Joint Action
Antimicrobial Resistance and
Healthcare-Associated Infections

MS33

INITIAL PRESENTATION OF THE TRAINING TOOLS

WP6 | Policies for prevention of Health-care Associated Infections and their implementation

Leader acronym | NPHO

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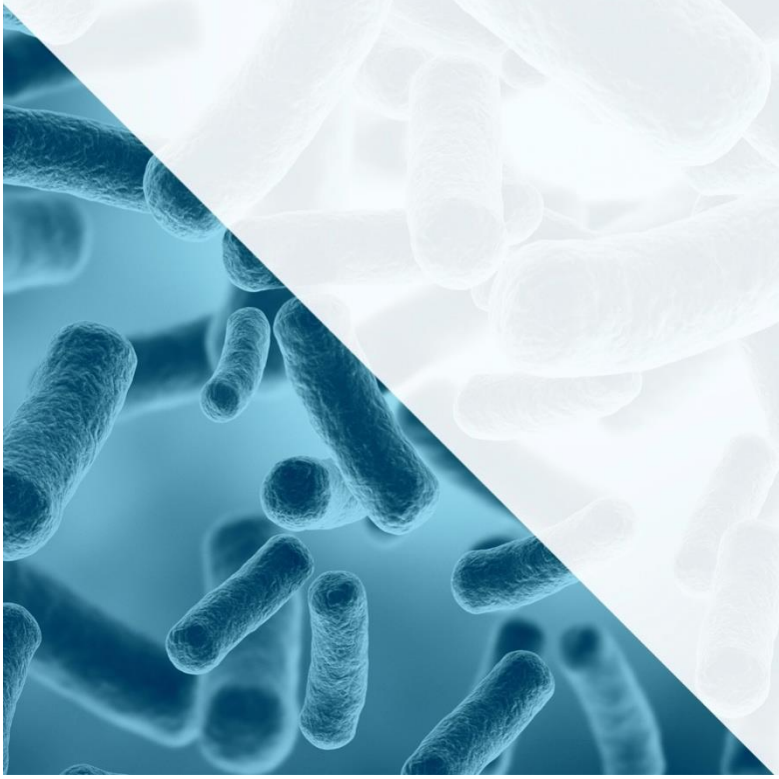

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ACRONYMS

AMR	Antimicrobial Resistance
ASP	Antimicrobial Stewardship Program
CDH	Clinical Department Heads
ECDC	European Centre for Disease Prevention & Control
HA	Hospital Administrators
HAI	Healthcare Associated Infections
HH	Hand Hygiene
HCW	Healthcare Worker
IC	Infection Control
ICC	Infection Control Committee
ICP	Infection Control Programs
IPC	Infection Prevention & Control
MDROs	Multi-Drug-Resistant Organisms
PH	Public Health
PHA	Public Health Authorities
UICF	Universal Infection Control Framework
WHO	World Health Organization

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1. BACKGROUND

Antimicrobial Resistance (AMR) poses an enduring threat to the global community and, in our days, a major public health risk to developed countries. The Control and Prevention of Healthcare Associated Infections (HAIs) is a key factor of limiting the horizontal spread of the Multi Drug Resistant Organisms (MDROs) within healthcare environment. Healthcare settings remain the main sector of Antimicrobial Resistance development to all the agents, especially to critical ones for the human health leading, nowadays, o Pan Drug Resistance Area.

It is a fact that the implementation of the Infection Control (IC) requires a holistic approach and the commitment of all stakeholders of the organization. In addition, the Infection Control Pyramid (Public Health Authorities, hospital administrators, Infection Control Committees and healthcare professionals) acts in different countries, healthcare systems and in completely different cultures. Regardless of healthcare structure and resources, both the organizational as well as the healthcare professional behaviour have proved to be key factors for the effective implementation of Infection Control.

The main objective of WP6.1 is to strengthen policies to prevent HAIs through the implementation of Infection Control Programs focused on institutional behavioural improvement. Therefore, 2 Surveys were conducted to determine the gaps between (i) policy & IC in clinical practice and (ii) organization culture & patient safety. The results from the Surveys as well as the international bibliography and the recent guidelines of WHO and ECDC resulted in the development of the Universal Infection Control Framework (UICF), which can be implemented in all healthcare settings regardless of the available resources or the specificities of each country's healthcare system. With the purpose of supporting the implementation of UICF, training tools are also developed, targeting Hospital Administrators, Healthcare Workers and IC committees, so as to raise their awareness and compliance to IC measures.

2. METHODOLOGY & DEVELOPMENT OF TRAINING TOOLS

The development of training tools was based on the crucial results of 2 Surveys that were conducted during the 1st stage of the project and international evidence-based practice. The ultimate goal is to help to change the behavioral culture of the organization regarding the prevention of HAIs, thus the tools are addressed to all the involved parties.

The followed methodology was based on:

- ✓ To communicate to all the involved parties in a simple and comprehensible manner the basic facts related to HAIs' prevention, which is the cornerstone of patient's safety. Every target group has a different view of these concepts due to different responsibilities and duties. Therefore, it is of highly importance to have a different approach for each team separately.
- ✓ To highlight Infection Control as a basic element of daily clinical practice, and that beyond the basic issue of patient safety, the question of its effective implementation on a consistent and timely basis still remains.
- ✓ To raise the awareness of all involved parties to act as ambassadors of these messages and active members of a team with common goals & culture. As communication and collaboration among the team members is not given, but is cultivated through various interventions, this area should be specially highlighted. The collaboration is built by and characterizes teams; thus, the effective IC prevention is not up to the specialists but due to teamwork.

3. GOALS OF TRAINING TOOLS

The developed training tools have the following goals:

I. **To raise the awareness on:**
   - ✓ Patient Safety
   - ✓ AMR/ HAIs global public health crisis

II. **To implement IPC effectively**
   - ✓ Roles & Active contribution
   - ✓ Essential Activities

III. **To train on basic IC Principles**
   - ✓ Precautions
   - ✓ Audit

4. WHO SHOULD USE THEM?

The training tools that support the implementation of UICF should be used by all Infection Control hierarchy, as it also depicted in Figure 1.

- ✓ Hospital Administrator
- ✓ Clinical Supervisors
- ✓ HCWs
- ✓ ICCs

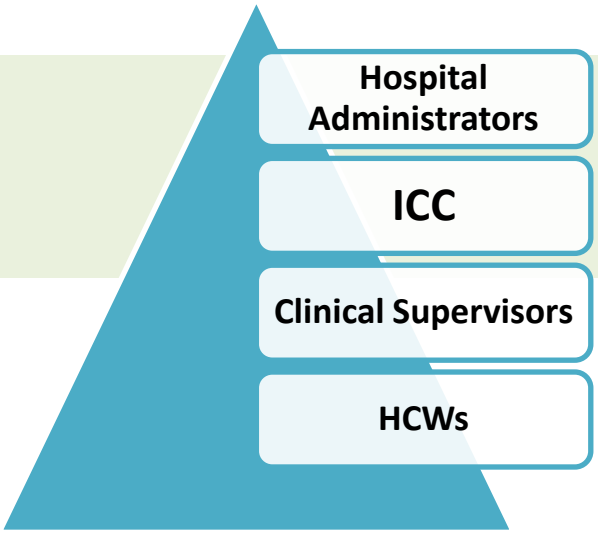

Figure 1: IC Hierarchy

5. HOW TO USE THEM?

There are 3 crucial points that should be stated concerning the use of the training tools.

1st This material should trigger both for ICCs and training teams of each hospital to either to use it to their training as a starting point or to enrich their already available material by adapting it to hospital's needs and professionals' culture.

2nd The training tools are suggested to be used during the 1st contact of personnel with each training subject. The trainings should be organized in small groups followed by the necessary discussion afterwards.

3rd Each tool has a specific training subject and key elements and by the end of each module should be totally comprehensible by the trainees. Based on these key elements, electronic quizzes have been designed so as the trainees could check their knowledge [*currently under development*].

6. TRAINING TOOLS

Tool	Target Group
1. **HAIs & AMR: The Cornerstone of Patient Safety**	ALL
2. **HAIs Control & Prevention: Basic IC measures**	Junior HCWs
3. **Audit as a tool for behavioral change**	Clinical Supervisors & HCWs
4. **Infection Control Program Implementation-Infection Control Gap Assessment**	ICCs
5. **The Cost Effectiveness of Infection Control Program**	Hospital Administrations
6. **Communication & Collaboration Tool**	Hospital Administrations & Clinical Supervisors & ICCs

EU-JAMRAI

Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections

* This document arises from the Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections (EU-JAMRAI), which has received funding from the European Union, in the framework of the Health Program (2014-2020) under the Grant Agreement N°761296. Sole responsibility lies with the author and the Consumers, Health, Agriculture and Food Executive Agency is not responsible for any use that may be made of in the information contained therein.

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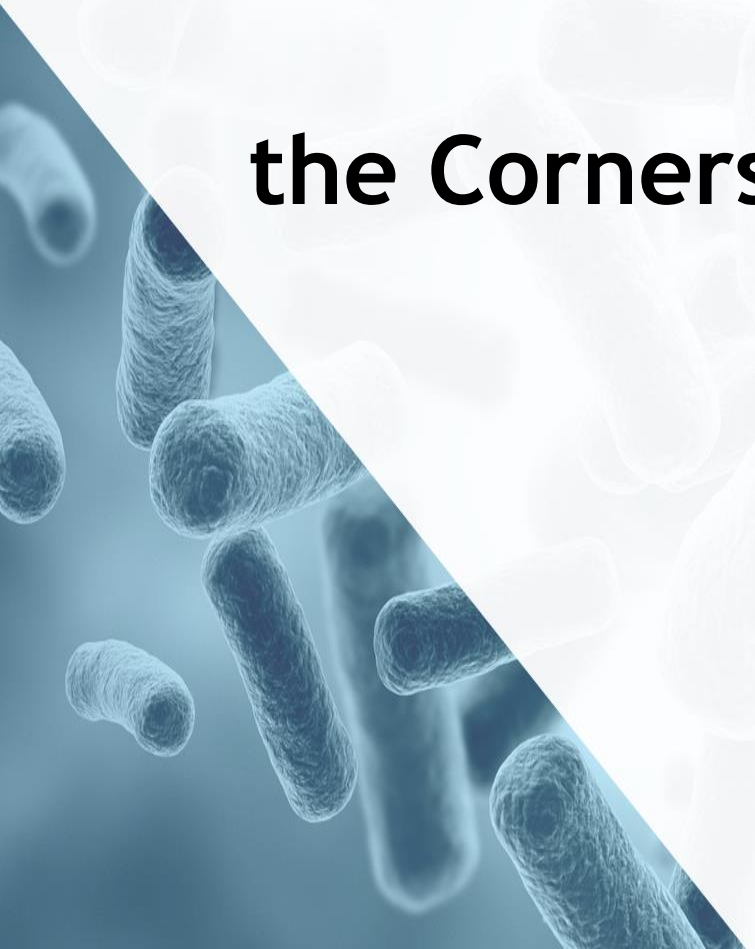


HAIs & AMR
the Cornerstone of Patient Safety

What do I need to know to keep my patient safe

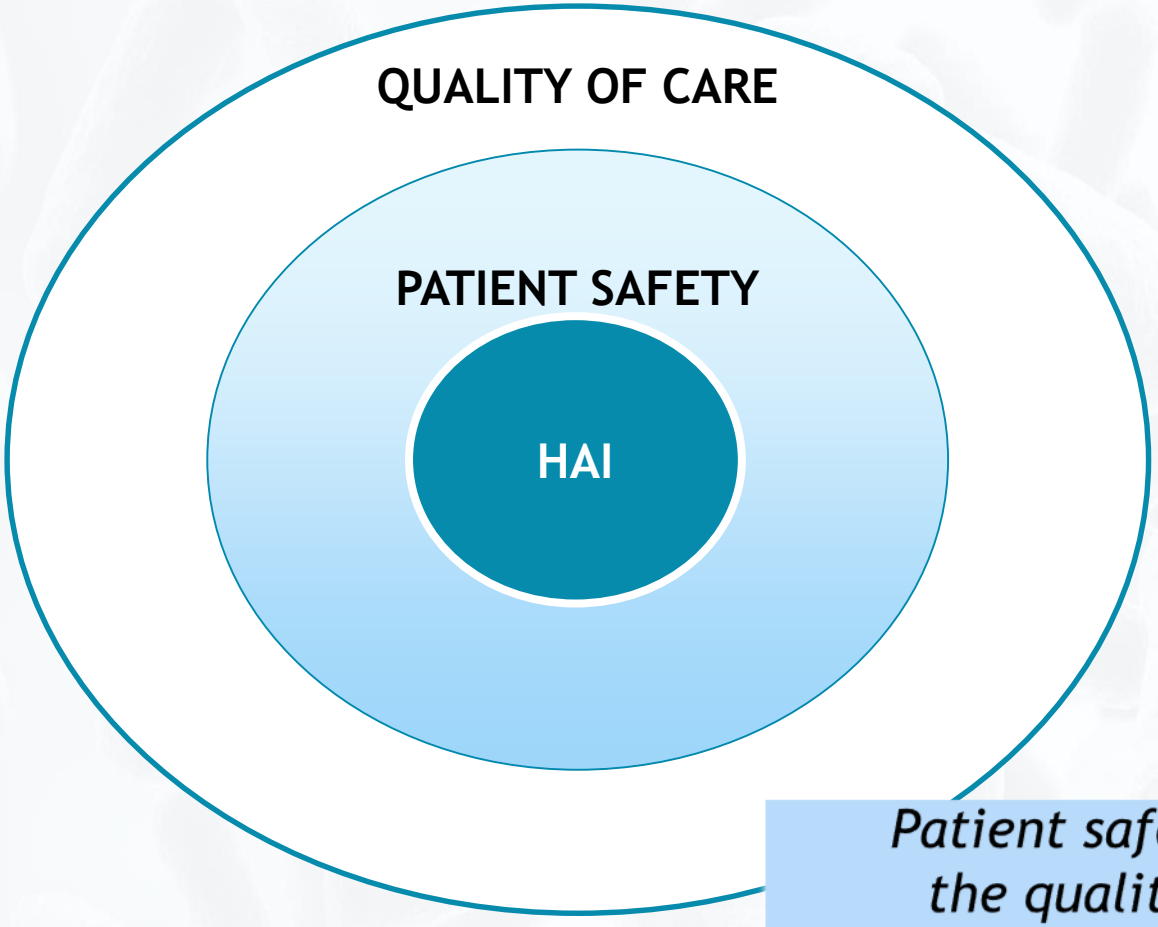
The scope of the presentation

1. To describe the human and economic burdens of health care associated infections (HAIs) and Antimicrobial Resistance (AMR)

2. To aware all the contributed parties regarding the correlation of Prevention and Control of HAI and patient safety

3. To promote the IPC as a priority for the hospital policy and culture for the improvement of the quality of healthcare services

Quality of Care - Patient Safety - HAIs



Patient safety is the key pillar of the quality of health services. Prevention and control of HAI is the cornerstone of patient safety

Patient Safety

Patient safety was defined by the IOM as

"The prevention of harm to **patients**."

Emphasis is placed on:

- ✓ the system of care delivery that prevents errors
- ✓ learns from the errors that do occur
- ✓ is built on a culture of **safety** that involves healthcare professionals, organizations, and **patients**.

