ECCMID 2019

Fast and furious in infection control: how to be successful in seven steps

Third: organise information flow among infection control, antibiotic stewardship, and microbiology teams

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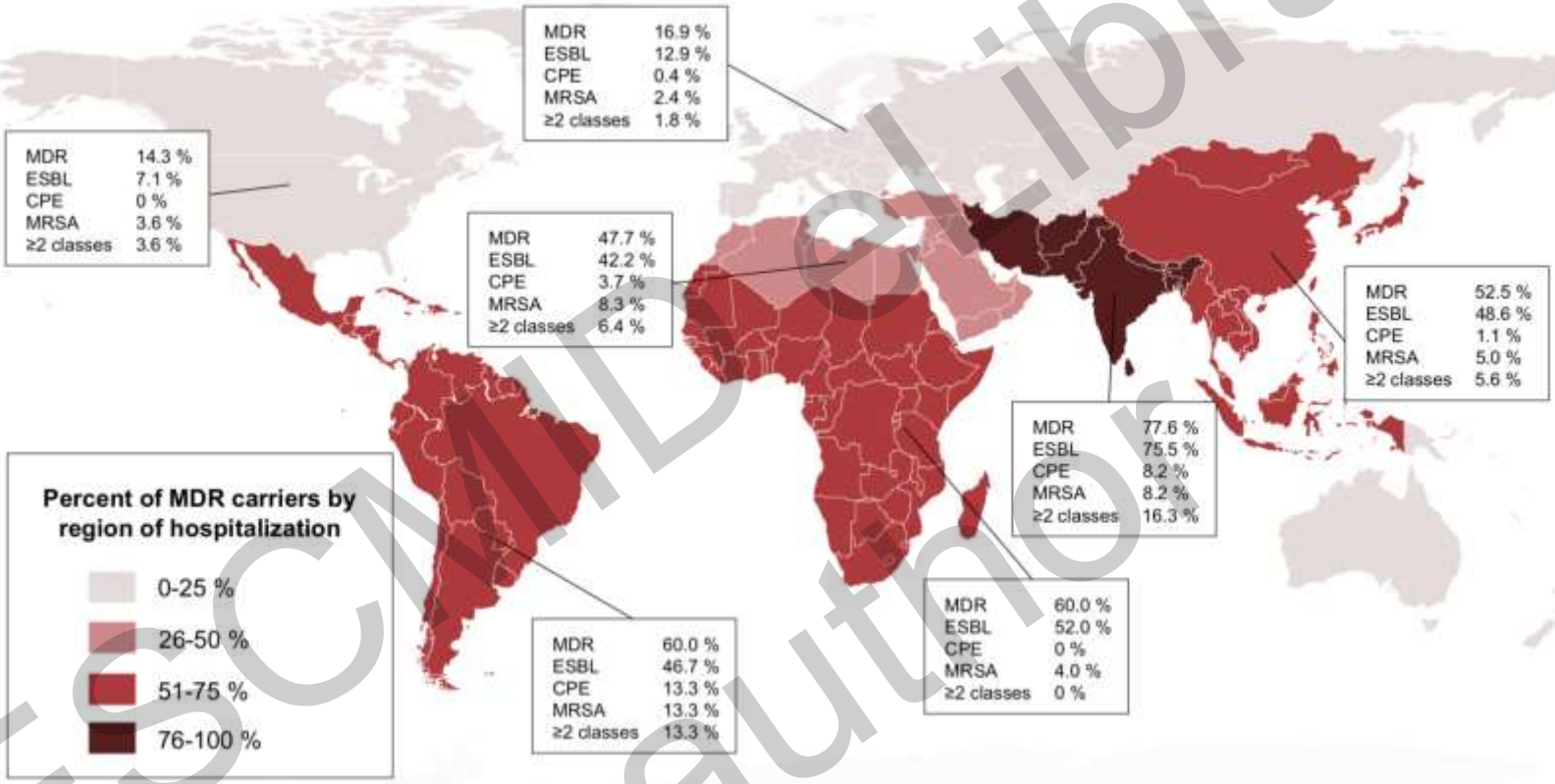
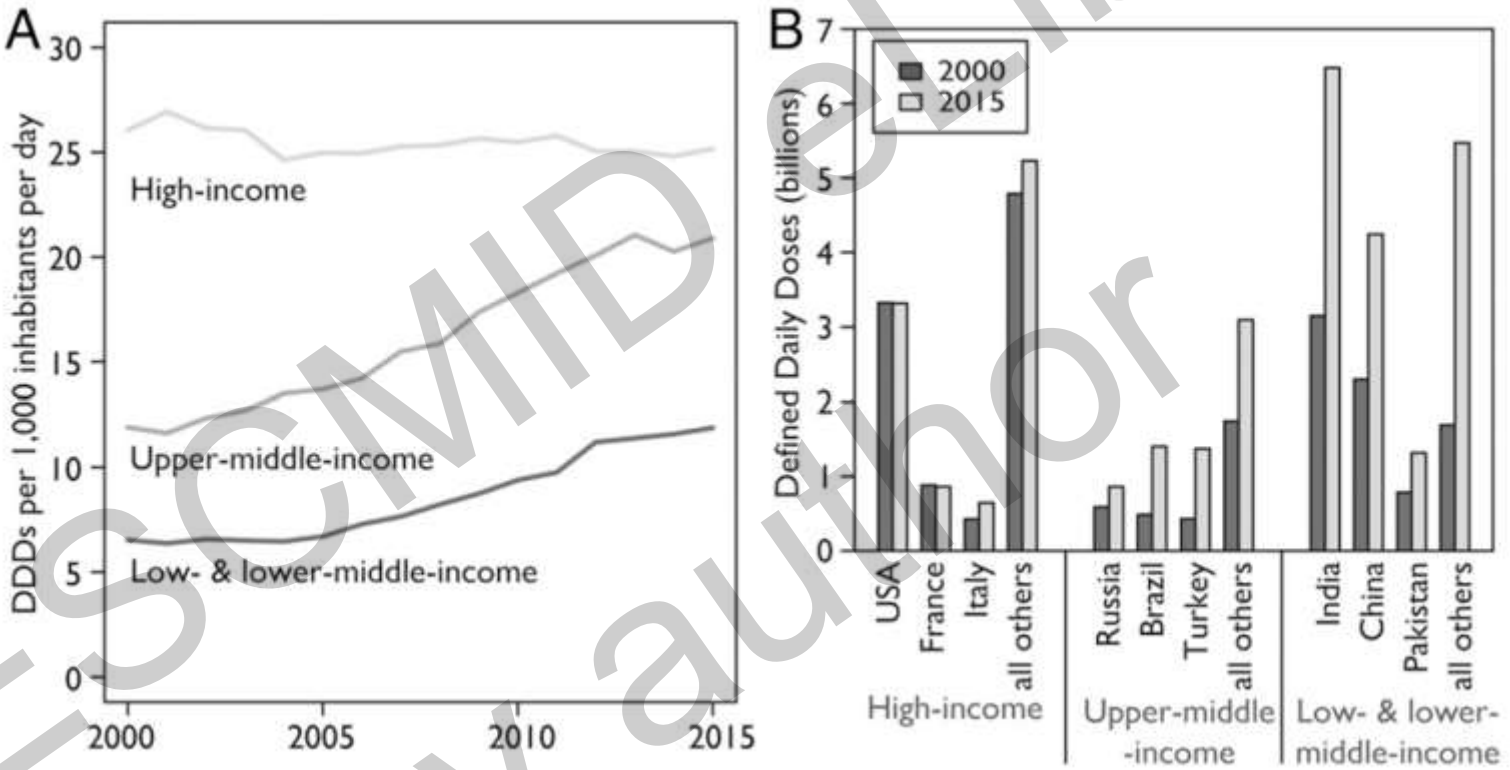
Multidrug-resistant organisms in patients hospitalised abroad



