World Health Organization
Regional Office for the Eastern Mediterranean

Surveillance of Healthcare-associated Infections in LMIC - Opportunities and Challenges

Maha Talaat
Regional Advisor AMR/IPC
World Health Organization
Eastern Mediterranean Region

IFIC/IPAC Canada
Quebec, 26-29 May, 2019

Overview

- Burden of HAIs in LMIC
- Role of IPC in reducing HAIs
- Objectives of HAI surveillance
- Key elements of HAI surveillance
- HAI case definitions
- Incidence vs prevalence surveys
- SSI surveillance
- Challenges of HAI surveillance

Burden of HAIs

- HAIs are important public health problems affecting millions of patients worldwide
  - Affect developed and LMIC countries
- Result in substantial human and economic impact
  - prolong hospital stays
  - create long term disability
  - increased use of antibiotics resulting in AMR
  - additional diagnostic and therapeutic interventions
  - high cost of healthcare

Burden of HAIs in LMIC

- **Burden of HAI in LMIC**
  - Hidden, fragmented, and paucity of data describing national levels of HAIs
  - Burden on systems and patients
  - Scanty information on risk factors associated with HAIs
- **HAI frequency**
  - On average, 1 in every 10 patients is affected by HAIs worldwide
  - In acute care hospitals, out of every 100 patients, 7 in high-income countries and 15 in LMIC will acquire at least one HAIs
  - Neonatal infection rates in LMIC countries are 3-20 times higher than in developed countries

World Health Organization Regional Office for the Eastern Mediterranean

4

Burden of healthcare- associated infections 1995-2010 – meta-analysis

High-income countries	Low- and middle-income countries
• **Overall HAI: 17/1000 pt-days**	• **Overall HAI: 47.9/1000 pt-days**
• CR-BSI: 3.5/1000 cath-days	• CR-BSI: 12.2/1000 cath-days
• CR-UTI: 4.1/1000 cath-days	• CR-UTI: 8.8/1000 cath-days
• VAP: 7.9/1000 vent-days	• VAP: 23.9/1000 vent-days

• at least X 2-3
• up to 13 times higher in some countries

World Health Organization Regional Office for the Eastern Mediterranean

WHO Report on the Burden of Endemic Health Care-associated Infection Worldwide 2015

5

Role of IPC in improving patient outcomes

>30% Reduction	Effective IPC programmes lead to more than a 30% reduction in HAI rates
25-57% Reduction	Surveillance contributes to a 25-57% reduction in HAIs
50% Reduction	Improving hand hygiene practices may reduce pathogen transmission in health care by 50%
13-50% Reduction	Strong IPC plans, implemented across the USA between 2008 and 2014, reduced central line-associated bloodstream infections by 50%, surgical site infections (SSIs) by 17% and MRSA bacteraemia by 13%
56% Reduction	MRSA declined by 56% over a four-year period in England in line with a national target
44% Reduction	A safety culture and prevention programme reduced SSI risk in African hospitals by 44%
80% Compliance	Between 2010 and 2015 Australia achieved and sustained 80% hand hygiene compliance in hospitals nationwide

REDUCE SPREAD OF AMR
- minimize the spread of pathogens, including resistant ones
- reduce the overall need for antimicrobials

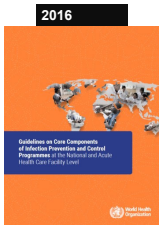
World Health Organization Regional Office for the Eastern Mediterranean

http://www.who.int/infection-prevention/en/

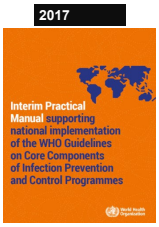
6

WHO Guidelines on Core Components of IPC Programmes *at the National and Acute Health Care Facility Level*

2016



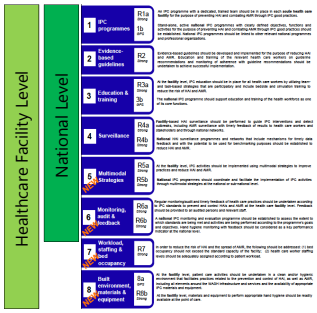
2017



World Health Organization
Regional Office for the Eastern Mediterranean

7

8 Recommendations of Core Components



World Health Organization
Regional Office for the Eastern Mediterranean

8

Core component 4: HAI surveillance

Core component 4: Health care-associated infection surveillance
- *4a. Health care facility level*

RECOMMENDATION

The panel recommends that facility-based HAI surveillance should be performed to guide IPC interventions and detect outbreaks, including AMR surveillance with timely feedback of results to health care workers and stakeholders and through national networks.

(Strong recommendation, very low quality of evidence)

Core component 4: Health care-associated infection surveillance
- *4b. National level*

RECOMMENDATION

The panel recommends that national HAI surveillance programmes and networks that include mechanisms for timely data feedback and with the potential to be used for benchmarking purposes should be established to reduce HAI and AMR.