Institute of Medicine (IOM)

Definitions of Quality

"Quality is doing the right thing right, the first time and doing it better the next". Al-Assaf, 1993

"Quality is the degree to which care services influence the probability of optimal patient outcomes". American Medical Association, 1991

«Quality is a process of meeting the needs and expectations of patients and health service staff» WHO, 2000

Quality of Care

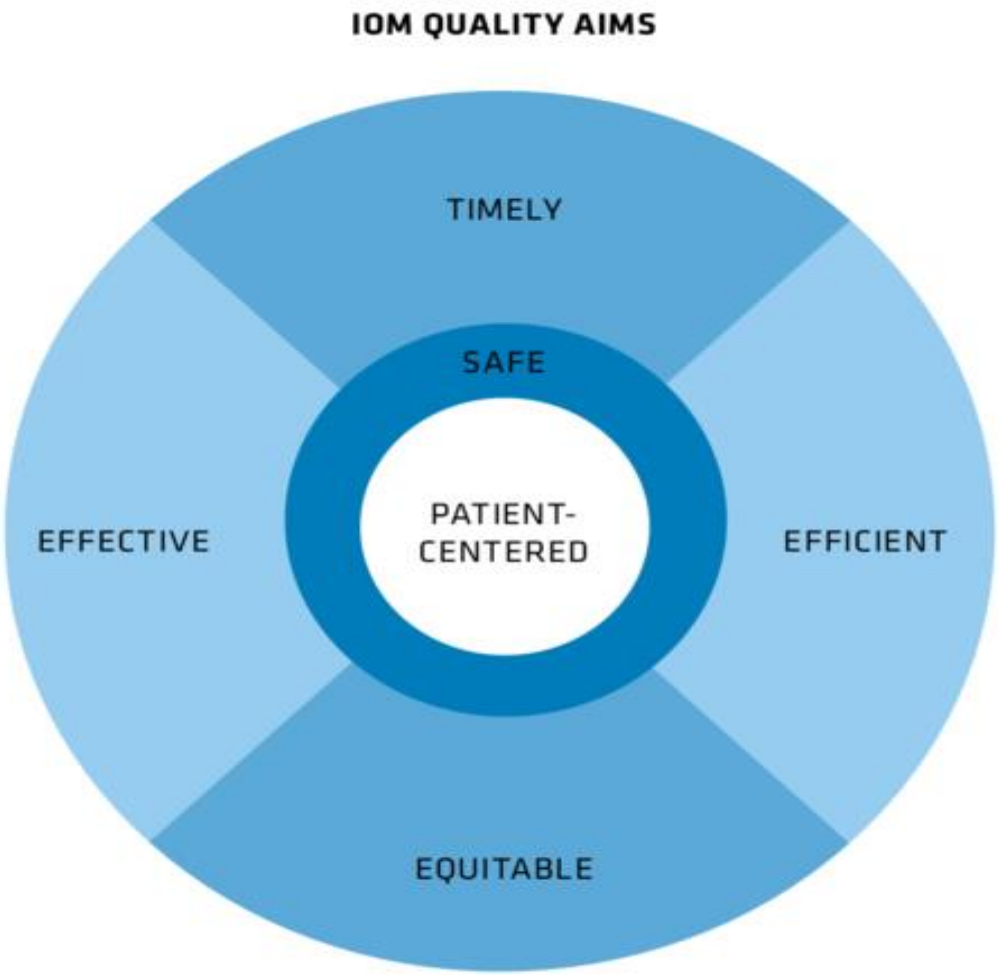
The degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge

Most clusters of quality indicators were and often continue to be comprised of the 5Ds:

Death, Disease, Disability, Discomfort & Dissatisfaction

Lohr K. Committee to Design a Strategy for Quality Review and Assurance. In: Medicare, editor. Medicare: a strategy for quality assurance. Vol. 1. Washington, DC: National Academy Press; 1990

Quality aims



PATIENT-CENTERED: provision of care that is respectful and responsive to patient preferences and needs, ensuring that patient values guide clinical decisions

EFFECTIVE: provision of services based on scientific knowledge to all who can benefit, not providing services to those not likely to benefit

EFFICIENT: avoidance of waste, including waste of equipment, supplies, ideas, and energy

SAFE: avoidance of injuries to patients from the care that is intended to help them

TIMELY: reduction of waits and harmful delays for both those who receive and those who give care

EQUITABLE: provision of care that does not vary in quality with respect to gender, ethnicity, geographic location, and socioeconomic status or other personal characteristics

(Henriksen et al., 2007) Evidence-based design can help address the six key goals outlined by the institute of medicine

Quality of Care

Safety is the foundation upon which all other aspects of quality care are built

Committee on the Quality of Health Care in America. Crossing the quality chasm: A new health system for the 21st century. Washington, DC: National Academy Press; 2001

How do we conceptualize quality?

Carrying out interventions correctly according to pre-established standards and procedures,with an aim of satisfying the customers of the health system and maximizing results without generating health risks or unnecessary costs.

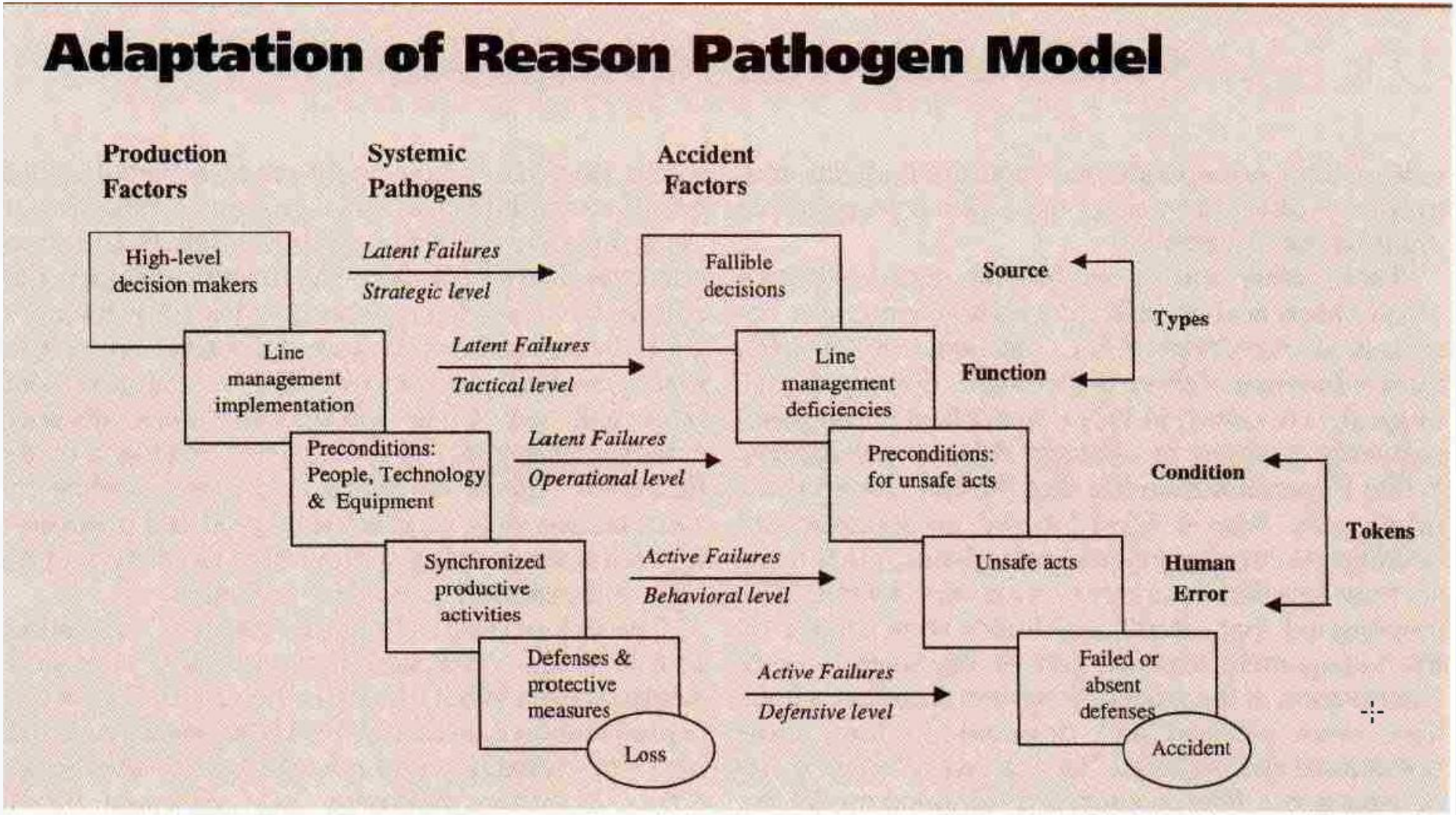
Organizational culture and Quality of Care

The types of errors and harm are further classified regarding domain, or where they occurred across the spectrum of health care providers and settings:

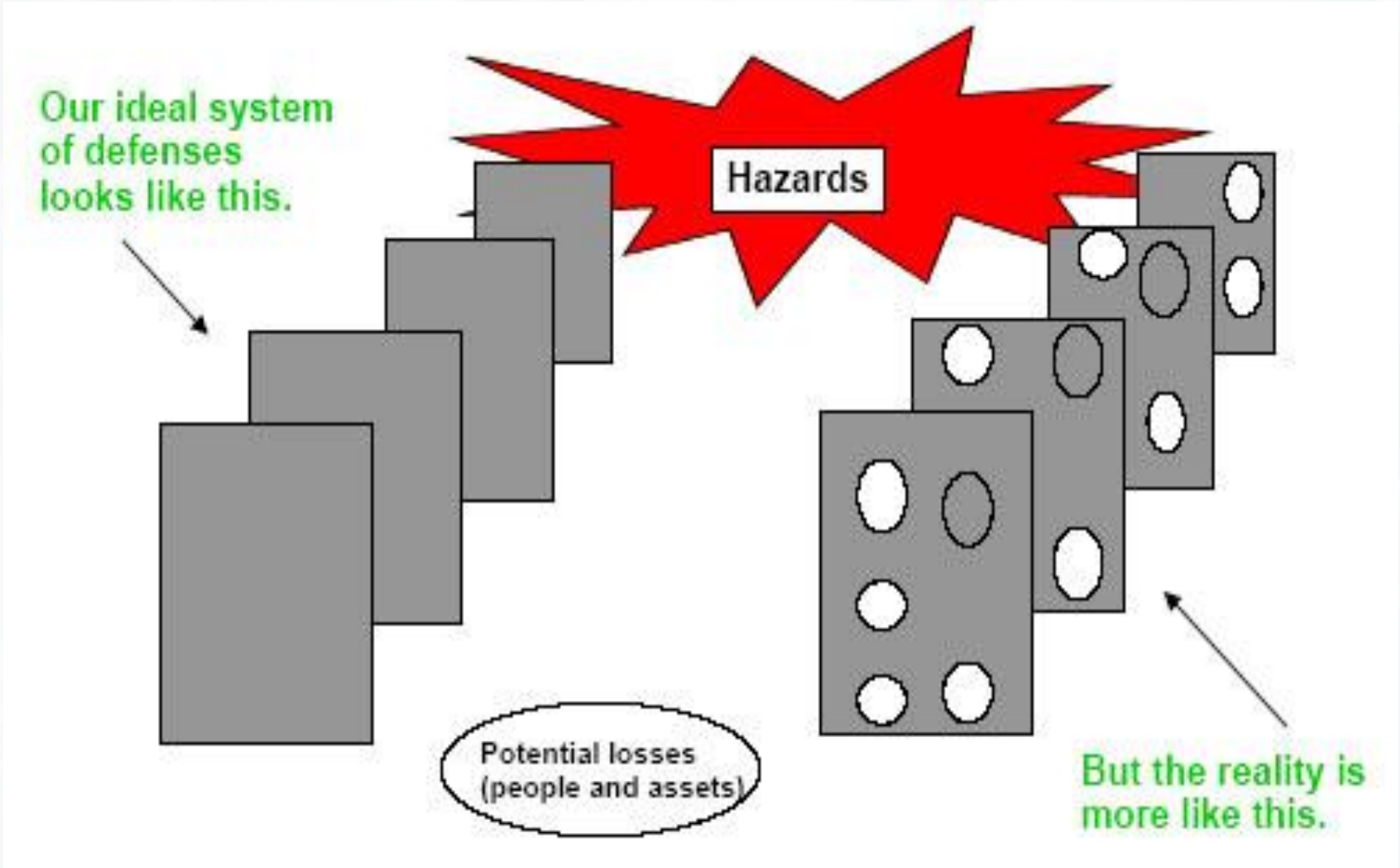
1. Latent failure—removed from the practitioner and involving decisions that affect the organizational policies, procedures, allocation of resources
2. Active failure—direct contact with the patient
3. **Organizational system failure—indirect failures involving management, organizational culture, protocols/processes, transfer of knowledge, and external factors**
4. Technical failure—indirect failure of facilities or external resources

National Quality Forum. National consensus standards for nursing-sensitive care: an initial performance measure set. Washington, DC: National Quality Forum; 2004. p. 40

