Correspondence between Guidelines for Antibiotic Treatment and Microbiological Outcome – Analysis of Cases of Pneumonia in the Swedish Intensive Care Registry

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Background

People with pneumonia needing intensive care are less than 4 % of all admittances but they use almost 8 % of occupied bed days (Table 1).
Pneumonia is still a disease causing death within 30 days in 20% of community acquired and in 28 % of hospital cases treated in Swedish Intensive care units. The treatment has to be started on an empiric base. To treat patients properly You need to keep guide lines updated. The Swedish infectionists published 2007 national guidelines for treatment of pneumonia where different antibiotics are recommended due to severity and from where the patient was diseased.

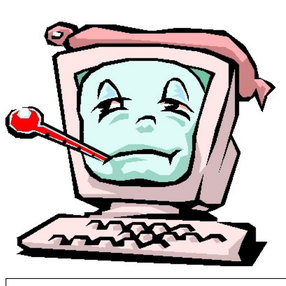
	Female	Male	Total
Number of admissions	880	1356	2236
Proportion of admissions (%)	3,3	3,8	3,6
Mean age	62,7	64,6	63,8
Mean length of stay (days)	5,1	6,1	5,7
Proportion of occupied bed days (%)	6,6	8	7,4
Mortality within 30 days (%)	21,8	26,8	24,9

Table 1. Background data on admissions for pneumonia as a primary diagnosis ICD 10—J15.9. Data from the Swedish National Registry of Intensive care.

Method

The National registry of intensive care in Sweden (www.icuregswe.org) collects data (like diagnosis, risk score, workload, special treatments and adverse events) from Swedish intensive care units (ICU) after discharge electronically with the help of xml files. Once a week mortality is followed up. Microbial data on an individual basis related to each episode of care is collected via a webb service from the microbiological laboratories.
In this study patients with the primary diagnosis of bacterial pneumonia were selected. They were divided in community acquired and hospital acquired with the help of their route of admission. Antibiograms from microbial findings from blood and/or airways within the first 48 hours from admission were compared with recommended therapy for severe pneumonia. Only cultures showing bacterias considered pathogen for pneumonia were used in the analysis.

Local Intensive care unit reports via xml-file to the national Intensive Care Registry



Corresponding microbial data are collected via webbservice

After mapping data analysis is performed

Results

Microbe	Community acquired	Hospital acquired
	Blood/ Airways	Blood/ Airways
Streptococcus Pneumoniae*	21/16	18/9
Staphylococcus Aureus*	6/11	10/11
KNS	15/1	13/6
Haemophilus Influenzae*	1/14	2/11
Non fermentative G-*	2/5	5/14
Entero-bacteriacae*	5/3	6/8
Moraxella Catarrhalis*	0/3	0/4
Enterococcus spp	0/0	2/3
Other non pathogenic	0/1	3/1
Candida Albicans	0/2	1/1
Klebsiella Pneumoniae*	0/1	0/2
Streptococcus spp*	1/1	0/1
Anaerobic	0/0	2/0
Fusobacterium spp*	1/0	0/1
Streptococcus pyogenes*	1/0	0/0
Total	53/58	62/72

Table 2. Microbial findings within 48 hours before and after admission to ICU from blood and airways. The yellow highlighted results are considered pathogenic.

Recommended antbiotic	Resistence %	Sensitive %	Not tested %
Community acquired, Cefotaxime+ Macrolid	3	86	11
Community acquired, BensylPC+ Moxifloxacin/ Levofloxacin	7	87	7
Hospital acquired, Piperacillin/ Tazobactam	5	88	7
Hospital acquired, Cefotaxime	3	74	23

Table 3. Results after comparing recommended antibiotics with the antibiograms for pathogenic microbs.

The most common bacterias were Streptococcus Pneumonia, Staphylococcus Aureus, Haemophilus influenae and Non fermentative G-. Highlighted bacterias in the table are considered pathogenic. (Table 2)
Recommended treatment of 3 to 7 % of community acquired cases and 3 to 5 % of hospital acquired pneumonia would have failed according to microbial findings.
7 to 23 % of the relevant cultures were not tested for the recommended antibiotics. (Table 3)

Conclusion

This kind of analysis is of great importance to verify the relevance of guide lines for infectious disease in areas where microbial patterns and susceptibility change over time.
There is no laboratory standardized terminology for description of samples etc which calls for manual mapping before analysis.

Discussion

Since severe pneumonia has to be initially treated empirically it is very important to keep guidelines up to date. This method contributes to do so.
To be able to make this kind of analysis automated there is a need for standardized terms regarding this area of health care.
The number of “not tested” antibiotics could be reduced by the use of synonym substances combined with microbiological knowledge of how certain bacteria respond to certain antibiotics.