Multidisciplinary investigation of an outbreak caused by methicillin resistant *Staphylococcus aureus* (MRSA) in a medical ICU – 2013/2014, Prague, Czech Republic

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BACKGROUND

- MRSA prevalence in Czech healthcare settings: ~14% (EARS-Net)

Setting and MRSA management
- Internal medicine ICU: 8 beds, 3 doctors, 18 nurses, 4 assistants
- Risk based MRSA screening at admission
- Contact isolation of MRSA cases for the entire hospital stay

Description of the outbreak situation
- Time: 20.01. - 08.02.14
- Cases: 7 patients and 3 nasal carriers among staff
- 3/14 positive environmental samples
- Control measures: ward closure, enhanced cleaning, education

OBJECTIVES

- To identify the source and reason for the outbreak in 2014
- To asses the MRSA situation in the internal department from 2012 - 2014
- ➢ In order to identify gaps in infection control practices

CONCLUSIONS

- Microbiological and epidemiological analyses identified the 2014 outbreak strain, its source, probable reservoirs and transmission routes
- PFGE and Phage typing demonstrated the circulation of multiple MRSA strains in 2012/2013 and one substantial outbreak in 2013/2014
- Psychological and work related factors had an extreme impact on compliance to infection control practices
- Staff self-evaluation and impartial audit results on work related factors were partially controversial

- ➢ **Continuous communication, education, auditing and evaluation of psychological and work related factors should be included in routine infection control practices**
- ➢ **Nosocomial outbreaks should be investigated in a multi-faceted approach to identify gaps in infection control practices, quality of care and operational management**

METHODS

Epidemiology
- Case definition: hospitalisation at the internal department between 01.01.2012 and 18.02.2014 **and** registered MRSA positivity
- Case category: hospital-acquired, imported, historical

Microbiological typing
- Spa typing
- Pulsed-field gel electrophoresis (PFGE) typing
- Phage typing

Analysis of work conditions (subjective)
- Anonymous nurse interviews
- Areas addressed:
  - personal sensation towards staff count and compliance with infection control practices
  - interpersonal relations
  - psychological factors

Audit of nursing practices (objective)
- Six audits performed by two independent infection control nurses
- Areas observed:
  - compliance to hand hygiene
  - nursing procedures
  - operational management
  - cleaning procedures

RESULTS

Epidemiology
- 31 cases (52% female, mean age 71y)
- Accumulation of cases in 2012 and 2013/14 (Fig.1)
- Case category: 52% hospital-acquired, 26% imported, 13% historical, 10% unknown

Microbiological typing (Fig.1)
- 36 isolates from patients, staff and environment
- 2014 outbreak strain: spa type t003, PFGE type A4, Phage type 54/812
- Environmental contamination and one staff colonization with the outbreak strain

Analysis of work conditions (Fig.2)
- Response rate: 72% (13/18 nurses)
- Psychological stress was assessed as very high
- Ladership support was rated very poor

Audit of nursing practices (Fig.3)
- Important gaps were mainly identified in criteria related to operational management and nursing procedures

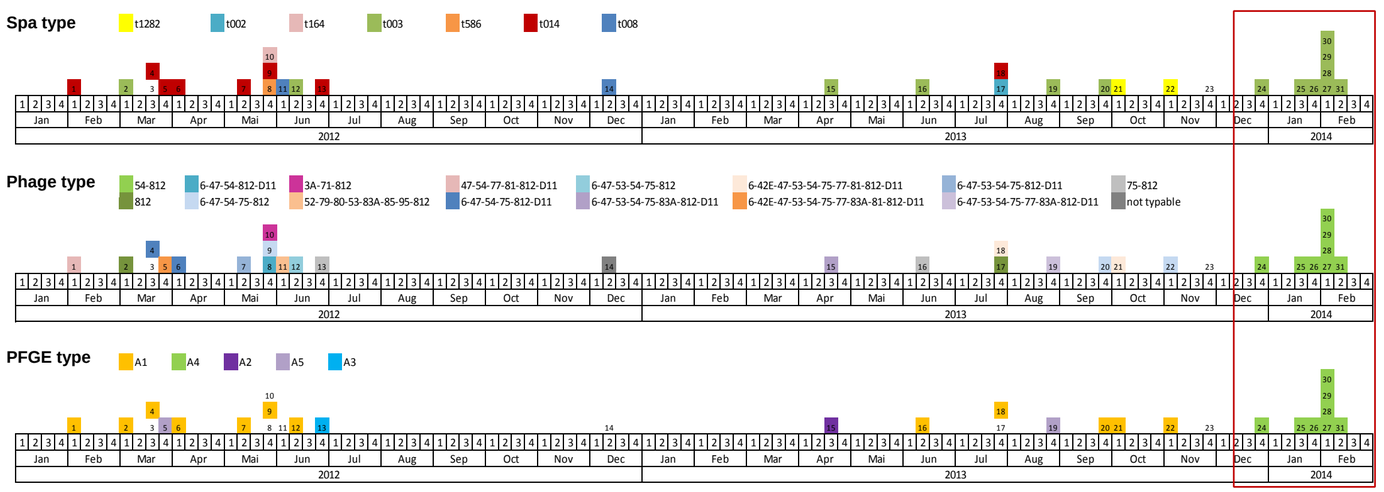

Fig.1: MRSA case distribution by time of detection and subtype, determined by spa typing, phage typing and PFGE typing. The 2014 outbreak is indicated

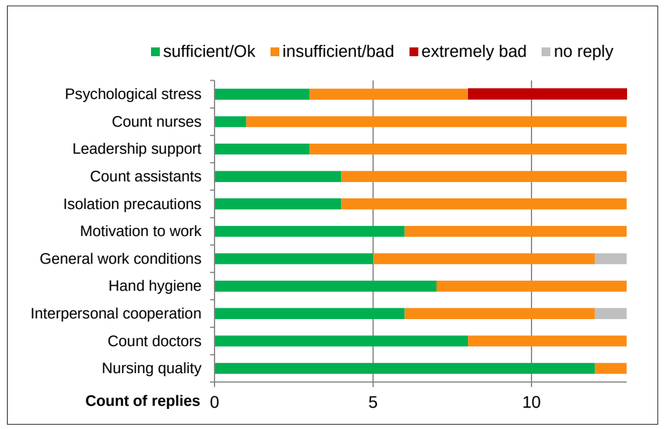

Fig.2: Analysis of work conditions and related factors by anonymous nurse interviews.

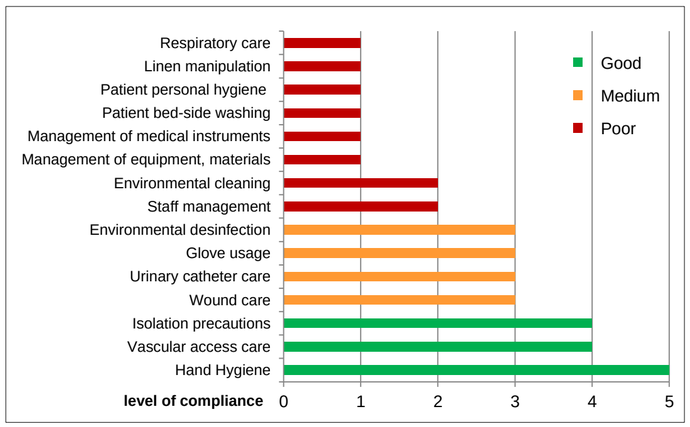

Fig.3: Analysis of work related factors, management and nursing procedures by impartial audits performed by specialized infection control nurses.