Reasons of errors



A Systemic Problem that Harms Patients



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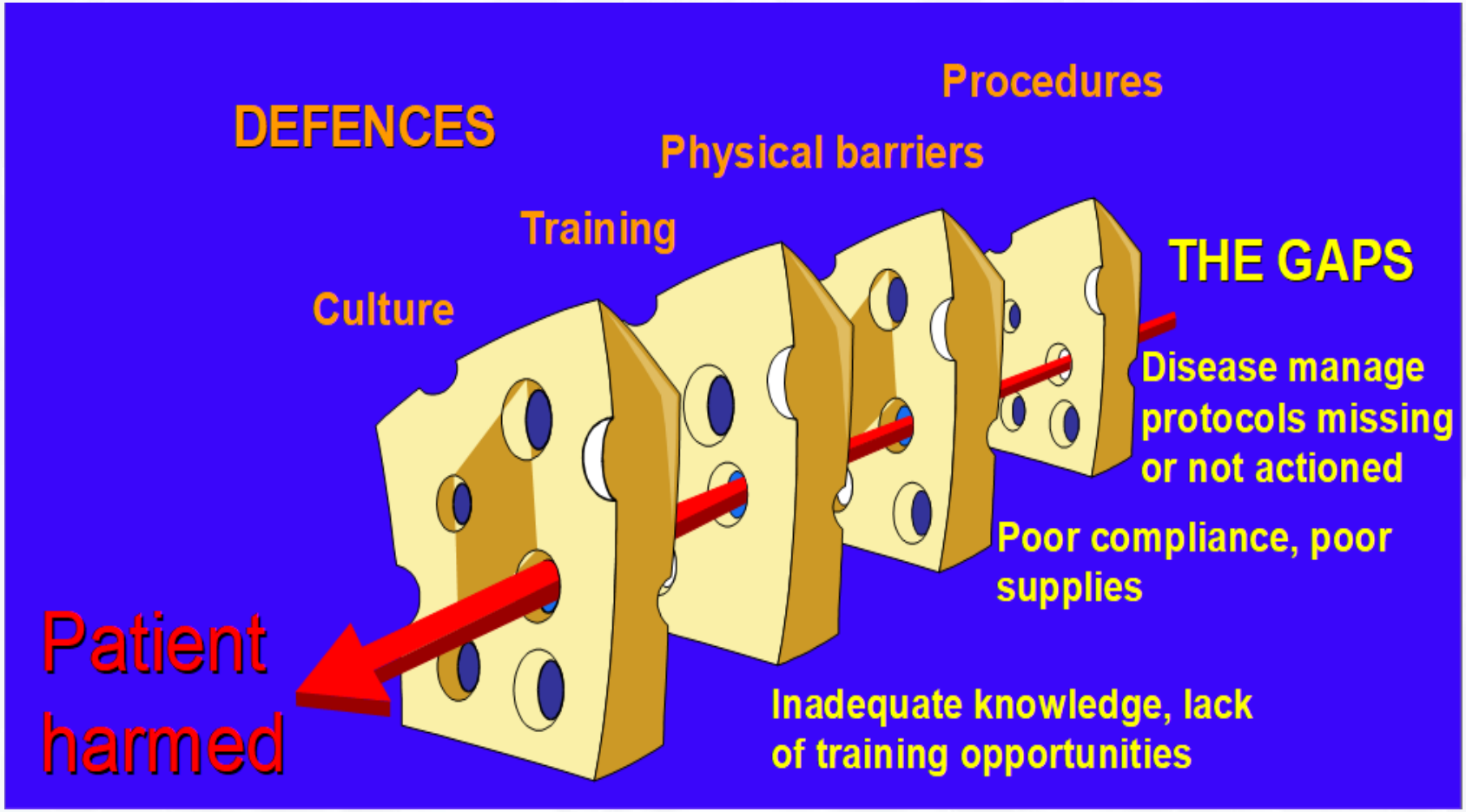
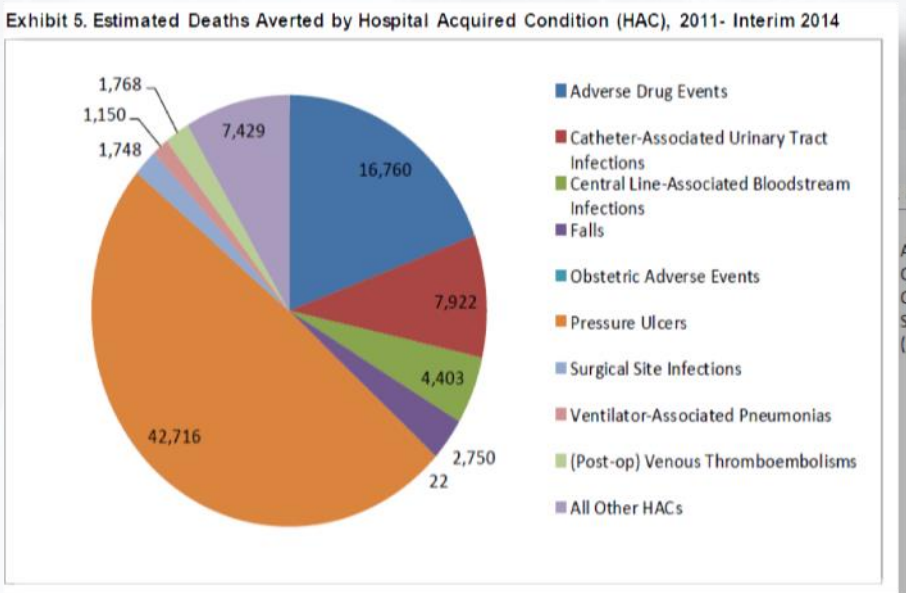
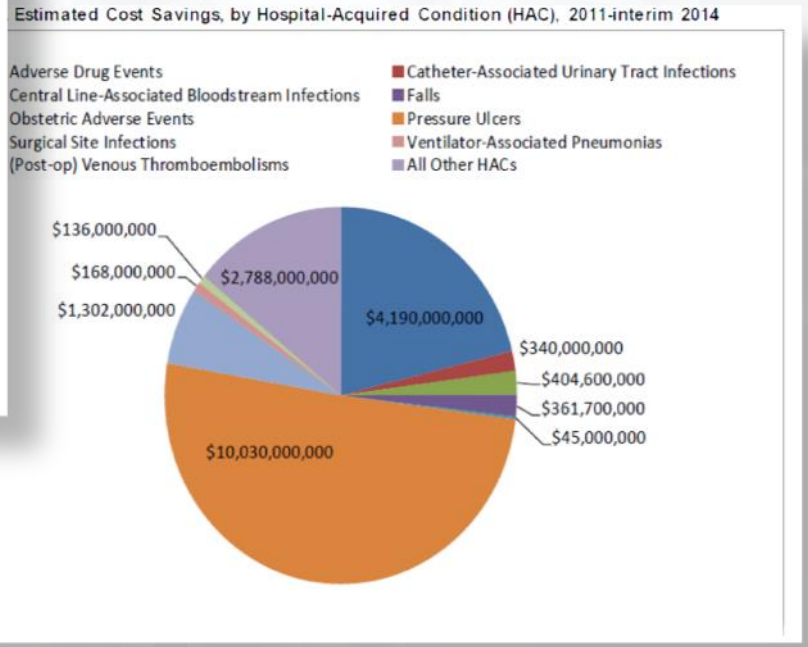


No clear leadership, no cohesive team structure

Infection Control and Patient Safety

Infection prevention and control is a critical component of patient safety, as HAIs are by far the most common complication affecting hospitalized patients





Saving Lives and Saving Money: Hospital-Acquired Conditions Update
Interim Data From National Efforts To Make Care Safer, 2010-2014

The impact of HAIs on individuals

The impact of HAIs on individuals is well documented:

- Increased morbidity and mortality
- Decreased well-being and increased suffering
- Safety issues including reduced attention to isolated patients from health care personnel and the psychosocial effects particularly in long-term care facilities that are considered home for many individuals
- Prolonged length of stay in hospitals with subsequent increased direct costs and reduced bed availability (e.g., Prolonged waiting time for patients needing joint replacements)

The impact of HAIs on healthcare system

HAIs' financial burden to the health care system has been estimated by measuring a number of indices including increased:

- Number of readmissions to hospital
- Length of stay
- Use of antimicrobials
- Surveillance and isolation measures for MDROs
- Laboratory and radiological services attributable to diagnosing and managing HAIs
- Overall direct or indirect costs
- Cost attributable to outbreaks

The impact of HAIs linked to the patient safety & the viability of Healthcare Systems

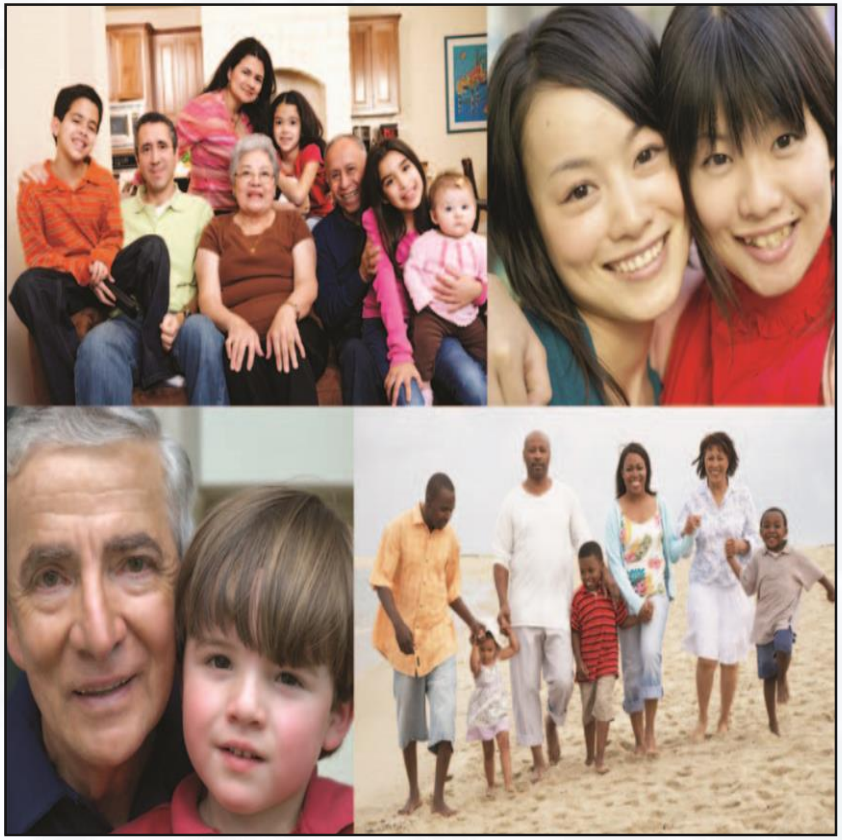
Category of Costs*		
Direct Hospital Costs	<u>Fixed Costs</u> Buildings Utilities Equipment/ Technology Labor (Laundry, Environmental Control, Administrator)	<u>Variable Costs</u> Medications Food Consultations Treatments Procedures Devices Testing Supplies
Indirect Costs	Lost/ Wages Diminished worker productivity on the job Short term & Long term morbidity Mortality Income lost by family members Forgone leisure time Time spent by family/ friends for hospital visits/ travel costs/ home care	
Intangible Cost	Psychological Costs (anxiety, grief, job loss) Pain & Suffering Change in social functioning/ daily activities	

HAI's impact both in Patient & Healthcare System are multiple, direct & indirect

**Adapted from Haddix AC & Shaffer PA. Cost- Effectiveness analysis. Prevention Effectiveness: A Guide to Decision Analysis & Economic Evaluation, 1996*

The Global CRISIS of HAI

Approximately 700,000 health-care–associated infections (HAIs) occurred in 2011, affecting approximately 1 in 25 hospitalized patients



Beyond the numbers, personal stories and lives matter, one of them could be you!

CDC National Health Report: Leading Causes of Morbidity and Mortality and Associated Behavioral Risk and Protective Factors — United States, 2005-2013

The CRISIS of HAI in Europe

Every day 1 to 15 hospitalized patients is

infected by a HAI

Every day 98,000 hospitalized patients is

Infected by at least one HAI in Europe

HAIs cause more deaths in Europe than any other infectious disease monitored by the ECDC

The global threat of AMR in Public Health

→ Antimicrobial Resistance poses an enduring threat to the global community and, in our days, **a major public health risk to developed countries**.

Even more alarming, though is the fact that we are heading towards **the era of Pan-drug Resistance - PDR**.

→ Already in countries with extensive spread of Carbapenem-Resistant *Enterobacteriaceae* (CRE), resistance to all available antibiotics is a **reality**.

The salvage of the last available antibiotics for treating infections caused by **Carvapenem Resistant pathogens disseminating even through the food chain.**

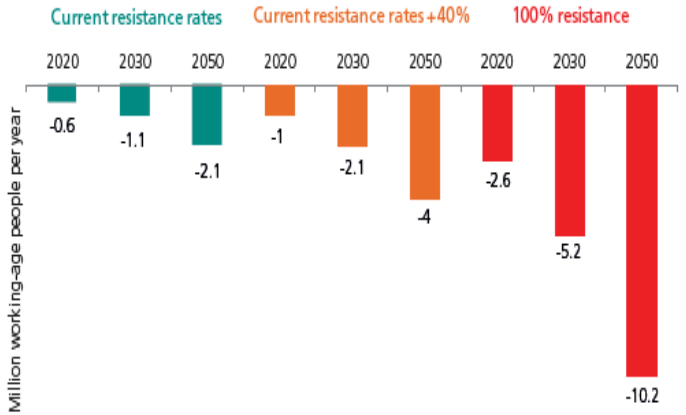
It is a major issue at a time when resistance even to colistin appears to be on the increase worldwide.

AMR's financial Impact at international level

WORLD BANK PROJECTIONS OF AMR IMPACT BY 2050

Average Per capita Income
Poverty
Livestock
Trade
Cost of Health Systems

Figure 2: Estimated annual working-age population loss in OECD countries in various resistance scenarios



Source: Adapted from World Bank [25].

Note: Resistance rates of E.coli, K. pneumoniae, S. aureus, HIV, TB and malaria.

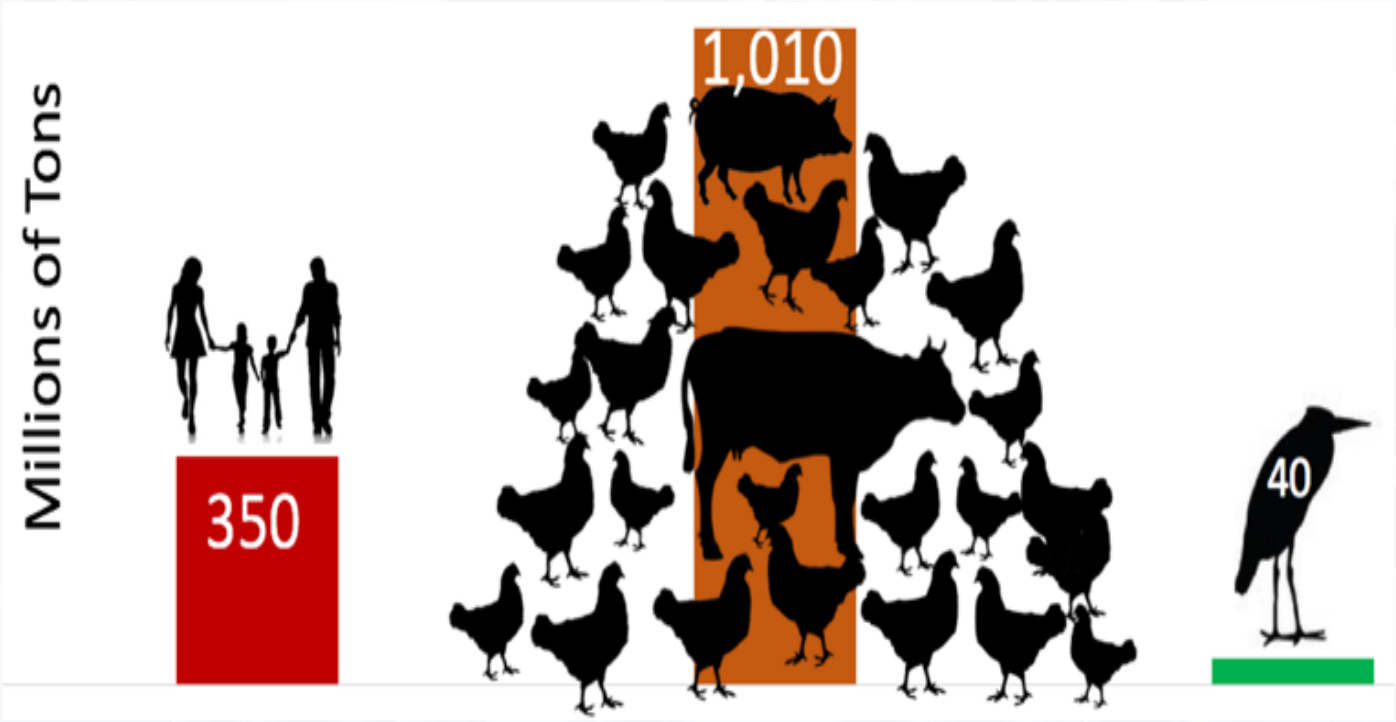
The cost of treating a resistant bacterial infection has been estimated to be $10,000-40,000 more than the cost of the same bacterial infection.

World Bank (2017). Drug-resistant infections: A threat to our economic future. Final report. Washington DC, World Bank Group

One Health Approach

Environmental Science and Pollution Research *March 2018*

Characterization of multiple antibiotic resistance of culturable microorganisms and metagenomic analysis of total microbial diversity of marine fish sold in retail shops in Mumbai, India.



The correlation between HAI & AMR

The emergence of AROs has compounded the impact of HAIs.