(Strong recommendation, very low quality of evidence)

Principles of HAI Surveillance

- HAI rates are indicators of quality of healthcare and patient safety
- National HAI surveillance is imperative for understanding the HAI burden, and advocating that HAIs might be a major public health problem
- Basic infection prevention and control systems and programs need to be in place
- Appropriate resources for surveillance system planning and implementation should be available
- Consistent standardized methodology based on sound epidemiologic principles needed
- Standardized HAI case definitions at global, regional or country levels

World Health Organization
Regional Office for the Eastern Mediterranean

10

Objectives of HAI surveillance

- Develop benchmarks of infections associated with healthcare
- Detect changes in the endemicity of an HAI over time
- Describe the microbiological profile of pathogens causing HAIs
- Early detection of clusters and outbreaks
- Inform tailored prevention activities
- Establishing the effectiveness of an intervention
- Identification of problems and prioritising infection prevention and control activities
- Provide data for decision making and research

World Health Organization
Regional Office for the Eastern Mediterranean

11

Key Elements of HAI Surveillance

- HAI case definitions
- Methods of case finding
- Who will be responsible for surveillance at facility level?
  - Planning, data collection, analysis, interpretation, dissemination
- Manual or electronic?
- Timeliness of data analysis and feedback
- Utilization of surveillance data to improve practice
- Monitoring/evaluation of surveillance

World Health Organization
Regional Office for the Eastern Mediterranean

12

Standardized HAI case definitions

- International available case definitions with well established validity and reliability
  - NHSN – US CDC
  - E-CDC
- Complex and based on several elements:
  - Clinical, Laboratory, Radiological
- Infection rates vary according to the HAI case definitions used
- Adaptation of HAI case definitions at country level is problematic
  - Only used within country (not comparable to others)
- **Discrepancy between '*surveillance*' *vs* '*clinical diagnosis*' of infection**
- Hospitals use their non-reviewed or validated case definitions

World Health Organization
Regional Office for the Eastern Mediterranean

13

Methods of Case Finding and Reporting

- Define population to be studied
- Incidence vs prevalence
- Active vs passive
- Prospective vs retrospective
- Hospital-wide vs targeted
- Patient-based vs laboratory-based
- Risk-adjusted vs crude rates
- Data reporting (manual vs IT)
- Feedback

World Health Organization
Regional Office for the Eastern Mediterranean

14

Incidence vs Prevalence Surveillance

Incidence

•Number of subjects in a population who develop a disease within a specified period of time

Measure of NEW infections

Prevalence

Proportion of subjects in a population who have a disease at a given point of time

Measure infections that are PRESENT (old and new)

World Health Organization
Regional Office for the Eastern Mediterranean

15

Incidence vs Prevalence Surveys

Incidence

- Undertaken prospectively
- Best way to establish trends and distribution of HAI
- Active surveillance involves daily visits to patient wards/care units to assess patients at risk of HAI
- Case finding using active surveillance by an IPC practitioner increases detection of HAIs

Prevalence

- A good substitute for continuous surveillance
- Performed on a single day or week
- Can show the magnitude of HAI, highlight problems requiring more investigation, and identify changing patterns of HAIs
- Can be used to target areas or services where infection rates are suspected to be high

Prevalence Surveys of HAIs

ADVANTAGES

- A good substitute for incidence
- Performed on a single day or week for each facility
- Can be used to target areas where infection rates are suspected to be high
- Relatively quick and inexpensive
- Provide data only during the period in which it is conducted
- Could be repeated on regular intervals to provide information on changing rates

DISADVANTAGES

- Not appropriate for hospitals where patient records do not include detailed information on:
  - Patient demographics
  - Clinical information
  - Laboratory investigations
  - Radiological results
  - Physician notes
- Provides an underestimate of the true infection status

E-CDC point prevalence surveys in acute care hospitals, 2016-2017: prevalence and estimated incidence of HAIs

	PPS in acute care hospitals	PPS in long-term care facilities (LTCFs)
Number of facilities, EU/EEA countries	1209 hospitals, 28 countries	1788 LTCFs, 23 countries
Number of included patients/residents	310 755	102 301
Patients/residents with at least one HAI on any given day*	6.5%[1,2] **1 in 15 patients**	3.9%[1] **1 in 26 residents**
Estimated total number of HAIs each year in EU/EEA	4.5 million	4.4 million

Total : 8.9 million HAIs per year

Adapted from: Suetens C, et al. Eurosurveillance 15 November 2018.