1122 patients returning to Finland after being hospitalised abroad

Khawaja T *Clin Microbiol Infect* 2017;23:673.e1

Antimicrobial consumption



Klein EY *Proc Natl Acad Sci* 2018: 201717295


ESCMID eLibrary
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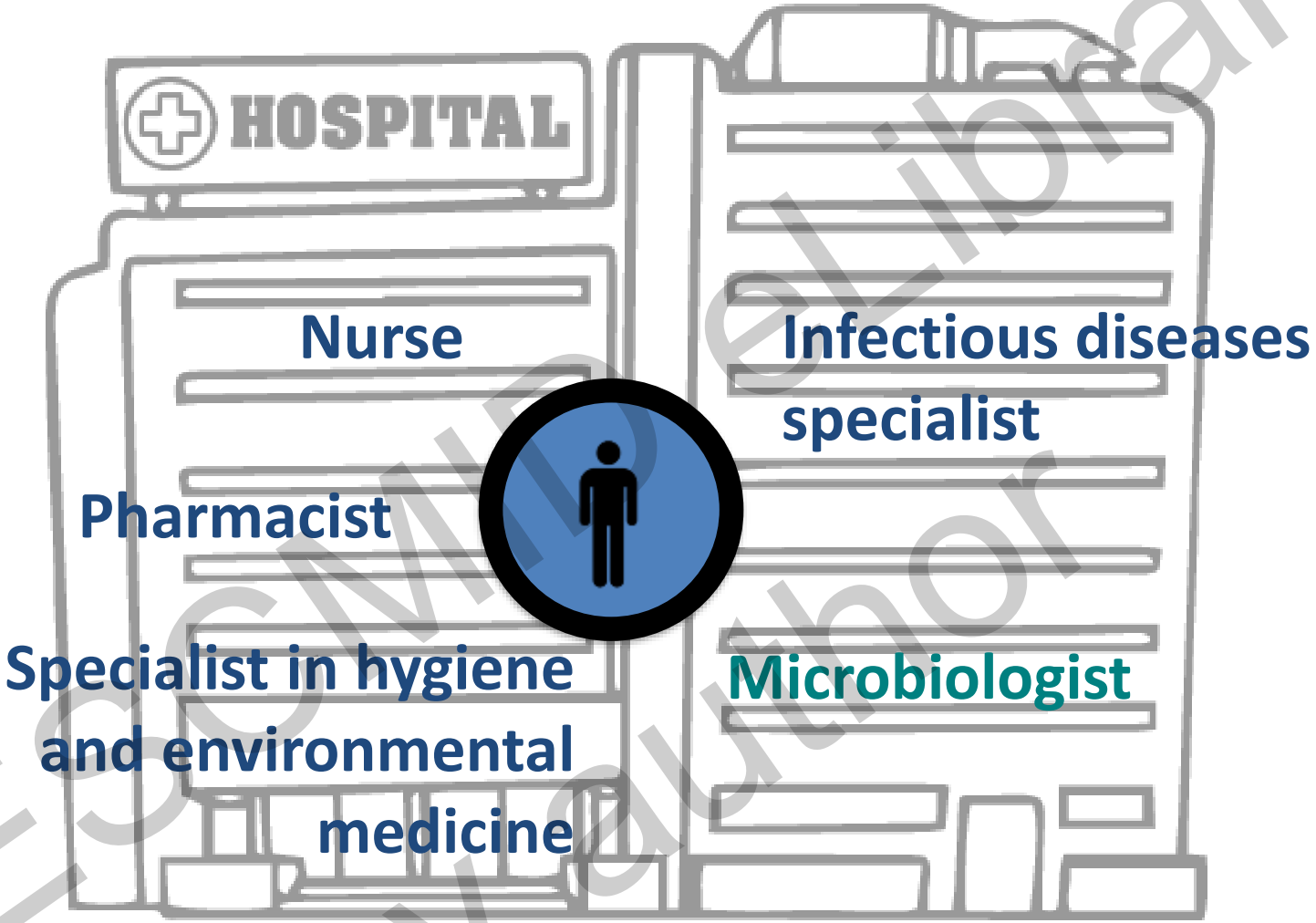
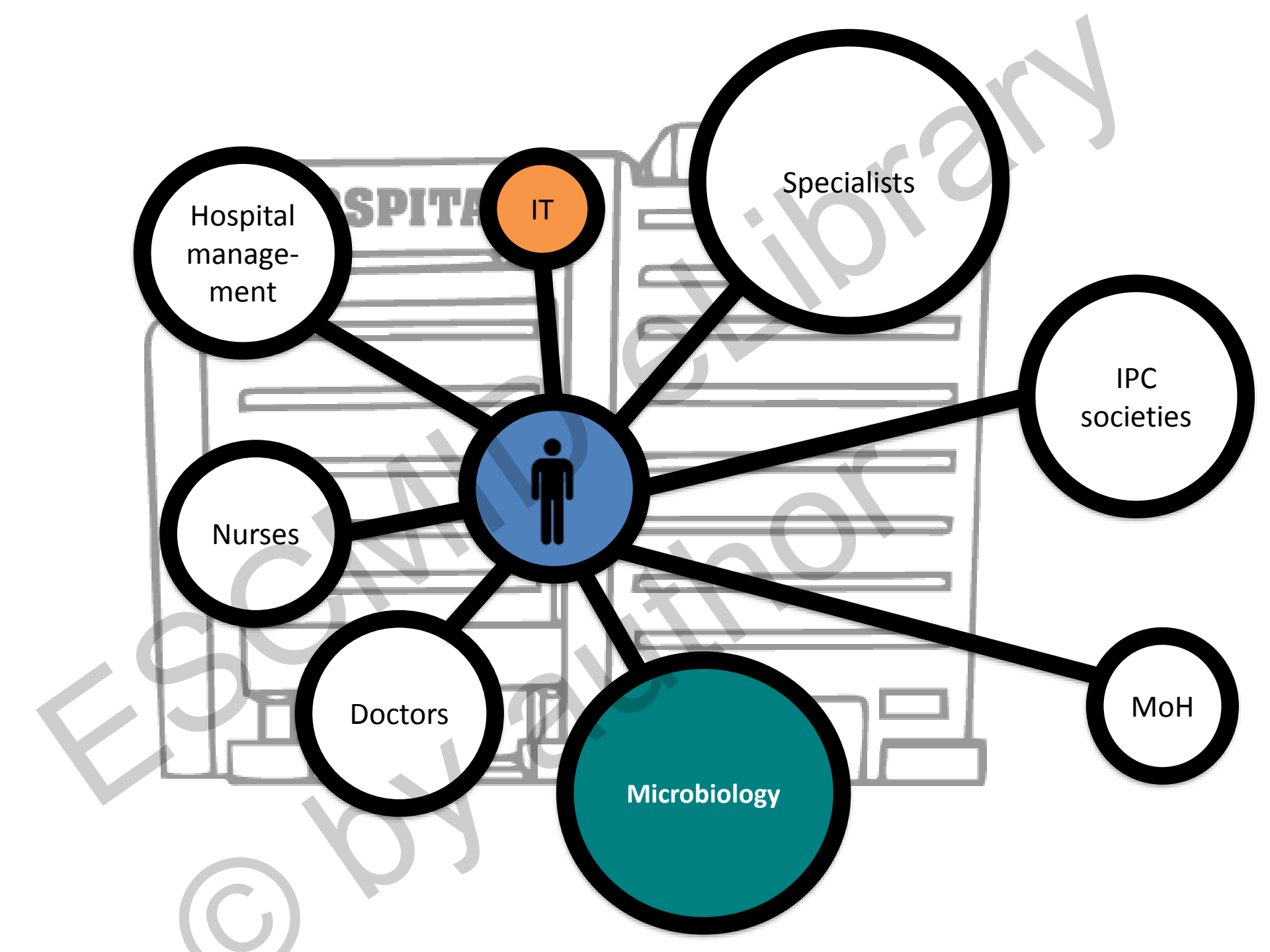
Infection prevention and control professionals

CBIC domains	TRICE areas	APIC domains
Management and communication (leadership)	Programme management	Leadership and programme management
Surveillance and epidemiologic investigations	Surveillance and investigation of healthcare-associated infections	Technology
Preventing/controlling the transmission of infectious agents	Infection control activities	Infection prevention and control
Education and research	Quality improvement	Performance improvement and implementation science
Identification of infectious diseases processes		
Employee/occupational health		

Zingg W *Clin Microbiol Infect* 2015; 21: 1052





The role of the clinical microbiology in HAI-prevention

Surveillance

Outbreak detection

Antimicrobial stewardship

Advisory

Pfaller & Diekema in „Practical Healthcare Epidemiology“, 4th edition

Surveillance

Establish a reporting system...