The costs of antimicrobial resistance have been reported as crude estimates

based on the following indices:

- Increased length of hospital stay
- Additional investigations required (e.g., Laboratory and Radiological)
- Additional drug treatment courses because, with AROS the person is less likely to respond to the first antimicrobial used to treat the infection
- Increased costs for isolation procedures
- Increased fatal outcome

The threat of AMR in Europe

1 of 3 HAIs is caused due to resistant to antibiotics bacteria

Each year, 33000 people die from an infection due to bacteria resistant to antibiotics. This is comparable to the total number of passengers of more than 100 medium-sized airplanes.

75% of the burden of bacteria resistant to antibiotics in Europe is due to HAIs

The threat of AMR in Europe

The burden of infections with bacteria resistant to antibiotics on the European population is comparable to that of influenza, tuberculosis and HIV/AIDS combined.

ICP's Goals

The goals of IPCPs are to minimize the negative effects of HAI by:

- Contributing to patient safety through protecting patients, health care workers and visitors from infections
- Accomplishing these goals in the most cost effective manner whenever possible thus reducing the economic impacts of HAIs on individuals health and health systems at local, regional and the national level

Are HAIs preventable events?

Reviewed 434 from 4.847 studies

International Bibliography reports that 65%-70% of CABSI & CAUTI and 55% of VAP & SSI could be prevented by implementing the appropriate protective measures.

The estimated number of preventable Infections & deaths annually are:

Preventable infections	
CAUTI	95,483 - 387,550
CABSI	44,762-164,127
VAP	95,078-137,613
SSI	75,526-156,862

Human lives saved	
CAUTI	2,225-9,031
CABSI	5,520-20,239
VAP	13,667-19,782
SSI	2,133-4,431

Direct Associated costs	
CAUTI	**$115 million -$1.82 billion**
CABSI	**$960 million - $18.2 billion**
VAP	**$2.19 billion - $3.17 billion**
SSIs	**$166 million -$345 million**

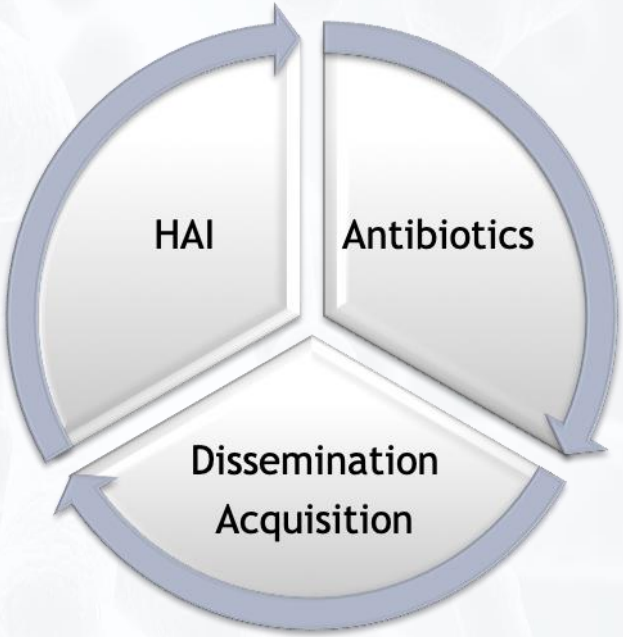
Estimating the Proportion of Healthcare-Associated Infections That Are Reasonably Preventable and the Related Mortality and Costs
Craig A.et al infection control and hospital epidemiology 2011

We are all responsible for our patient safety

Perform the precautions for controlling the spread MDROs

Perform the care bundles for the prevention of HAIs

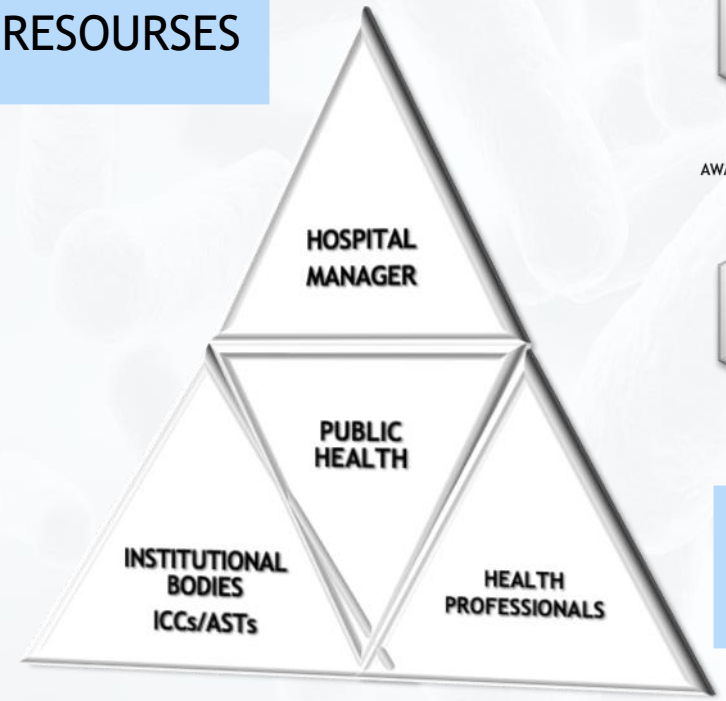
Think SMART
Don't forget the responsible use of antibiotics



Be active in your hospital!

PATIENT SAFETY

HUMAN RESOURSES



INFECTION CONTROL PROGRAM

WORKING ENVIRONMENT

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5. *Saving Lives and Saving Money: Hospital-Acquired Conditions Update Interim Data From National Efforts To Make Care Safer*, 2010-2014

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HAI Control and Prevention 1

Key facts on HCWs' infection control practice in healthcare settings

Fact 1
HAI Prevention and Control & Patient Safety

What is a Healthcare Associated Infection-HAI/Nosocomial Infection?

Health care-associated infection (HCAI), also referred to as "nosocomial" or "hospital" infection, is an infection occurring in a patient during the process of care in a hospital or other health care facility which was not present or incubating at the time of admission.

HCAI can affect patients in any type of setting where they receive care and can also appear after discharge.

Furthermore, they include occupational infections among staff

WHO

Infection Prevention & Control

Prevention: to avoid the occurrence of a new event (infection)

A basic element of prevention is the **risk assessment** and the **empirical implementation** of measures according to the risk assessment until the confirmation of the event & the conversion of a possible to confirmed case

Control: to manage the confirmed event

Primary objectives of IPC 1. Patient Safety

Patient has to be treated for the disease which was hospitalized

To avoid any complications/ errors during the hospitalization

Why HAI prevention and control is a key component of Patient Safety

- Health care-associated infections, or infections acquired in health-care settings are the most frequent adverse event in health-care delivery worldwide.
- Multiple studies indicate that the common types of adverse events affecting hospitalized patients are adverse drug events, HCAIs, and surgical complications.
- Every day, patients get infections in healthcare facilities while they are being treated for something else. These infections can have devastating emotional, financial, and medical effects. Worst of all, they can be deadly.

HAIs in Europe

ECDC estimated that approximately 4 million patients acquire a HAI each year in all EU Member States and that approximately 37,000 deaths directly result from these infections

In November 2001, the EU Health Ministers adopted the Council Recommendation on the prudent use of antimicrobial agents in human medicine (2002/77/EC)
In June 2009 they adopted the Council Recommendation on patient safety, including the prevention and control of healthcare associated infections (2009/C 151/01)

These Recommendations ask Member States to adopt and implement specific strategies for the prudent use of antimicrobial agents - aiming at containing antimicrobial resistance, and for the prevention and control of healthcare-associated infections - aiming at improving patient safety.

Primary objectives of IPC 2. Healthcare providers safety

Healthcare professionals treating the patient
must not be infected due to their involvement with the patient

Occupational exposure

Primary objectives 3. Healthcare services quality

Resources Management

Increased functionality of healthcare setting

Why HAI prevention and control is criterion of Healthcare services quality assessment?

Every day, HCAI results in prolonged hospital stays, long-term disability, increased resistance of microorganisms to antimicrobials, massive additional costs for health systems, high costs for patients and their family, and unnecessary deaths.

Primary objectives 4. Functionality & sustainability of healthcare system

Addressing critical situations that are simultaneously expose many HCWs & patients to pathogens

Early response to a crisis

Avoidance of new crisis' occurrence

Deregulation of the system

The impact of HAIs linked to the patient safety and the viability of Healthcare Systems

Category of Costs*			
	Fixed Costs	Variable Costs	
Direct Hospital Costs	Buildings Utilities Equipment/ Technology Labor (Laundry, Environmental Control, Administrator)	Medications Food Consultations Treatments	Procedures Devices Testing Supplies
Indirect Costs	Lost/ Wages Diminished worker productivity on the job Short term & Long term morbidity Mortality Income lost by family members Forgone leisure time Time spent by family/ friends for hospital visits/ travel costs/ home care		
Intangible Cost	Psychological Costs (anxiety, grief, job loss) Pain & Suffering Change in social functioning/ daily activities		

HAI's impact both in Patient & Healthcare System are multiple, direct & indirect

*Adapted from Haddix AC & Shaffer PA. Cost- Effectiveness analysis. Prevention Effectiveness: A Guide to Decision Analysis & Economic Evaluation, 1996

Definition of Healthcare Associated infection/Nosocomial Infection

HCAIs are infections that:

first appear 48 hours or more after hospitalization

or

within 30 days after having received health care

HAIs and AMR burden

10%

1 in 10 patients get an infection while receiving care.

50%

More than 50% of surgical site infections can be antibiotic-resistant.

30%

Effective infection prevention and control reduces health care-associated infections by at least 30%.

WHO

The most frequent HAIs are caused due to interventions related to patient care

Healthcare procedures can leave you vulnerable to germs that cause HAIs. These germs can be spread in healthcare settings from patient to patient on unclean hands of healthcare personnel or through the improper use or reuse of equipment.

The most frequent HAIs are caused due to interventions related to patient care

Alongside infections due to cross-contamination between patients and health workers, patients being susceptible to common infections due to diminished immune responses, and infections at surgery sites (SSIs), many HCAIs are due to implants and prostheses.

These include central line-associated bloodstream infections (CLABSIs), catheter-associated UTIs, and ventilator-associated pneumonia (VAP).

Fact 2
AMR & HAI

The development of AMR

The development of AMR is caused from

- Horizontal transmission – lack of compliance to infection control measures
- Vertical transmission – pressure from the antibiotics use

HAI and AMR

HAIs are caused from MDRO and from sensitive pathogens The spread of MDROs in the hospital environment is a high risk factor for patient colonized and infected, especially in closed departments with critical ill patients like ICUs.

Antimicrobial Resistance: The reality now...

Antimicrobial Resistance poses an enduring threat to the global community and, in our days,

a Major Public Health risk to developed countries

Even more alarming, is the fact that we are heading towards

the era of Pan-drug Resistance – PDR

Already in countries with extensive spread of Carbapenem-Resistant *Enterobacteriaceae* (CRE), resistance to all available antibiotics is a reality.

The salvage of the last available antibiotics for treating infections caused by

Carvapenem Resistant pathogens disseminating even through the food chain

is a major issue at a time when resistance even to colistin appears to be on the increase worldwide.

HealthCare Associated Infections

The intervention could be:

The initial colonization of the patient from a MDRO and after the development of an infection due to this pathogen.

Especially for critical ill patients (like patients in ICUs & in hematological units), the initial colonization of their flora with these pathogens is the first step for been infected by them.

Fact 3
Are HAI preventable events?

Are HAIs preventable events?

Many infection prevention and control measures, including hand hygiene, are simple, low-cost and effective, however they require staff accountability and behavioural change.

30%

Effective infection prevention and control reduces health care-associated infections by at least 30%.

Key fact 3: Are HAIs preventable events?

Estimating the Proportion of Healthcare-Associated Infections that Are Reasonably Preventable and the Related Mortality and Costs
Craig A.et al Infection Control and Hospital Epidemiology (2011)

Reviewed 434 from 4.847 studies

International Bibliography reports that **65%-70%** of CABSI & CAUTI and **55%** of VAP & SSI could be prevented by **implementing the appropriate protective measures**.

The estimated number of preventable Infections & deaths annually are:

Preventable infections	
CAUTI	95,483 - 387,550
CABSI	44,762 – 164,127
VAP	95,078 – 137,613
SSI	75,526 – 156,862

Human lives saved	
CAUTI	2,225 – 9,031
CABSI	5,520 – 20,239
VAP	13,667 -19,782
SSI	2,133 – 4,431

Direct Associated costs	
CAUTI	**$115 million - $1.82 billion**
CABSI	**$960 million - $18.2 billion**
VAP	**$2.19 billion - $3.17 billion**
SSIs	**$166 million - $345 million**

The HAIs prevention and control needs an holistic approach

What are the solutions to this problem?

- Infection prevention and control measures
- Appropriate Hand Hygiene
- Correct application of basic precautions during invasive procedures

are **simple & low-cost**

but require **Staff Accountability & Behavioral Change**

World Health Organization | Patient Safety — A World Alliance for Safer Health Care | SAVE LIVES Clean Your Hands

Which are these measures?

Transmission-Based Precautions
Route and risk of transmission
Pathogens

HAI care bundles
CRBSI
CRUTI
VAP
SSI

Measures due to transmission route

Criteria used to assign Transmission-Based Precautions categories follow:

- A Transmission-Based Precautions category was assigned if there was strong evidence for person-to-person transmission via droplet, contact, or airborne routes in healthcare or non-healthcare settings and/or if patient factors (e.g., diapered infants, diarrhea, draining wounds) increased the risk of transmission
- If there was no evidence for person-to-person transmission by droplet, contact or airborne routes, Standard Precautions were assigned If there was a low risk for person-to-person transmission and no evidence of healthcare-associated transmission, Standard Precautions were assigned.
- Standard Precautions were assigned for bloodborne pathogens (e.g., hepatitis B and C viruses, human immunodeficiency virus). Subsequent experience has confirmed the efficacy of Standard Precautions to prevent exposure to infected blood and body fluid.