Process *vs* Outcome Surveillance

Central-Line Associated Blood Stream Infections: [CLABSI]

Hand hygiene (During insertion and maintenance)

Skin Antiseptic (Use of alcohol-based chlorhexidine solution)

Maximal **Barrier Precautions**

PROCESS SURVEILLANCE
Monitoring of IPC practices to prevent CLABSI

OUTCOME SURVEILLANCE
Counting no. of CLABSIs

Optimal selection of **insertion site**

Daily review for need of CVC

World Health Organization
Regional Office for the Eastern Mediterranean

19

Surgical Site Infection (SSI) Surveillance in LMICs

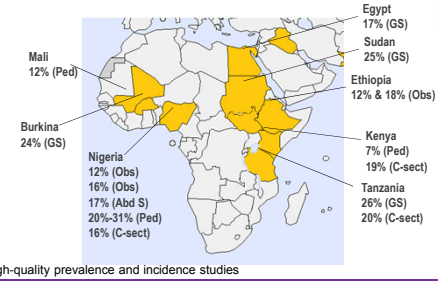
- **Most frequent type of HAIs in LMICs**
- **Pooled SSI incidence in LMICs** (WHO unpublished data, 2017)
  - 11.2 per 100 surgical patients
- Mortality: 2-11 fold higher risk of death compared to non-infected operative patients
- 77% of deaths among SSI patients are directly attributable to SSI
- Length of Hospital Stay: ~7-11 additional postoperative hospital days
- **Most frequent pathogens** are *S. aureus* (20.3%) and *Escherichia coli* (*E. coli*) (20.3%)
- Average methicillin resistance among *S. aureus* isolates (MRSA): **54.5%**

World Health Organization
Regional Office for the Eastern Mediterranean

Allegranzi B, Bagheri Nejad S, Combescure C, Graafmans W, Attar H, Donaldson L et al. Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis. Lancet. 2011; 377:228–41.
Ling ML, Apisarnthanarak A, Madriaga G. The burden of healthcare-associated infections in Southeast Asia: a systematic literature meta-analysis. Clin Infect Dis. 2015;60(11):1690–9.
Bruce M Biccard, Thandinkosi E Madiba, Hyla-Louise Kluyts, Dolly M Munlemvo, Farai D Madzimbamuto, Apollo Basenéro, et al. Lancet

20

SSI frequency* in specific African countries

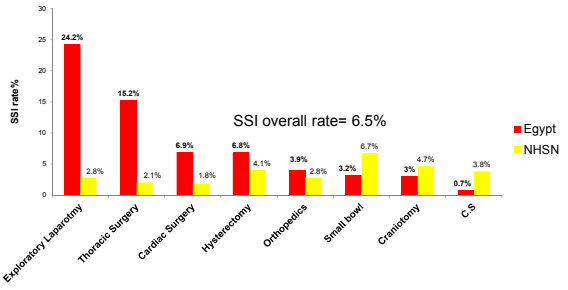


*High-quality prevalence and incidence studies

World Health Organization
Regional Office for the Eastern Mediterranean

21

Surgical Site Infections in Egypt



Abdou et al., 2018, doi:10.1016/j.jhin.2018.07.001

Expert Consultation on Best Practices for HAIs Surveillance in LMIC, 20-21 February, 2019, Cairo

Regional and Global report end of 2019
Specific Recommendations on Methods of HAI Surveillance in LMIC

World Health Organization
Regional Office for the Eastern Mediterranean

23

Recommendations of the EMRO Workshop

- Develop new standardized HAI case definitions in alignment with the international case definitions to be used in LMIC
- Develop appropriate methods of HAI surveillance implementation relevant to country capacities
- Suggest methods of validation of HAI surveillance using the newly developed HAI case definitions

World Health Organization
Regional Office for the Eastern Mediterranean

24

Challenges of HAI surveillance in LMIC

National Level

- Low political priority in many LMIC countries
- Resources spent on more attractive investments (roads, bridges)
- Competing priorities for health problems
- Several LMIC still lack IPC programs (national and facility levels)
- Limitation of national expertise
  - Limited human resources: design HAI surveillance, IPC, data management
  - Establish or adapt national HAI case definitions,
  - Data interpretation
  - Communication of data (feedback)
  - Data utilization
  - Good quality microbiological support (NRL)
  - Monitoring validity of HAI surveillance data

World Health Organization
Regional Office for the Eastern Mediterranean

25

Challenges of HAI surveillance in LMIC

Healthcare facility level

- Lack of skilled human resources to perform the task of HAI surveillance
  - What type of infection to assess based on population, resources
  - Methods for detecting infections
  - Who is responsible for HAI surveillance?
- Complex HAI case definitions
- Patient medical records not well maintained
- Paper based surveillance reports processes due to paucity in electronic records
- Quality microbiology laboratory capacity limited
- Limited capacities in data management including analysis
- Timeliness of reporting surveillance data within facility
- Cultural background and limited transparency

World Health Organization
Regional Office for the Eastern Mediterranean

26

Conclusions/Recommendations

- Surveillance is an essential component for an effective IPC programme
- Global need to update international HAI case definitions for use in LMIC
  - Definitions of surveillance must be practical & applicable to the local health care facility/country depending on the availability of resources
- Prioritise and target surveillance in high risk units/areas
- Advocate for the importance of HAI surveillance
- Process indicators are useful in LMIC
- Support use of IT solutions for HAI surveillance in LMIC

World Health Organization
Regional Office for the Eastern Mediterranean

27

THANK YOU

talaatm@who.int

World Health Organization
Regional Office for the Eastern Mediterranean