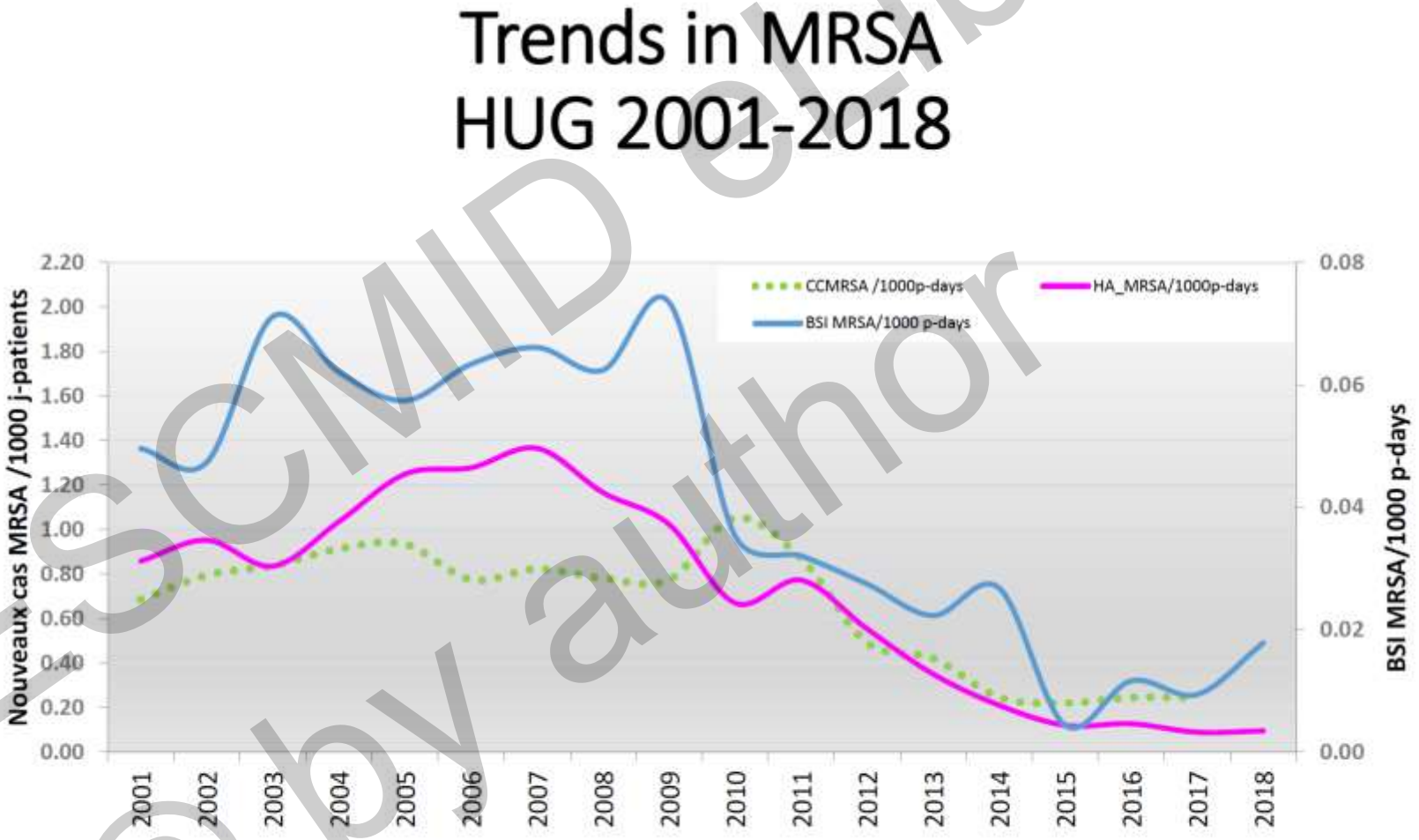
1. Select antimicrobial **"resistance"**
   - phenotypic resistance, conventional testing/rapid testing
   - resistance genes
   - pathogen-resistance compbinations
   - multidrug-resistance (3-MRGN etc.)