PRECAUTIONS

STANDARD

To all patients

Blood and body fluid

CONTACT

Patients colonized or infected by MDROs

C.Difficile

DROPPLET

Infected patients by influenza,minigitis

AIRBORME

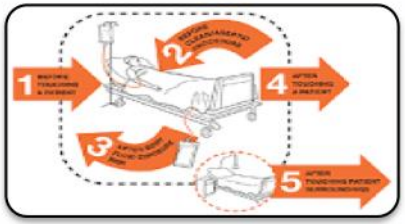
TB, rubella,measules

The most important MDROs

- Carvapenem Resistant Enterobacteriaceae
- Carvapenem Resistant Acinetobacter
- Carvapenem Resistant Pseudomonas
- MRSA
- VRE
- C.difficile

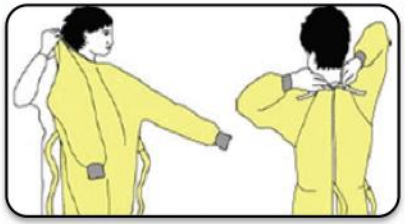
Standard precautions

Standard precautions are taken by all personnel, all patients & all potentially contaminated biological fluids



HAND HYGIENE
before & after every contact with the patient

(5 Moments for HH)



PPE
When there is risk of ejecting biological fluid

Safe disposal of sharp and infectious waste

Follow the guidelines for routine cleaning and disinfection

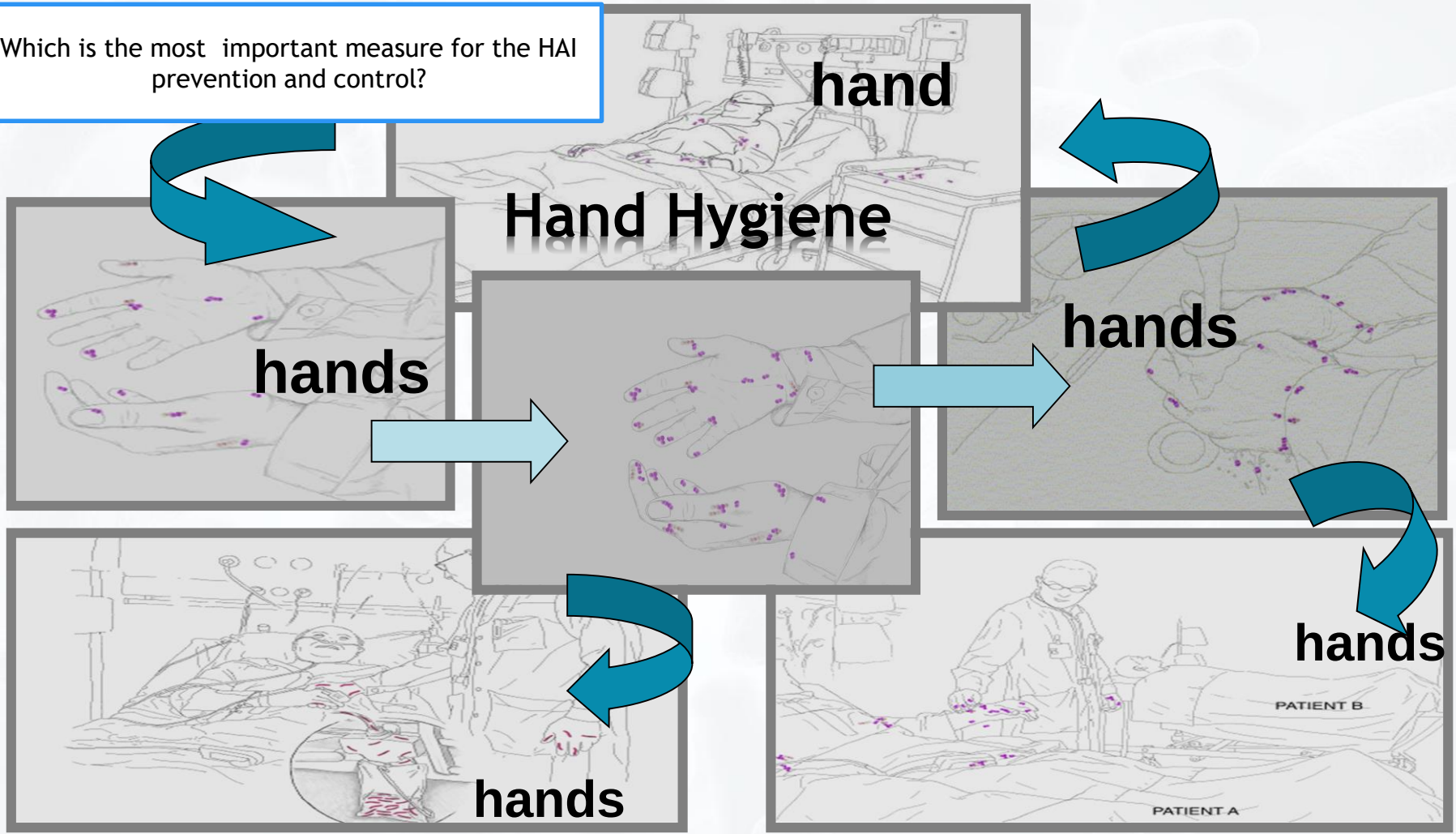
ISOLATION Precautions - Personal Protective Equipment

Contact precautions

Droplet precautions

Airborne precautions

Which is the most important measure for the HAI prevention and control?



Hand Hygiene
When and How

In under no circumstances using gloves replaces Hand Hygiene




WHEN TO USE GLOVES:

- ✓ Before any clean or aseptic handling
- ✓ When in contact with blood, biological fluids, mucous membranes or skin infections
- ✓ When removing contaminated objects and cleaning contaminated surfaces
- ✓ When contact precautions are required

Important issued when applying
Hand Hygiene & using gloves

When there is an indication for hand hygiene application when gloves are on, the gloves must be removed to perform hand hygiene as required, and then changed if needed

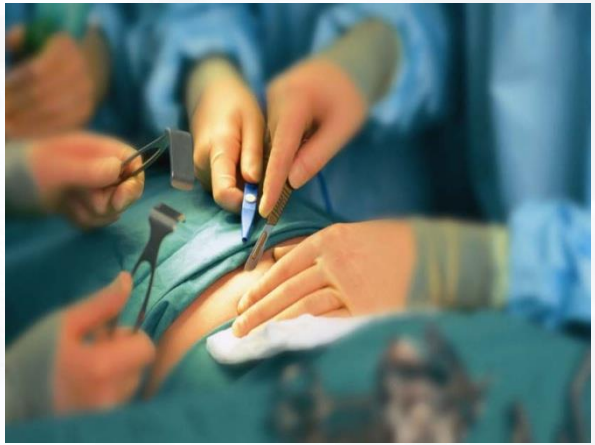



Sharp's safety

Sharp's safety

Injuries from scalpels occur mostly:

- Loading or removing a disposable scalpel blade on a reusable knife handle
- During hand to hand passing of the scalpel
- Cutting toward the proceduralist or assistants



Sharp's safety

Sharp safety is Top Priority

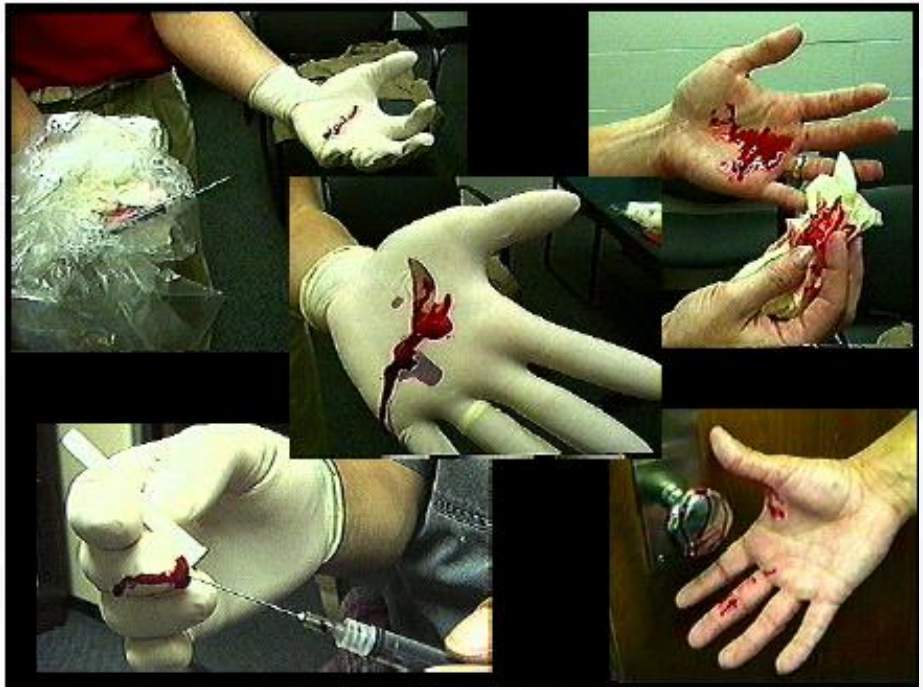
Risk reduction strategies

Immunization for HBV

Safe practices

Use of devices with safety features

Procedure after sharp's accidents



Sharp's safety

Sharp safety is Top Priority

Injuries from needles occur mostly:

1. During use between steps of a multistep procedure
2. Disassembling device
3. Recapping
4. Withdrawing needle from rubber
5. After use, before disposal
6. Putting item in disp. container
7. After disposal, item protruding from disposal container
8. Device left on floor or other inappropriate place
9. Other

From U.S. EPINet, 82 healthcare facilities,1998-2002, total cases=687

Sharp's safety

Sharp safety is Top Priority

Injuries from Needles Occur Most Often When:

1. During use between steps of a multistep procedure
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8. Device left on floor or other inappropriate place
9. Other

HCW vaccinations

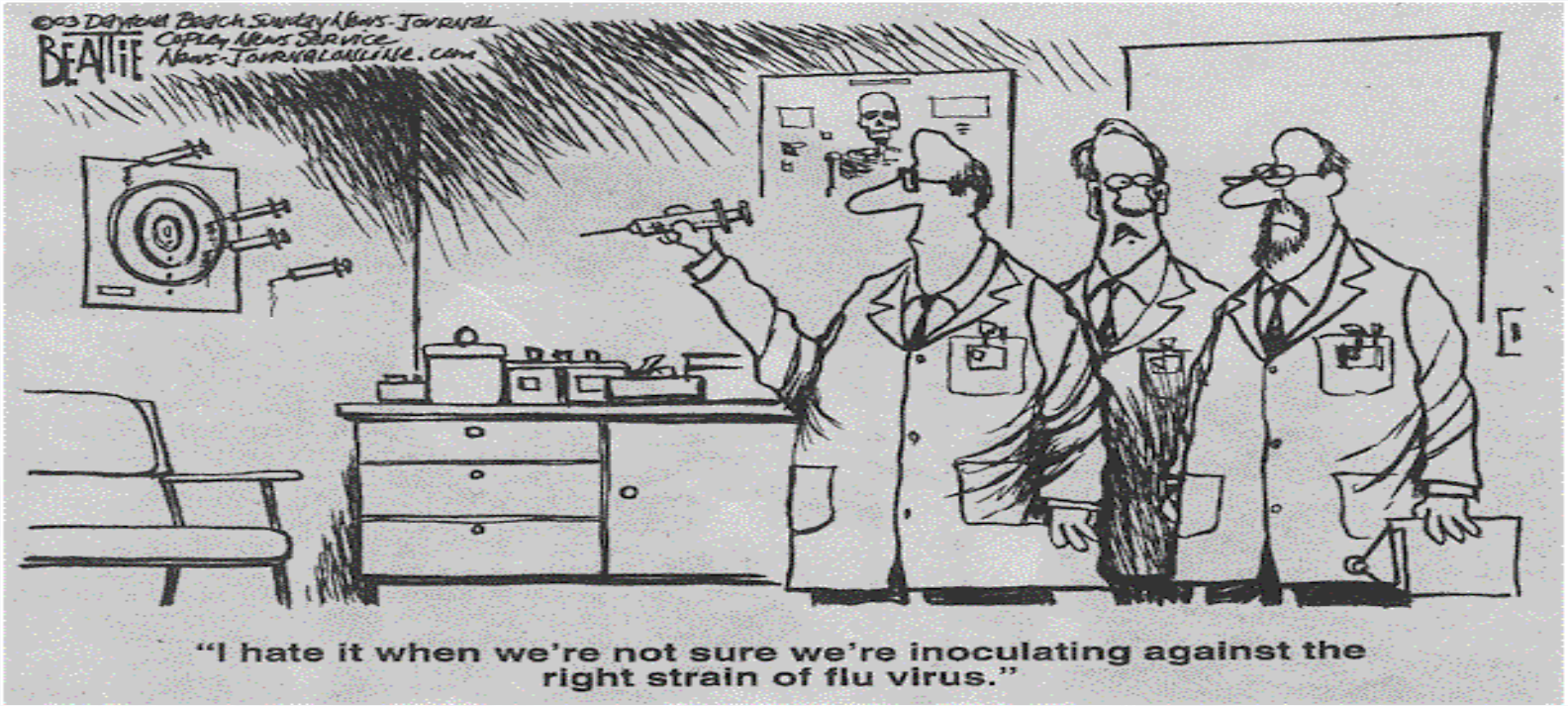
Between European countries exist many differences for HCW vaccinations and implementation terms (recommendation/mandatory) , special HCW populations and Healthcare settings.

Hepatitis B

Measles

Influenza

Influenza vaccine



HAI Infection Prevention and Control bundles care per type of infection

- Catheter Related Blood Stream Infections
- Urine Catheter Related Infections
- Ventilator Associated Pneumonia
- Surgical Site Infections

Don’t forget, the proper use of antibiotics!

The proper use of antibiotics protects our patients from being colonized and infected by MDROs.

Fact 4
How can I be sure for my IC practice?

Get an advice from the preventionists of your hospital!

- Information and consultation sources in the hospital
- Infection Control Committee
- Antibiotic Stewardship Team
- Liaisons for IC in clinical wards
- Education team
- Clinical supervisors

Fact 5.
How can you become an active part of your hospital IC Policy

What you have to do to protect yourself and your patients

1. Learn about IC policy of your hospital
2. Attend all the training schedules of the hospital
3. Get and inform for the national and regional guidelines
4. Ask the advice of the dedicated personnel to IC of your hospital.
5. Try to be active part of the fight against AMR and HAIs.

Learn about the IC hospital policy!

Get the national and regional guidelines

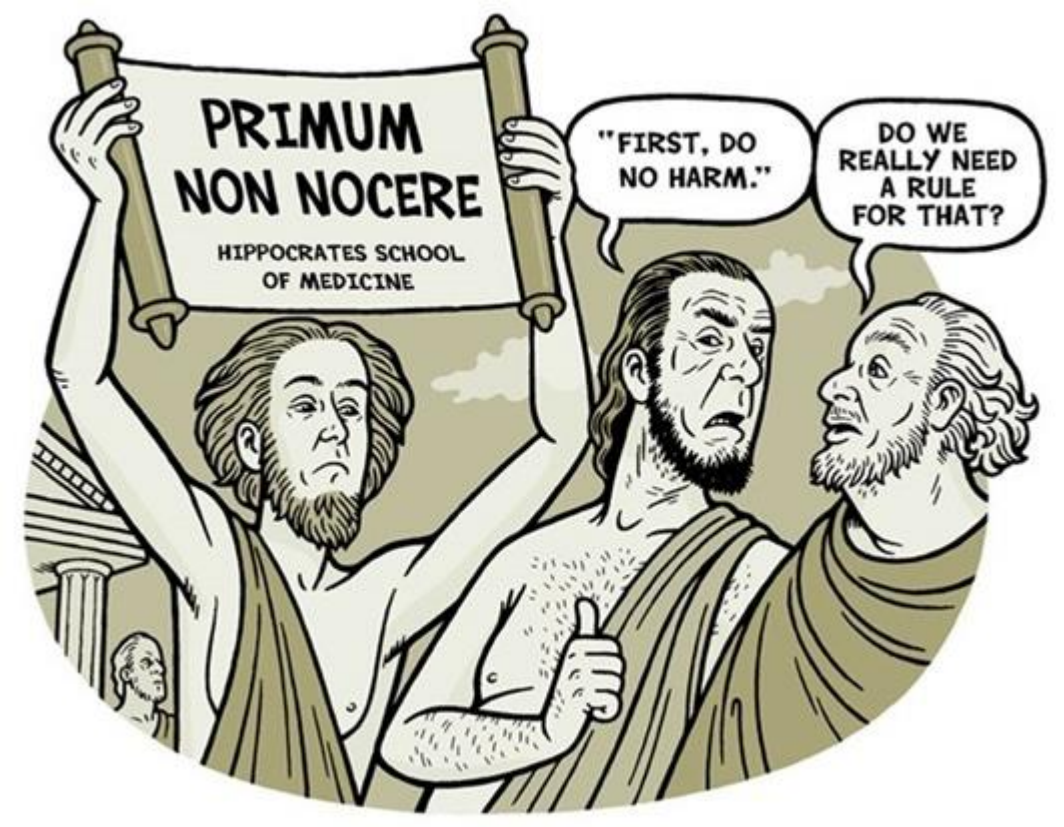
My active contribution

- How can I contribute to the ICP of my hospital?
- How can I be sure that I am sufficient trained to infection control measures implementation?

