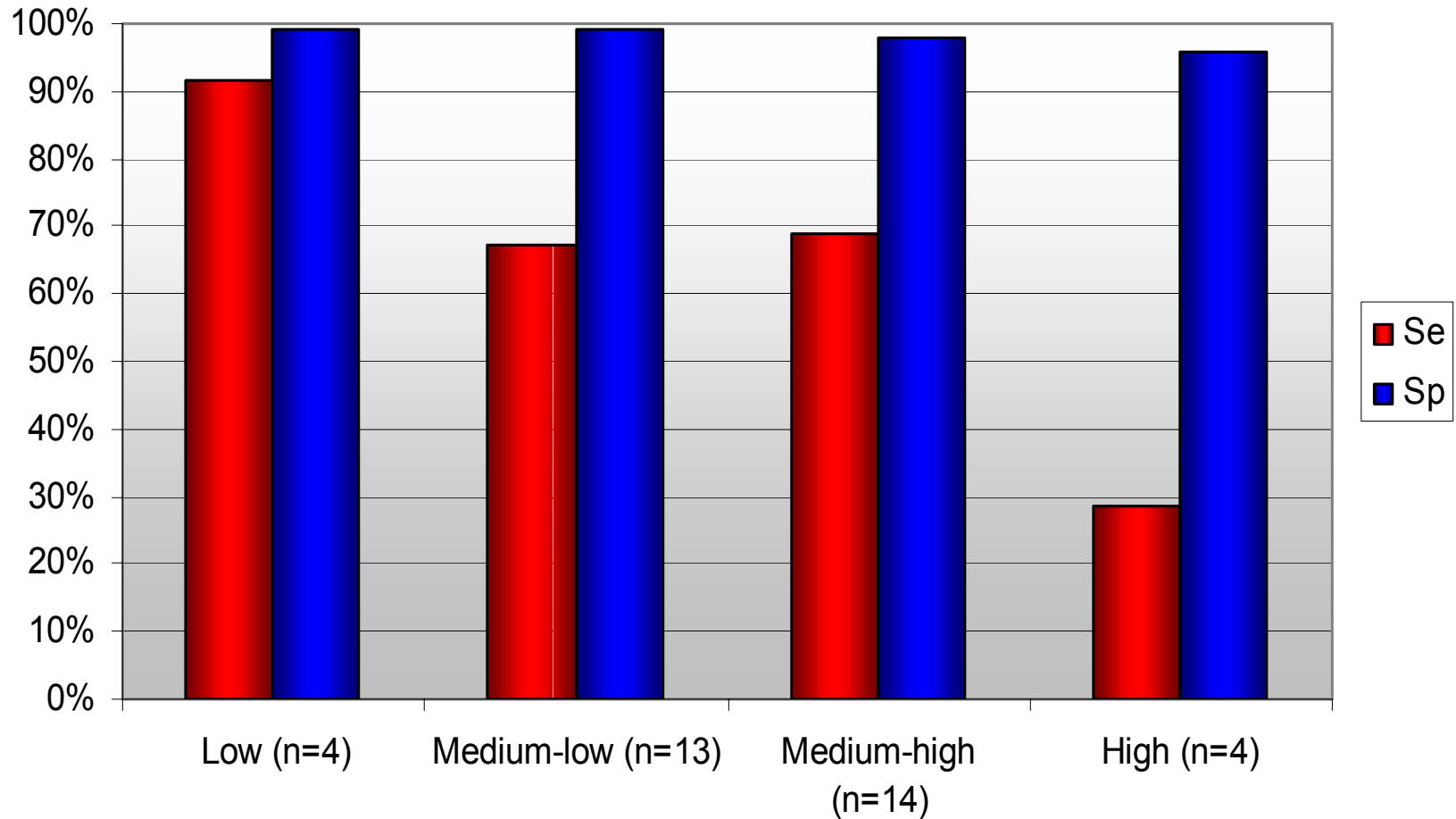
Pneumonia: *adherence to protocol definitions*

	OR	95% CI	P-value
Selection of patients (wrong)	0.4	(0.2-0.8)	0.015
≥3 major criteria to report PN	2.3	(1.6-3.1)	<0.001
Infection file filled in if no micro-org.	0.3	(0.2-0.4)	<0.001
Infections reported on both files	0.4	(0.3-0.5)	<0.001
Early PN included	0.7	(0.5-0.9)	0.021

Independent risk factors for FN & FP Pneumonia: *Other characteristics*

	OR	95% CI	P-value
PN risk score ≥ 30	4.0	(2.3-6.9)	<0.001
≥ 1 of discordant values	4.0	(2.1-7.6)	<0.001
Zero infection rate	1.6	(1.3-2.2)	<0.001