2. Select **pathogens of interest (PAI)**

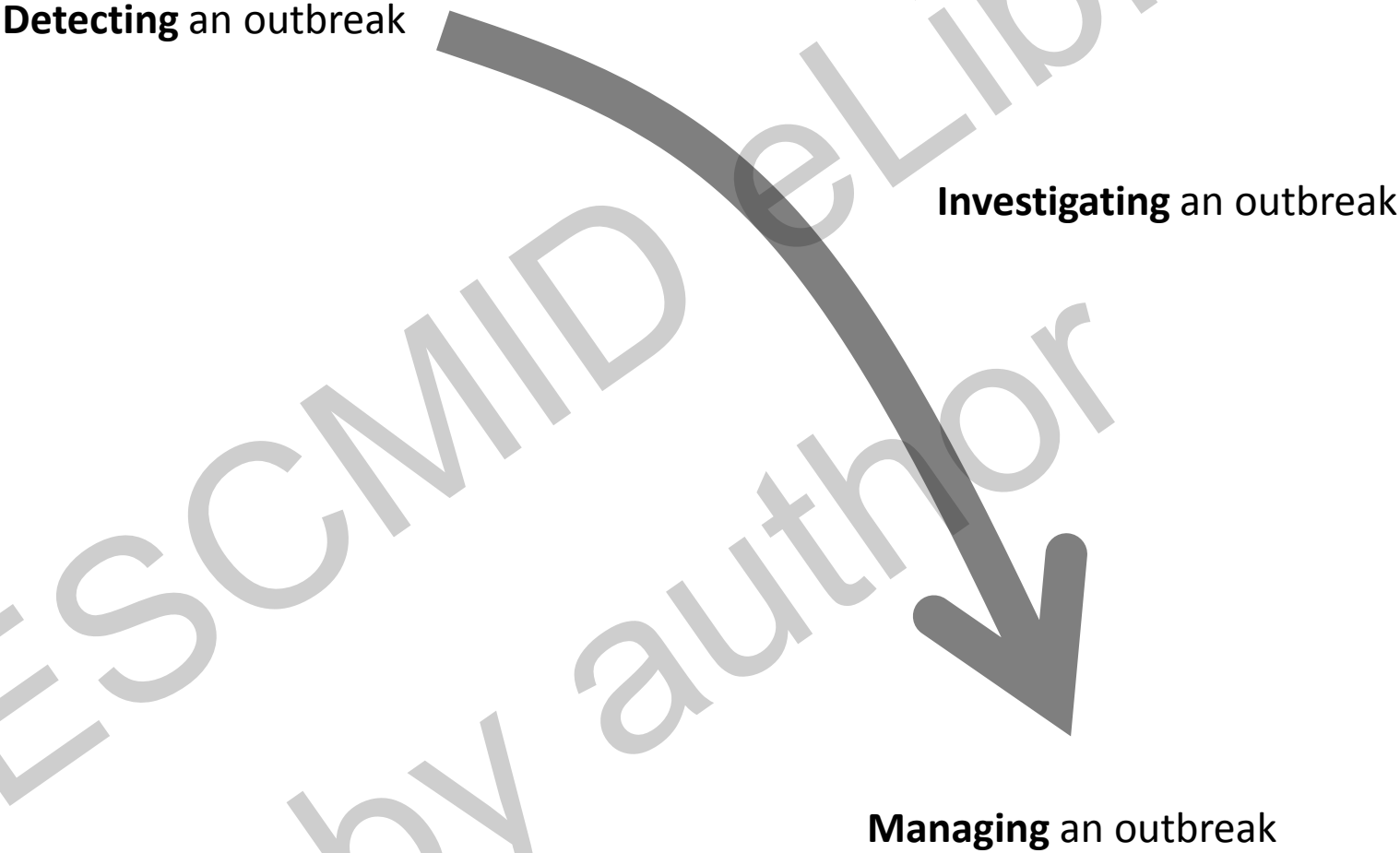
- Seasonal screening?
- Patient screening on admission or in high risk areas?
- Air/water sampling?
- Quality assurance (e.g. VRE/*C. difficile* after terminal cleaning)?

Wassilew N *Euro Surveill* 2018

Surveillance



Outbreak detection



Outbreak detection

1. **Detecting** → Surveillance

2. **Investigating**
   - Screening exposed patients
   - Environmental sampling (surfaces, water, air)
   - Phenotypic methods: swabs, contact plates, selective media, filters, compactors
   - Typing: testing clonality or genetic relatedness on species level but also on genetic resistance level (pathogencity islands, mobile genetic elements between strains and species) – interpretation on the microbiology side may need epidemiological information from IPC.
   - Produce meaningful data to act on, and at acceptable expenses

3. **Managing** (isolation precaution measures, audits, screening)

Outbreak detection

Typing method	Comments
PFGE	Labor-intensive method with excellent discriminatory power. Was considered gold standard for most common HAI-pathogens. Useful in outbreak surveillance.
PCR-Ribotyping	Simple, low-cost method, used extensively for subtyping *C. difficile*
MLST	Limited discriminatory power, 100% typability and high reproducibility. Best for phylogenetic studies and large-scale typing.
MLVA	MLST approach using virulence-associated genes.
WGS	Gold standard for discriminatory power.