Key questions and points that you have to remember

- Which are the primary objectives of IPC?
- Which are the impact of HAIs in patient safety?
- Which is the relation between HAIs and AMR?
- Which are the most frequent HAIs?
- Which is the key measure for the prevention and control of HAIs?

Don’t forget…


PRIMUM NON NOCERE
HIPPOCRATES SCHOOL OF MEDICINE
"FIRST, DO NO HARM."
DO WE REALLY NEED A RULE FOR THAT?

Don’t forget…

“First do no harm.”

Hippocratic Oath

Infection Control is a Teamwork!

Joint Action
Antimicrobial Resistance and
Healthcare-Associated Infections

Co-funded by the
Health Programme
of the European Union

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** This presentation arises from the Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections (EU-JAMRAI), which has received funding from the European Union, under the framework of the Health Program (2014-2020) under the Grant Agreement N° 761296. Sole responsibility lies with the author and the Consumers, Health, Agriculture and Food Executive Agency is not responsible for any use that may be made of the information contained herein.*

Joint Action
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Audit as Tool for Behavioral Change

Gaps between organization culture and patient safety

WHAT NEEDS IMPROVEMENT:

- ✘ FEEDBACK to all stakeholders on surveillance and audit results

- ✘ **AUDIT of procedures and policies based on feasible procedures**

- ✘ TRAINING of target groups using appropriate method and tools on practical guidelines

Infection Control Plan -KEY steps

- Assess the current situation?
- Epidemiological status

- Who can manage?
- Targets
- Plan - Activities
- Resources

- Monitoring & evaluation of the program
- Feedback to the contributed parties
- Evaluation of the progress & promote necessary changes

- What can be implemented?
- Prioritizing recourses
- Authorities and duties
- Multimodal strategies

Essential activities

GOALS	ESSENTIAL ACTIVITIES
Establishment of internal audit	1.1 Well-defined audit procedures which will be under the audit process
	1.2 The audit plan will be developed undertaking a gap analysis of the current processes, practices and performance deficiencies.
	1.3 Dedicated and trained audit team
Establishment of external audit	2.1 Cooperation with external audit committees on ICP and infection practices in order to be established the external audit in the health care facility
Empower frontline staff to actively involved	3.1 Support the development of the Infection Control quality improvement culture.
	3.2 Training of frontline staff to be familiar with audit and to adapt it as a tool for individual improvement on infection control practices and assurance of patient safety
Improve the effectiveness of audit feedback	4.1 Having a supervisor or senior colleague provide feedback
	4.2 Providing feedback at least monthly
	4.3 Providing feedback in both verbal and written forms,
	4.4 Using feedback to reduce instead of increase a particular behaviour
	4.5 Setting clear goals with specific instructions for how to improve

CHECK LIST	
Dedicated auditing team	✓
Annual auditing plan	✓
HCWs awareness to the audit importance	✓
Evaluation of audit results and intervention planning	✓
Dissemination of audit results	✓

ICP implementation:
What changes can happen in your hospital?

CHANGING HEALTHCARE PROFESSIONALS' BEHAVIOUR

CREATING ORGANISATIONAL BEHAVIOUR

CREATING SAFE WORK ENVIRONMENT

Joint Action
Antimicrobial Resistance and
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Audit
in Infection Prevention & Control

Framework

What is audit?

Why audit?

Audit process

Audit tools

Communicating results

Learning objectives

At the end of presentation the participants will be able to:

- Understand the importance of audit in daily clinical practice
- Describe the main principles of audit

Time involved

- 30-40 minutes

Introduction

- Healthcare-associated infections (HAIs) are due to multiple factors
- Prevention depends on surveillance and Infection Prevention and Control (IP&C) practices
- Practices are outlined in policies, guidelines and procedures
- **Audit is a way to monitor the implementation of policies and procedures**

Source: International Federation of infection control

What is audit? (I)

Audit and feedback defined as “any summary of clinical performance of health care over a specified period of time aimed at providing information to health professionals to allow them to assess and adjust their performance”

It is an overarching term used to describe some of the measures that are used to improve professional practice.

Source: http://www.euro.who.int/en/data-and-evidence/evidence-informed-policy-making/publications/2010/using-audit-and-feedback-to-health-professionals-to-improve-the-quality-and-safety-of-health-care

What is audit? (II)

"Audit is a **quality process** that seeks to improve patient care and outcomes **through systematic review** of care against explicit criteria and the implementation of change".

National Institute for Clinical Excellence (2002). "Principles for Best Practice in Clinical Audit"

What is audit? (III)

Providing results of the audit to staff enables them to identify where improvement is needed.

“Where indicated, changes are implemented at an individual, team or service level and further monitoring is used to confirm improvement in healthcare delivery”.

National Institute for Clinical Excellence (2002). “Principles for Best Practice in Clinical Audit”

What is audit? (IV)

Audit in the wider sense is simply a tool

- to find out what you do now;
- this often to be compared with what you have done in the past, or
- what you think you may wish to do in the future

Audit: Are we doing the best thing in the best way?

Audits are:

- preventive, not detective
- a tool for change
- planned, organized, and coordinated

Audits are not:

- a quick look
- used for punishment of HCWs
- experiment

Audit aims:

- ✓ to improve…
- ✓ to enhance…
- ✓ to increase…
- ✓ to change…
- ✓ to ensure…

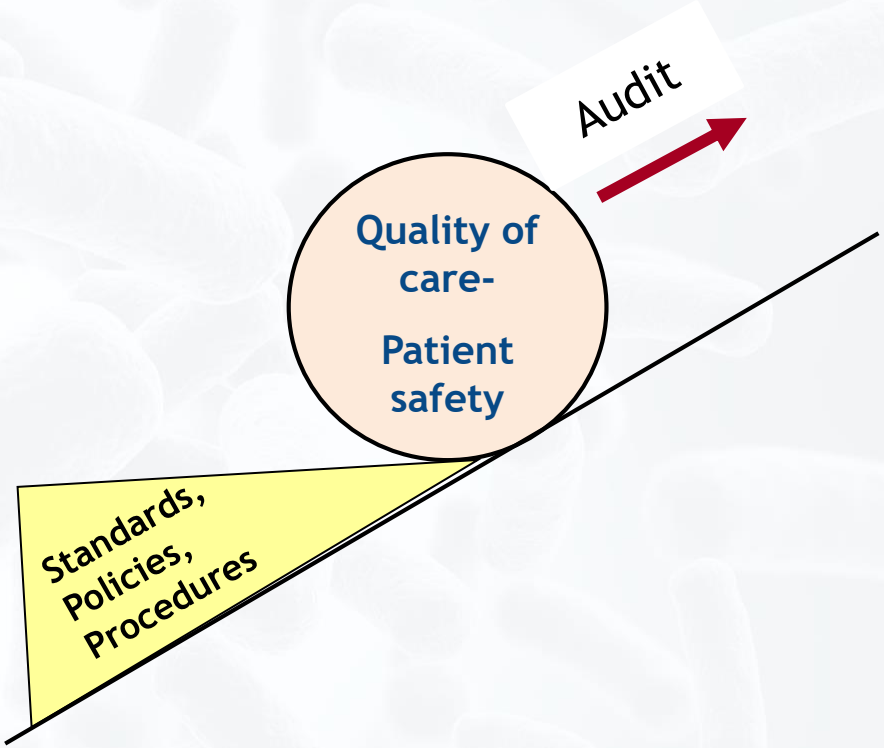
Why audit? (I)

- Quality of care
- Patient safety

Why audit? (II)

If we imagine the quality of care as a ball on a sloping surface, the standards, policies and procedures support the quality so that it does not go down.

At the same time audit pulls quality upwards.



What is Quality Improvement (QI)?

Evidence based medicine

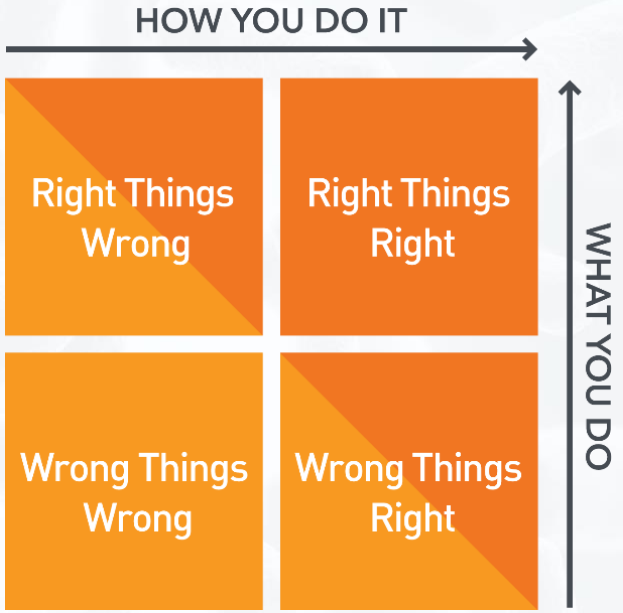
- *"Doing the right things"*

Quality Improvement

- *"Doing things right"*

Should be complimentary

- *"Doing the right things right"*

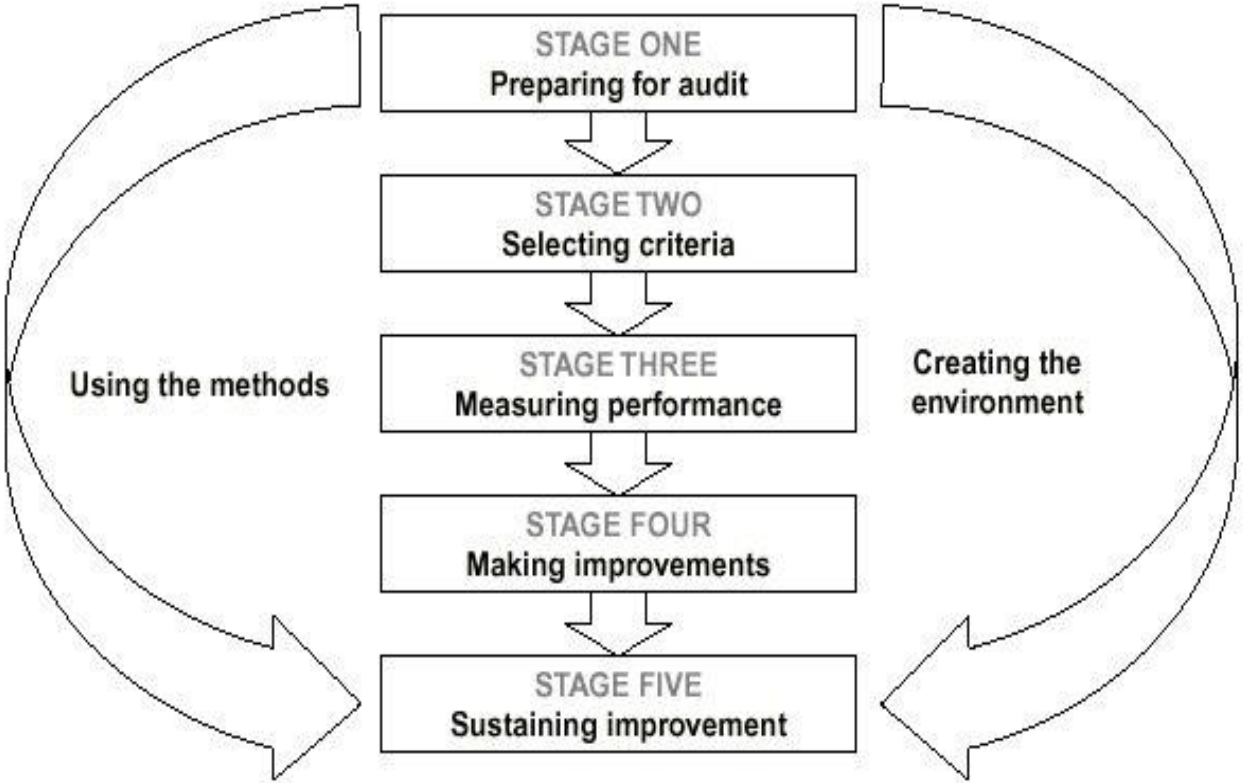


Audit process

An audit is a cyclical process with the following steps :

- Planning for audit
- Defining standards
- Collecting data/ Measuring performance
- Identifying areas for improvement
- Giving feedback
- Making necessary changes/ improvements
- Sustaining improvements/ re-audit

Audit stages



Audit process

Pre-audit meetings are essential to:

- explain and discuss the goals and objectives of the audit,
- explain how it will be conducted
- discuss how the results will be reported and communicated

Staff should understand that the audit will be performed consistently across the facility, and anonymity will be protected.

Audit tools

- Templates to measure implementation of the procedure
- They could be in the form of checklists, bundles or pack of toolkits
- They could be focused on:
  - Hand Hygiene,
  - isolation,
  - Personal Protective Equipment,
  - Insertion and care of intravascular, respiratory and urinary devices,
  - Hair removal,
  - prophylactic antibiotic,
  - Disinfection and sterilisation,
  - Cleaning

Hand Hygiene audit form

World Health Organization | Patient Safety — A World Alliance for Safer Health Care | SAVE LIVES — Clean Your Hands

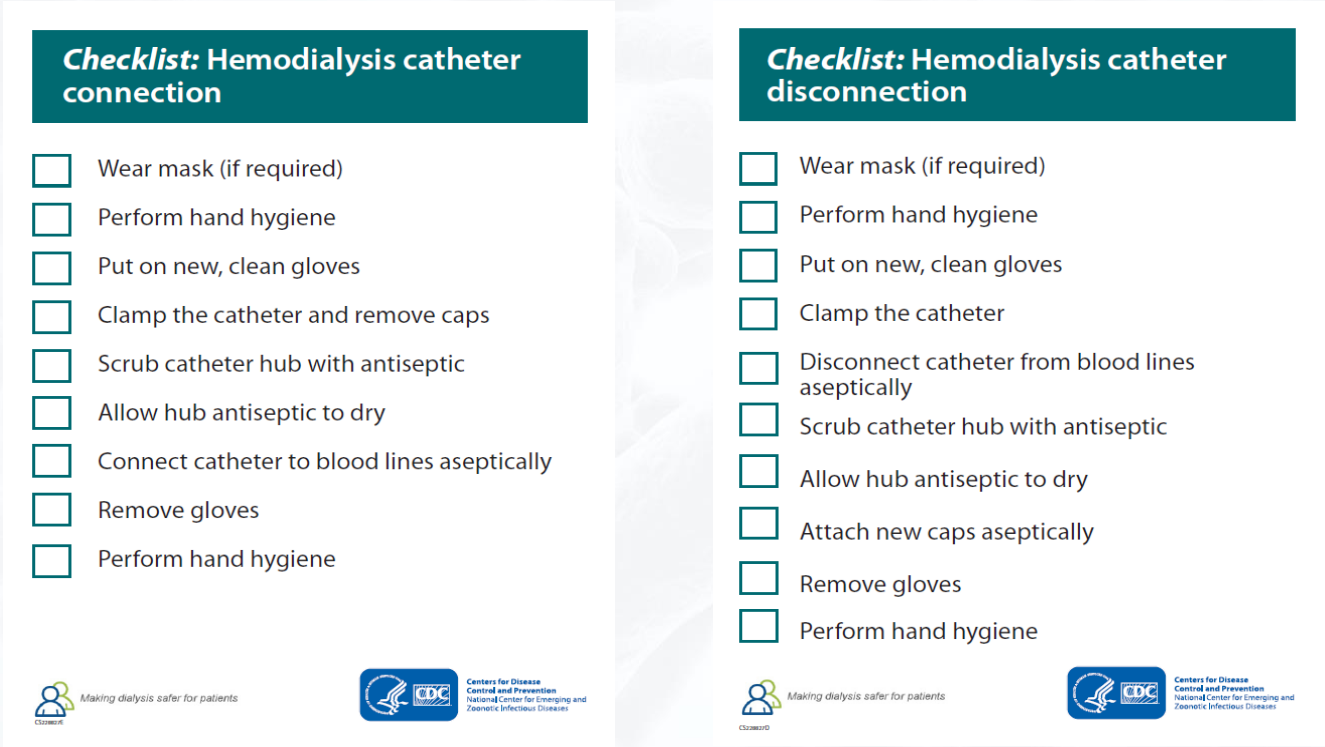
Observation Form

Facility:		**Period Number*:**		**Session Number*:**	
Service:		**Date:** (dd/mm/yy)	/ /	**Observer:** (initials)	
Ward:		**Start/End time:** (hh:mm)	: / :	**Page N°:**	
Department:		**Session duration:** (mm)		**City**:**	
Country:**					