Se & Sp according to FN/FP score



Mean FN/FP risk profile in hospital

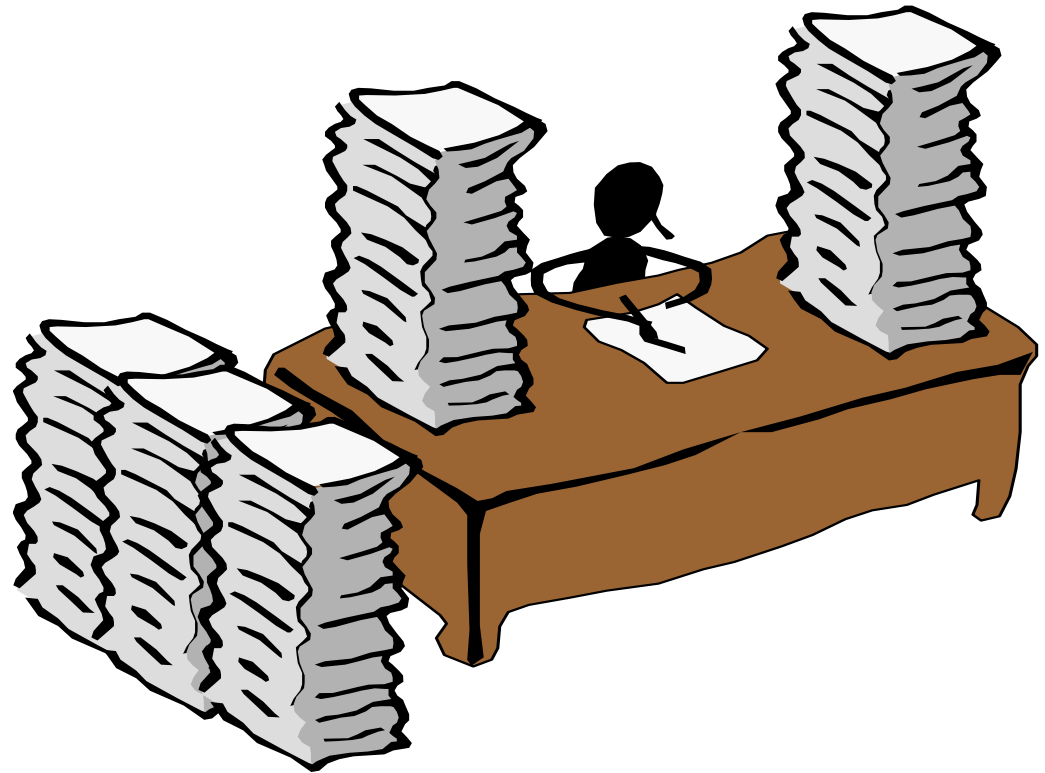
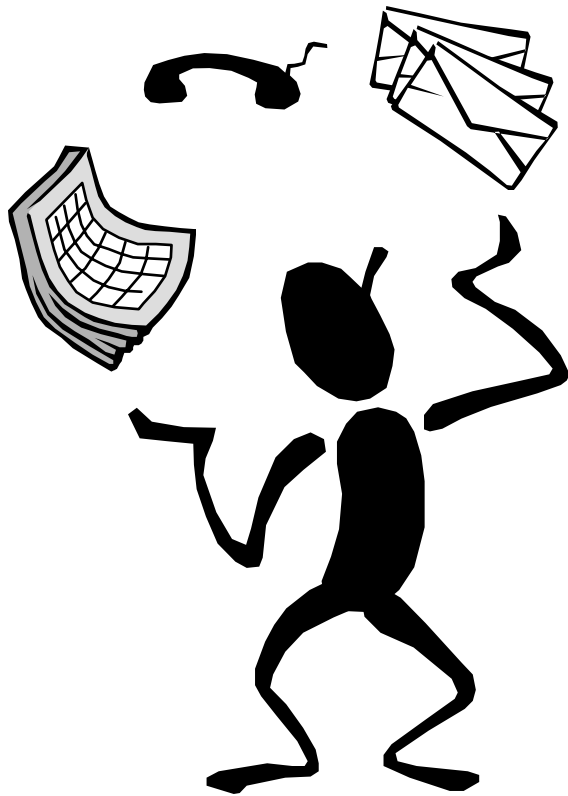




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Reasons of refusal



Reasons of refusal



Reasons of participation not possible



Profile of participation versus refusal: patient characteristics (pts >48h)

	N hosp	Mean LOS in days (NS)	Tot. catheter use % (NS)	VUR % (NS)
Participation	35	6.9	88.0	39.1
Refusal	5	7.5	83.2	34.4
Participation not possible	5	5.9	71.3	29.0

Profile of participation versus refusal: quality of data

	N hosp	Tot. missing & discordant (%) <i>(NS)</i>	Tot. major errors (%) <i>(NS)</i>
Participation	35	52.0	1.5
Refusal	5	53.5	1.8
Participation not possible	5	88.4	1.9

Profile of participation versus refusal: infection rates

	N hosp	BAC / per 1000 ptdays (NS)	PN / per 1000 ptdays (p=0.04)
Participation	35	3.1	9.0
Refusal	5	3.6	12.3
Participation not possible	5	3.7	13.8



Discussion – 1

- Collection of data mainly done at the ICU
- Number of persons involved is rather low (mean 1-2)
- Time invested : rather high



Discussion - 2

- Factors influencing the Sens. Of PN in ICU surveillance

Sensitivity higher when :

- Intensivist decide to report the PN (NS)
- Comply with the protocol definitions (NS)



Discussion – 3

Important risk factors for the FN en FP pneumonia

- Decision to participate outside ICU and intensivist not involved
- Infection file not filled in if no micro-org identified
- Diagnostic criteria too specific for PN:
 - Wait for 3 major criteria
 - Early PN not included
- PN risk score of ≥ 30
- Zero infection rate



Discussion – 4

- Profile of hospitals participating to validation study versus refusing & 'participation not possible' :

No significant difference in patient characteristics, quality of data & infection rates (with exception of PN rate)

—————> Probably no bias



Conclusions

- Labour intensive but worth it.
- Identifies methodology problems and factors influencing Sens. & Spec. of the surveillance.
- Gives a better idea of field work
- Better targets the ICPs' training.



Future objectives

- Simplify protocol : Helics/ICU
- Training case definitions (& surveillance methods)
- Electronic surveillance: possible positive influence on sensitivity
- Validatie on continuous basis



Thank you all !