Pfaller & Diekema in „Practical Healthcare Epidemiology“, 4th edition

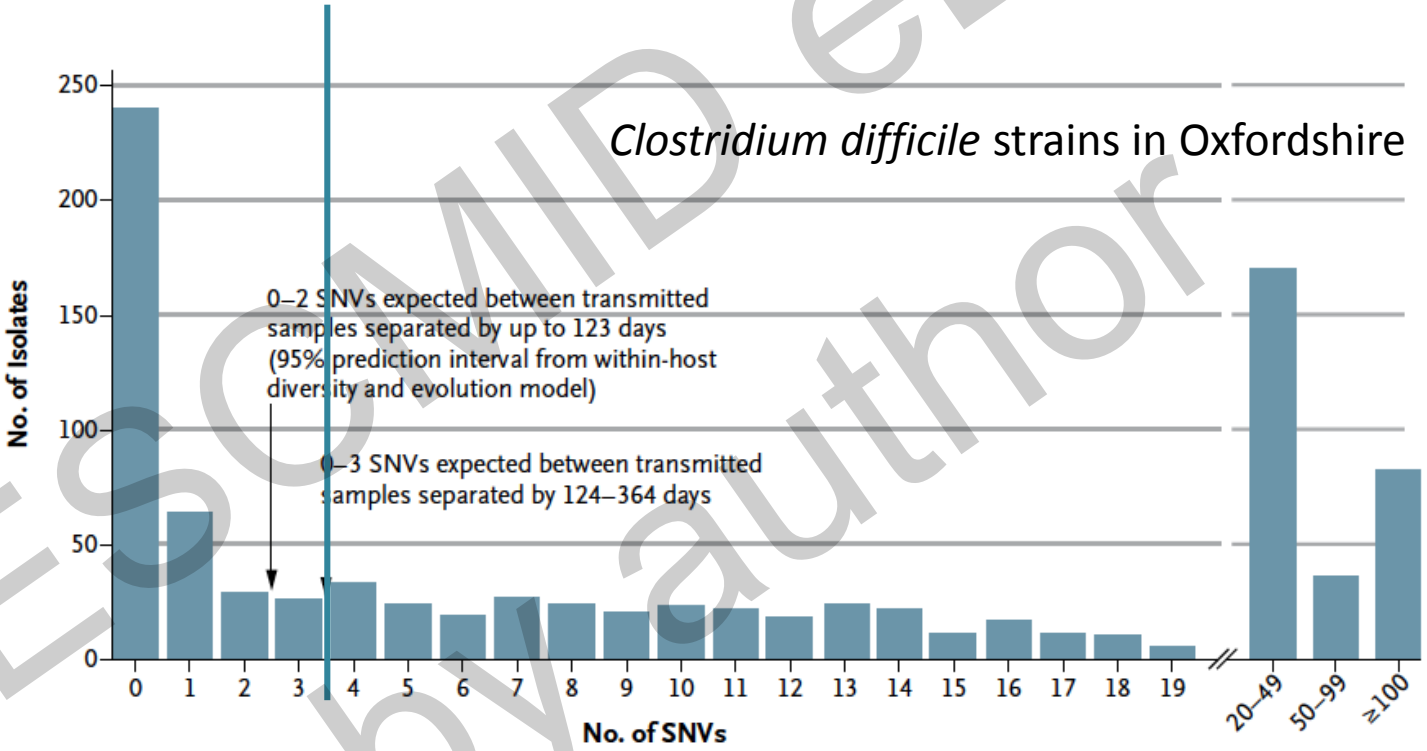
Whole genome sequencing (WGS) is a process of determining the **complete sequence** of an organism's chromosomal DNA at a single time – today in less than a day

The technology is rapidly evolving, and it is endorsed by ECDC and US-CDC

- Fast species identification
- Direct identification of an emerging range of antimicrobial resistance (mechanisms)
- Epidemiology (global epidemiology/evolution of antimicrobial resistance/outbreak investigation)

Genomic distance is measured by determining single nucleotide polymorphism (SNP)

Sameness is time- and species-dependent!
Epidemiology ⟷ microbiology

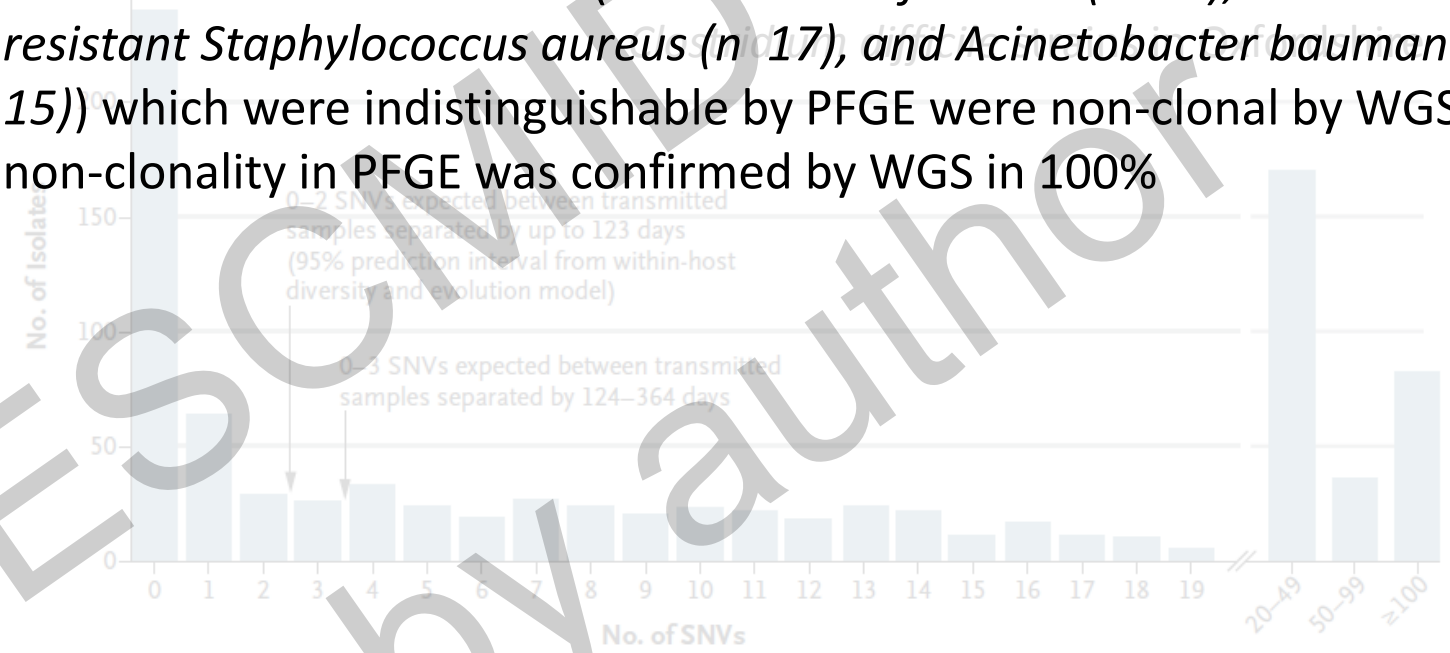


Eyre DW *New Engl J Med* 2013;369:1195

Genomic distance is measured by determining single nucleotide polymorphism (SNP)