Prof.cat		Prof.cat		Prof.cat		Prof.cat	
Code		Code		Code		Code	
N°		N°		N°		N°	

Opp.	Indication	HH Action	Opp.	Indication	HH Action	Opp.	Indication	HH Action	Opp.	Indication	HH Action
1	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	1	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	1	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	1	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves
2	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	2	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	2	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves	2	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ○ missed ○ gloves

Audit tool corresponds to CDC checklist



Checklist: Hemodialysis catheter connection

- ☐ Wear mask (if required)
- ☐ Perform hand hygiene
- ☐ Put on new, clean gloves
- ☐ Clamp the catheter and remove caps
- ☐ Scrub catheter hub with antiseptic
- ☐ Allow hub antiseptic to dry
- ☐ Connect catheter to blood lines aseptically
- ☐ Remove gloves
- ☐ Perform hand hygiene

Making dialysis safer for patients

Centers for Disease Control and Prevention
National Center for Emerging and Zoonotic Infectious Diseases

Checklist: Hemodialysis catheter disconnection

- ☐ Wear mask (if required)
- ☐ Perform hand hygiene
- ☐ Put on new, clean gloves
- ☐ Clamp the catheter
- ☐ Disconnect catheter from blood lines aseptically
- ☐ Scrub catheter hub with antiseptic
- ☐ Allow hub antiseptic to dry
- ☐ Attach new caps aseptically
- ☐ Remove gloves
- ☐ Perform hand hygiene

Making dialysis safer for patients

Centers for Disease Control and Prevention
National Center for Emerging and Zoonotic Infectious Diseases

http://www.cdc.gov/dialysis/PDFs/collaborative/CL_Hemodialysis-Catheter-Connection-508.pdf

http://www.cdc.gov/dialysis/PDFs/collaborative/CL-Hemodialysis-Catheter-Disconnection-508.pdf

Cath connect/disconnect audit tool

CDC Dialysis Collaborative *Facility Name:*_____ *Date:*_____ *Start time:*_____*AM / PM*

*Day: M W F Tu Th Sa Shift: 1st 2nd 3rd 4th Observer:*_____ *Location within unit:*_____

Audit Tool: Catheter connection and disconnection observations

(Use a "√" if action performed correctly, a "Φ" if not performed. If not observed, leave blank)

Procedure observed, C=connect D=disconnect	Discipline	Mask worn properly (if required)	Hand hygiene performed	New clean gloves worn	Catheter removed from blood line aseptically (disconnection only)	Catheter hub scrubbed	Hub antiseptic allowed to dry	Catheter connected to blood lines aseptically (connection only)	New caps attached aseptically (after disconnecting)	Gloves removed	Hand hygiene performed

Discipline: **P**=physician, **N**=nurse, **T**=technician, **S**=student, **O**=other

Duration of observation period = _____minutes

Number of procedures performed correctly = _____

Total number of procedures observed during audit = _____

ADDITIONAL COMMENTS/OBSERVATIONS:

Numerato

Denominator

Making dialysis safer for patients

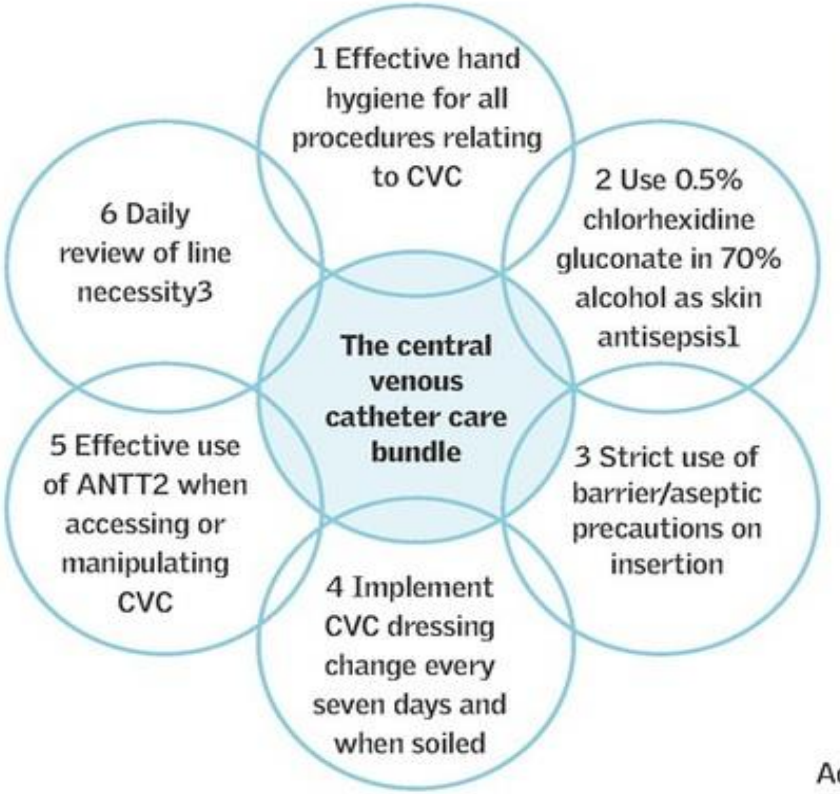
National Center for Emerging and Zoonotic Infectious Diseases

Division of Healthcare Quality Promotion

Bundles

- A bundle:
  - ✓ is a multi-model structured method of improving processes of care and patient outcomes
  - ✓ is a collection of processes and/or interventions needed to effectively care for patients.
- Several interventions are "bundled" together and, when combined, significantly improve patient care outcomes.
- Bundles are helpful and have been developed for central line-associated bloodstream infection prevention, ventilator associated pneumonia, catheter-associated urinary tract infection etc.

Central Venous Catheter Care Bundle



1 Alternatively use povidone iodine if chlorhexidne gluconate contra-indicated
2 Aseptic non-touch technique
3 With subsequent removal of unnecessary lines

Adapted from IHI 2006

Audit Tools

- Audit tools must match the recommended practices and resources of the institution
- The audit can be performed by the IP&C team or other designated and trained staff

Barriers of audit & change

- Fear
- Lack of understanding
- Low morale
- Poor communication
- Organizational culture
- Pushing too hard
- Consensus not gained

Communication results and feedback

- **Weekly reports**
  - Rapid feedback on incidental issues
- **Monthly reports**
  - Audit results, education, training, and consultations
- **Quarterly reports**
  - Formal reports including recommendations and management
- **Annual reports**
  - A summary of audits carried and the resulting improvement

Behavioural Change

- Behavioural theories and interventions insufficient
- Interventions must account for different levels
- Interdependence of factors, environmental constraints, and institutional climate taken into account
- Factors necessary for change
  - Dissatisfaction with the current situation
  - Perception of alternatives
  - Recognition, of the ability and potential to change

Key points

- Audit means checking practice against a standard
- Improves by providing information about practices
- Use for risk assessment, strategic planning, and root cause analysis
- Essential to have an audit team
- Results need to be known by decision makers and all involvement stakeholders

Source:International Federation of infection control

Quiz

1. Audits have demonstrated improvement in processes and outcomes. T/F
2. An audit tool helps evaluate
   a) Practice against a standard
   b) Health care behaviour
   c) Surveillance
   d) Epidemiological investigation
3. Regarding audits, it is <u>incorrect</u> that:
   a) The intent of audits is to promote good practice, improve patient care, and ensure safety.
   b) Audit means checking practice against a standard
   c) It is punitive
   d) There needs to be a plan

Source:International Federation of infection control

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Joint Action
Antimicrobial Resistance and
Healthcare-Associated Infections

Co-funded by the
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Infection control program implementation

Key Elements For The Establishment

An Effective Infection Control Program Implementation

OBJECTIVES OF THE TRAINNG TOOL

1. The impact of Infection Control Program Implementation
2. Development and Implementation of ICP

2.1 How to built an ICP

- The core components of an ICP
- The process of ICP development
- The management of ICP

2.2 How to built IC organization culture

- The implementation
- Areas for improvement
- Essential activities

OBJECTIVE OF THE TRAINING TOOL 2

The objective of this tool is to support the organizational bodies in healthcare settings to develop and implement Infection Control Programs based on organizational behaviour change.

Key steps on ICP establishment:

- Development
- Management
- Implementation

Infection Prevention & Control

Prevention: to avoid the occurrence of a new event (infection)

A basic element of prevention is the **risk assessment** and the **empirical implementation** of measures according to the risk assessment until the confirmation of the event & the conversion of a possible to confirmed case

Control: to manage the confirmed event

How can we achieve this?
By implementing measures of infection control & prevention

A set of scientific evidence based measures that reduce the probability of pathogens' spread in healthcare settings.

Patients

Healthcare Workers

Visitors

Equipment

Environment

Objectives of an ICP implementation

Patients' safety

Healthcare professionals' safety

Proper functionality of healthcare setting

Quality of healthcare services

Key steps to HAI infection prevention and control and patient safety

In **November 2001**, the EU Health Ministers adopted the Council Recommendation on the prudent use of antimicrobial agents in human medicine (2002/77/EC)

In **June 2009** they adopted the Council Recommendation on patient safety, including the prevention and control of healthcare associated infections (2009/C 151/01)

Institute of Medicine published **2000**

To Err Is Human: Building a Safer Health System and subsequently drew attention to preventable medical errors, including HAIs and patient safety

First National Patient Safety Goals **2003**

Prevention's Framework

What should be done

- Guidelines and evidence based practices
- International experience
- Assessment of current situation

What can be done

- Availability of resources (human & material)
- Defined of priorities based on available resources

From prevention measures to ICP implementation

USA

SENIC study 1975-1985

Basic elements of the program

1. Surveillance & feedback
2. Implementation of specific practices
3. Engagement of specialized personnel

Senic's results were crucial in establishing ICPs as necessary element of healthcare services' quality

→ 32% reduction of HAIs

ICP description

- The **PRACTICES** in your hospital for the control of HAIs & AMR
- Their **APPLICATION** in the clinical departments with the resources available (logistics, staff and research)
- The **RESULTS** of their implementation
- FUTURE **goals** & activities for improvement

The key components of ICP

Infection control Policy Dedicated personnel	Infection control guidelines	IPC training
Surveillance	Monitoring-audit of ICP practices and feedback	Workload, staffing and bed occupancy
	Multimodal strategies	

November 2016

World Health Organization

Key components of ICP at hospital level - WHO 2016

→ **Dedicated personnel (strongly recommended)**

It is critical for a functioning Infection Prevention & Control program to have dedicated, trained professionals in every acute care facility. A minimum ratio of one full-time or equivalent infection preventionist (nurse or doctor) per 250 beds should be available.

However, there was a strong opinion that a higher ratio should be considered, for example, one infection preventionist per 100 beds, due to increasing patient acuity and complexity, as well as the multiple roles and responsibilities of the modern preventionist.

Key components of ICP at hospital level - WHO 2016

→ **Surveillance (strong recommended)**

At Healthcare facility level, a facility-based HAI surveillance, including AMR surveillance, should be performed to guide IC interventions and detect outbreaks, including AMR surveillance with timely feedback of the results to healthcare workers and stakeholders and to national networks.

Key components of ICP at hospital level – WHO 2016

→ **Guidelines – Training (strong recommended)**

- Evidence-based guidelines should be developed and implemented for the purpose of reducing HAIs and AMR. Education and training on IC practices of the healthcare workers in accordance with the guidelines and recommendations and monitoring of adherence to them should be undertaken to achieve a successful implementation.
- At healthcare facility level, IC education should be in place for all healthcare workers by utilizing team- and task-based strategies that are participatory and include bedside and simulation training to reduce the risk of HAIs and AMR.

Key components of ICP at hospital level - WHO 2016

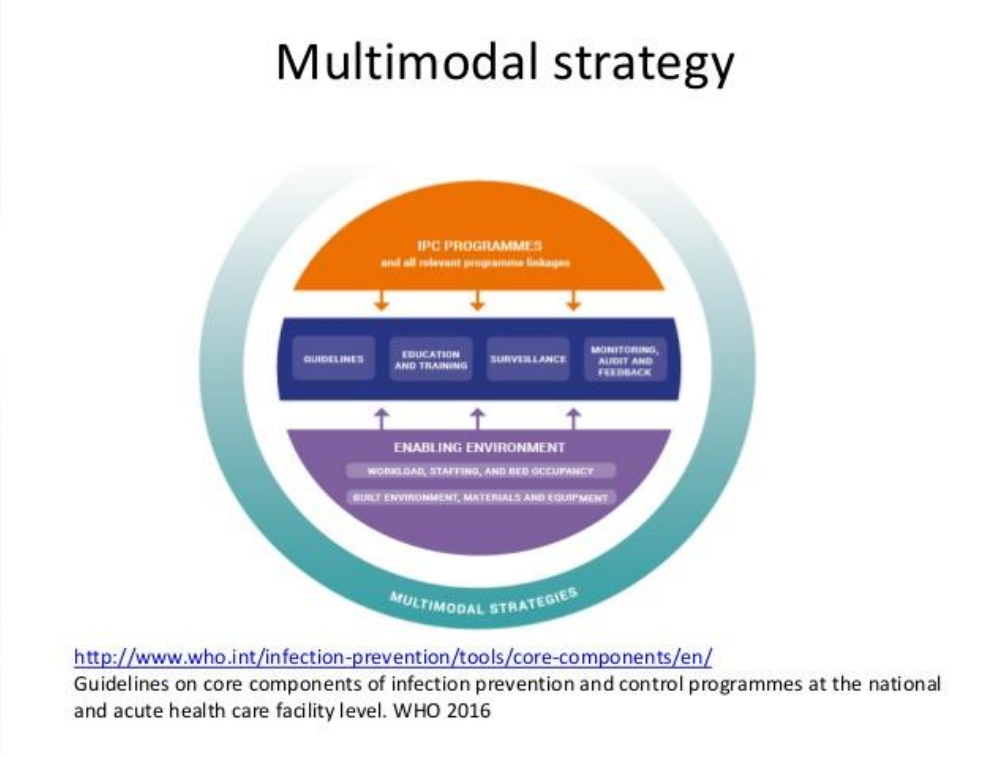
→ Monitoring /audit of IC practices (strong recommended)

At healthcare facility level, it is recommended that regular monitoring/ audit and timely feedback of health care practices according to ICP standards is performed to prevent and control HAIs and AMR.