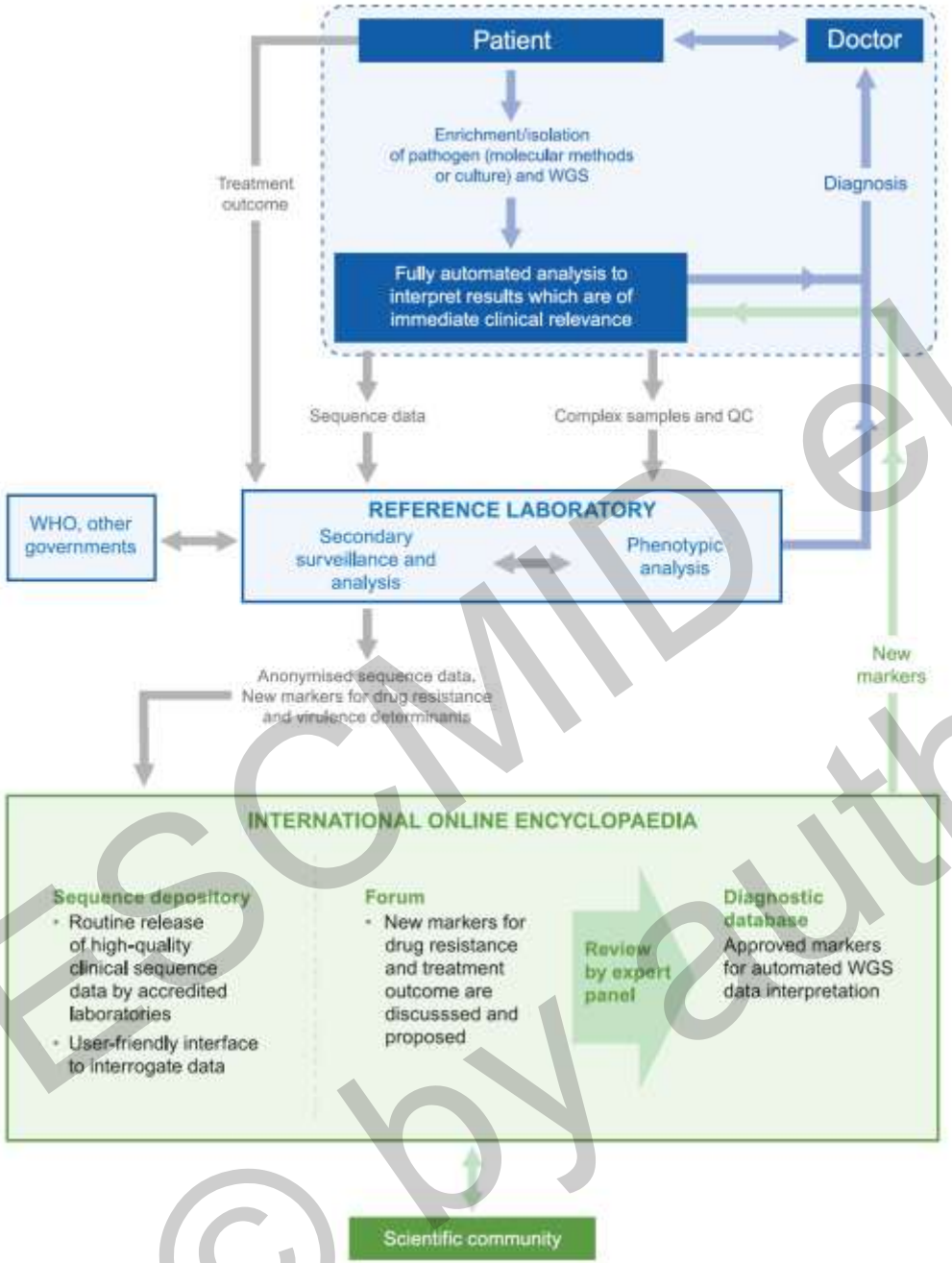
Sameness is time- and species-dependent!

A total of 28.9% of isolates (*Enterococcus faecium (n 19), methicillin-resistant Staphylococcus aureus (n 17), and Acinetobacter baumannii (n 15)*) which were indistinguishable by PFGE were non-clonal by WGS, but non-clonality in PFGE was confirmed by WGS in 100%



Salipante SJ. *J Clin Microbiol* 2015; 53: 1072

Eyre DW *New Engl J Med* 2013;369:1195



Institution

Region/country

Global

Köser CU *PLOS pathogens* 2012; 8:e1002824

Antimicrobial stewardship

Includes also infectious diseases and pharmacy!

1. improve **diagnostics** (get a sample before antimicrobial treatment)
2. map **local epidemiology** of antimicrobial resistance
3. report susceptibility in due time (**rapid methods**)
4. feed computer-based decision support systems with microbiology data
5. define **local** empirical **treatment**

Advice

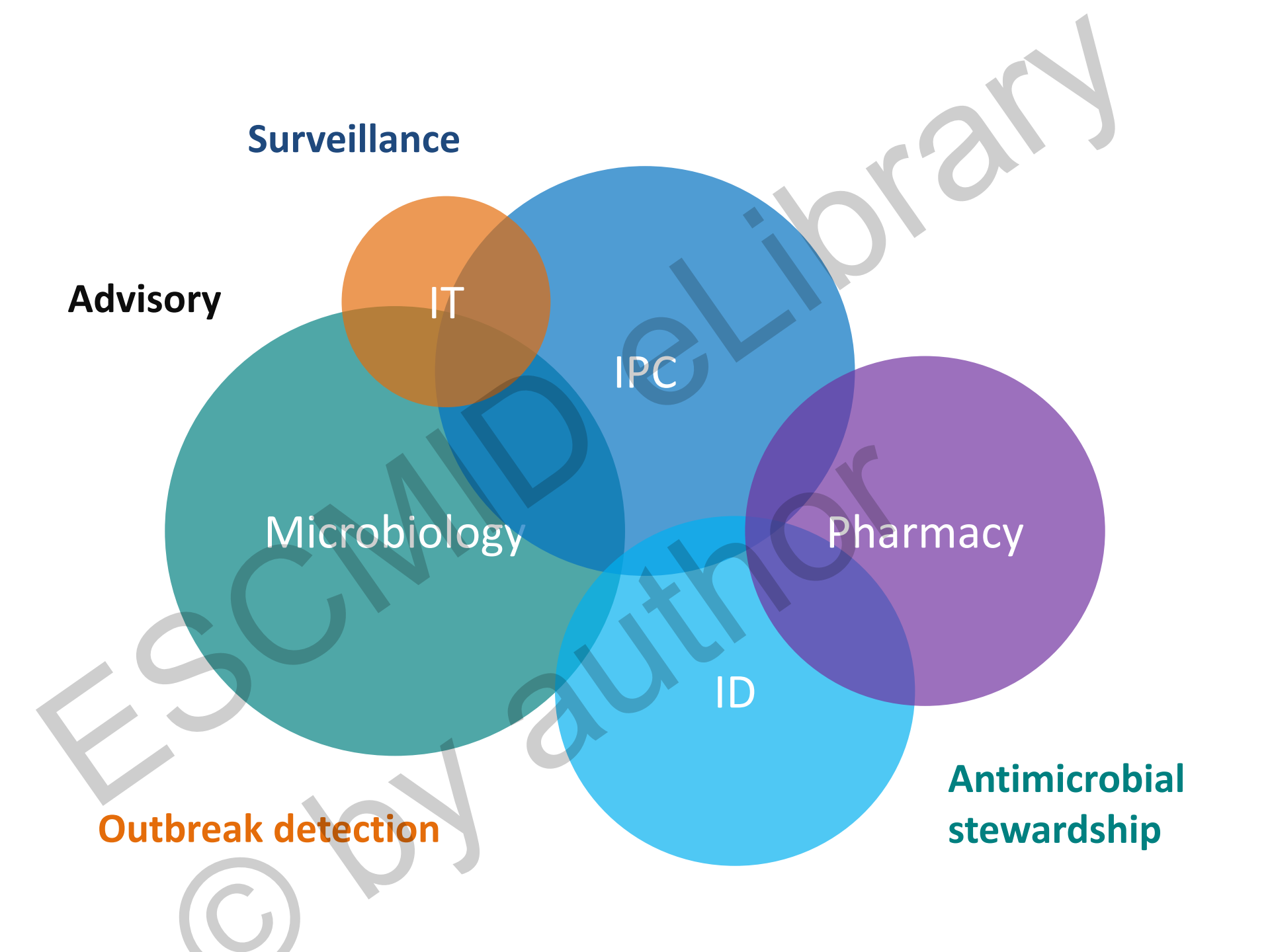
The microbiologist should provide advice on...

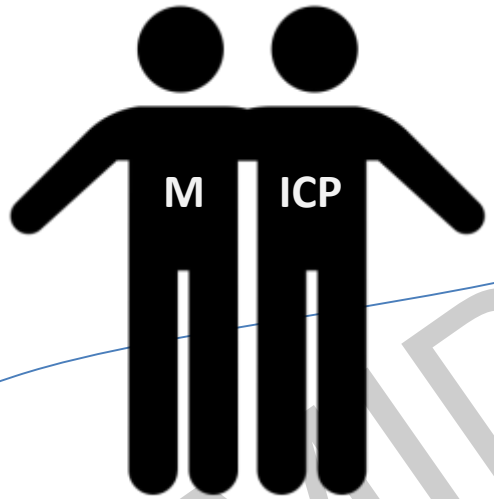
1. basic microbiology principles and correct interpretation of laboratory methods

2. advantages, limitations, scope, and accuracy of the different laboratory methods

3. resources (cost and staff)
   - reimbursement system
   - contingency fund to finance outbreaks
4. changes of break-points with the resulting consequences in reporting susceptibility

5. taxonomy confusions e.g. by using MALDI-TOF (coagulase-negative Staphylococcus, diphteroids) – species identification instead of groups such as dipheteroids (application of HAI-definitions)





Advice

AMS

Surveillance

Have a strategy

Communicate

Outbreak detection

Settle resource allocation

Define services and tasks

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Thank you for your attention!

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