Key components of ICP at hospital level - WHO 2016

→ Multimodal strategies (strong recommended)

- Healthcare facility level: Successful multimodal interventions should be associated with an overall organizational culture change as effective Infection Prevention & Control Program can be a reflector of quality care, a positive organizational culture and an enhanced patient safety climate.



http://www.who.int/infection-prevention/tools/core-components/en/
Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. WHO 2016

Key targets of ICP management

Human recourses

- Administration
- Dedicated personnel
- Laboratory
- Pharmacy
- Clinical wards
- Training teams
- Liaisons
- Cleaning personnel
- Technical and financial dept

Recourses

- Prioritizing the needs
- Management of the personnel and support of the critics areas
- Appropriate materials for the laboratory diagnosis of infections/ acquisition
- Electronic tools
- Materials for disinfection and sanitation
- PPE materials, gloves, masks

Procedures

- Infection Control Practises - measures
- Surveillance
- Training - Guidelines
- Audit
- Antibiotic Stewardship Program
- Communication
- Annual Infection Control Plan

Key Infection Control practises for the Prevention and Control of HAI and AMR in healthcare settings

Prevention of Transmission - Acquisition - Infection
Standard and isolation precautions – Hand Hygiene
Environmental sanitation
Active surveillance for specific pathogens

Care bundles for the HAIs prevention and control of *CRBSI, CR-UTI,VAP,SSI*

Proper use of antibiotics
Monitoring of broad spectrum antibiotic use and surgical & medical prophylaxis

Infection Control Plan -KEY steps

- Assess the current situation
- Epidemiological status

- Who can manage?
- Targets
- Plan - Activities
- Resources

- Monitoring & evaluation of the program
- Feedback to the contributed parties
- Evaluation of the progress & promote necessary changes

- What can be implemented?
- Prioritizing recourses
- Authorities and duties
- Multimodal strategies

The impact of the risk assessment

Risk assessment becomes increasingly critical in infection control with numerous results which can be summarised as follows:

- ✓Frames the problem
- ✓Ranks risks by score to determine organizational priorities
- ✓Identifies organizational areas of weakness
- ✓Assists in determining where to focus available resources
- ✓Provides basis for developing the Infection Control Plan
- ✓Identifies gaps in infection prevention measures and processes
- ✓Identifies environmental issues/concerns
- ✓Identifies organization's gaps in health and safety standards
- ✓Helps emergency preparedness (Internally and Externally)
- ✓Guides Patient Safety Goals
- ✓Represent a communication tool

What can we, as team members with the same goal of implementing effectively the ICP, do?

?

Behavioral Change

«The traditional efforts to convince the clinicians to change their behaviour, for example to comply with a protocol so as to increase healthcare services' quality, has long failed»

WHO 2009

ICP implementation:
What changes can happen in your hospital?

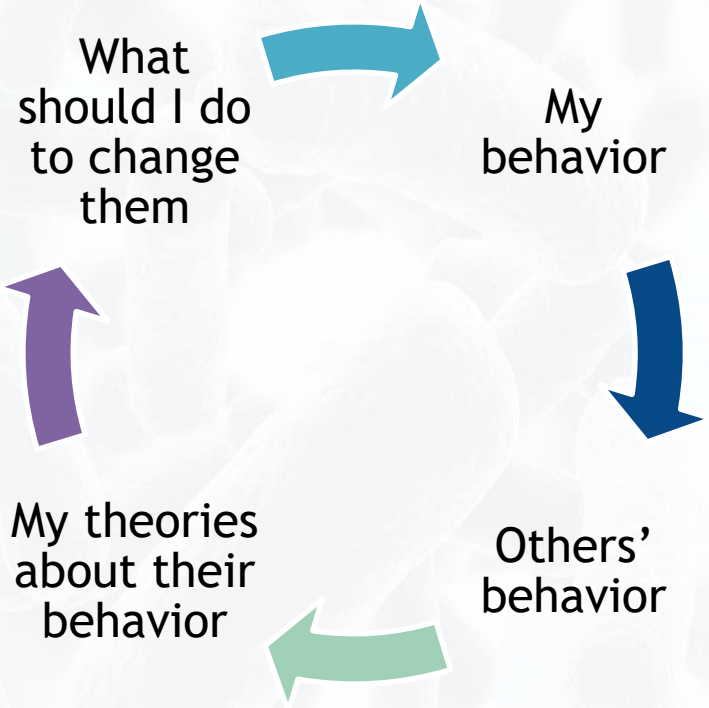
Creating organisational behaviour

Changing Healthcare professionals' behaviour

Creating safe work environment

It Seemed Like A Good Idea At The Time

Why is it difficult to change a behavior?



Observe → Intervene

✖ **Understand**

Process

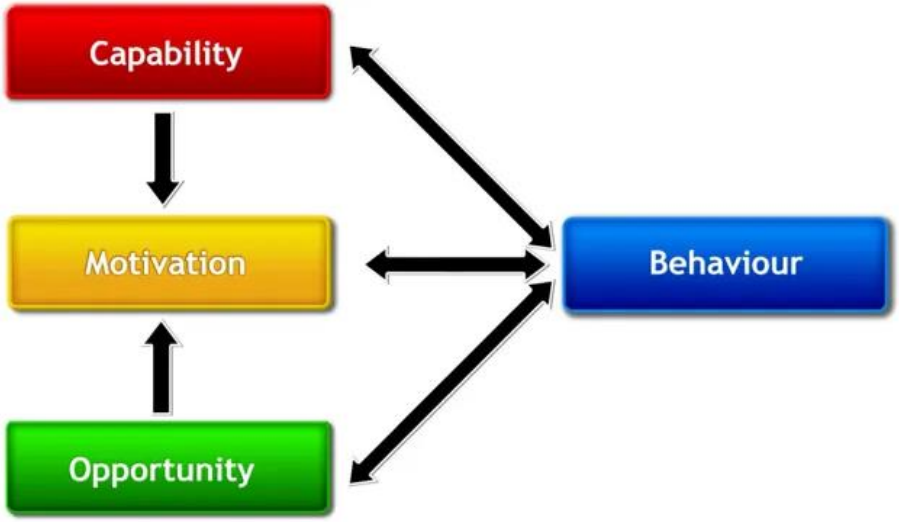
Why this behavior happened?

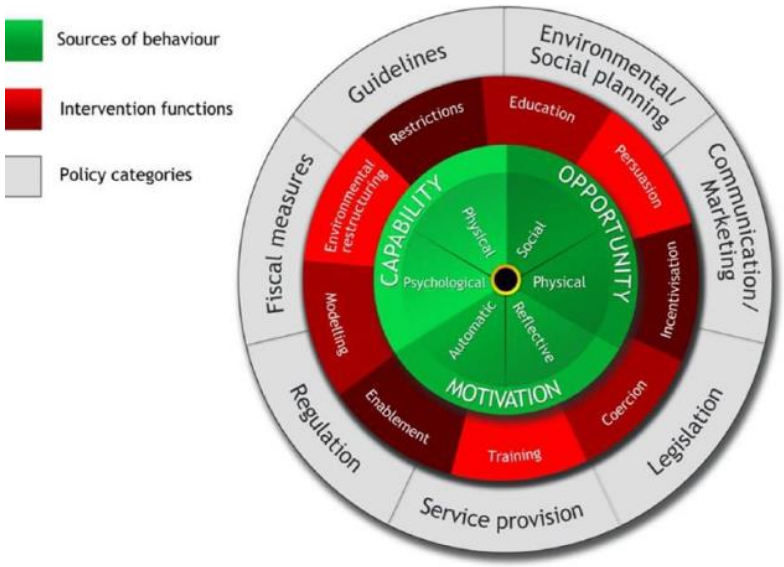
What do we need to change to achieve the desired behavior?

DIAGNOSIS

INTERVENTION

From Com-B System to Behavior Change Wheel





The COM-B system - a framework for understanding behaviour.

Michie et al. Implementation ***Science*** *2011, 6:42*

The Behavior Change Wheel: Sources of Behavior

3 Principles

1. **Capability**: know what to do + how to do it
   logical & physical ability
2. **Motivation**: to care
   reflective processes- is it worth it?
   automatic processes- emotional reactions, values, needs
3. **Opportunity**: resources
   physical components- time, money
   social environment- cultural context

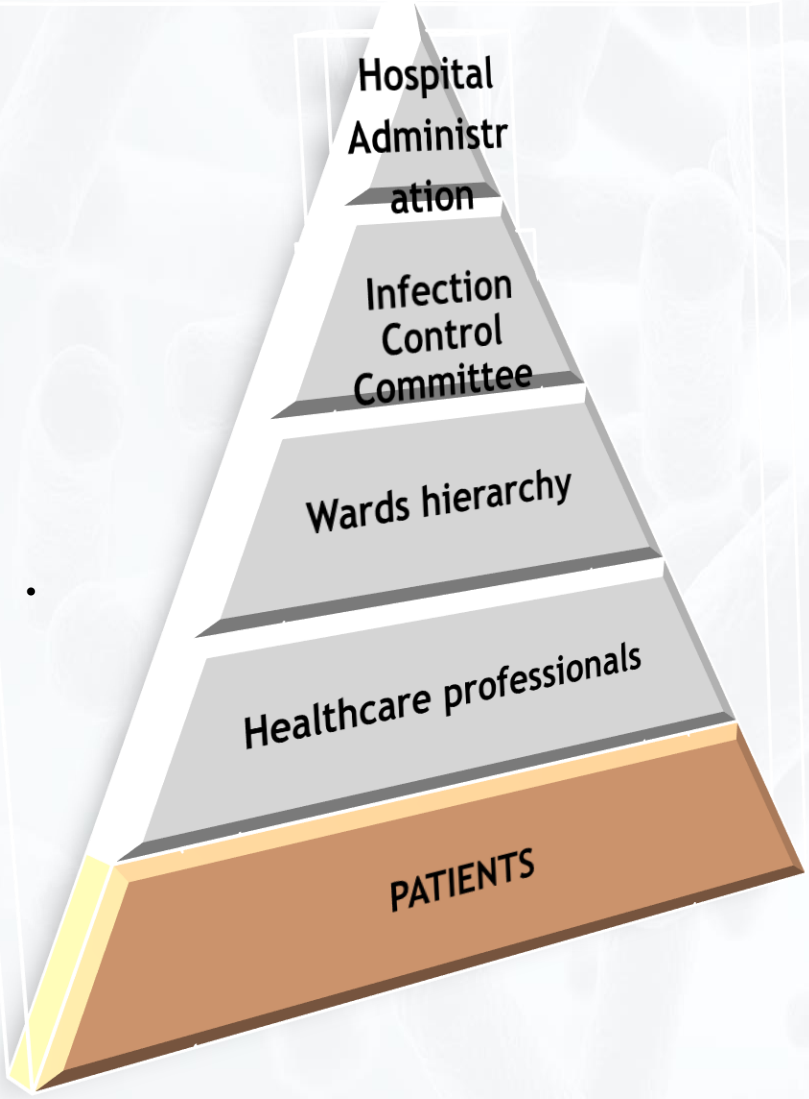
9 Intervention-Functions

Training- Coercion- Incentivization- Persuasion

Education- Regulation- Modelling- Enablement

Environmental Restructuring

- The role of cooperation between Contributed parties to ICP in a healthcare setting and the leadership



Organizational chance bundle
Holmes A. Working smarter: an organizational approach to infection prevention 2008

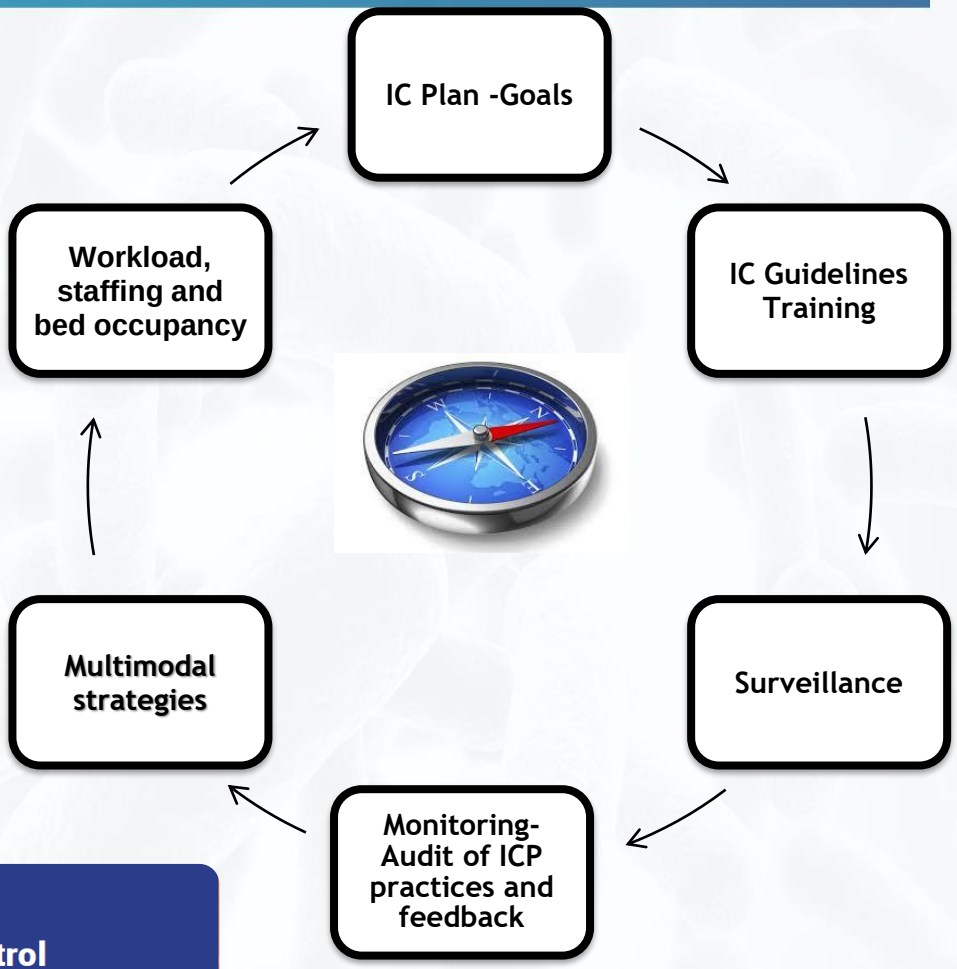
Achieving safety requires more than individual carefulness. It is a corporate responsibility. Consistent role models are key to organizational change
Lawson E, Price C. Psychology of change management.2003

Within a hospital structure leadership must come directly from the Chief Executive Officer (CEO) who must have demonstrable commitment to infection prevention and control and leadership
Kohn LT, Corrigan J, Donaldson MS. To err is human: building a safer health system (1999)

The DIPC leads and champions infection prevention and control at multiple levels within the organization, ensuring that a consistent message is embedded in directorates, groups, teams, and networks.
Lawson E, Price C. Psychology of change management (2003)

Infection Control Behavior

Successful multimodal interventions should be associated with an overall **organizational culture change** as effective IPC can be a reflector of **quality care**, **a positive organizational culture** and an enhanced **patient safety climate**.

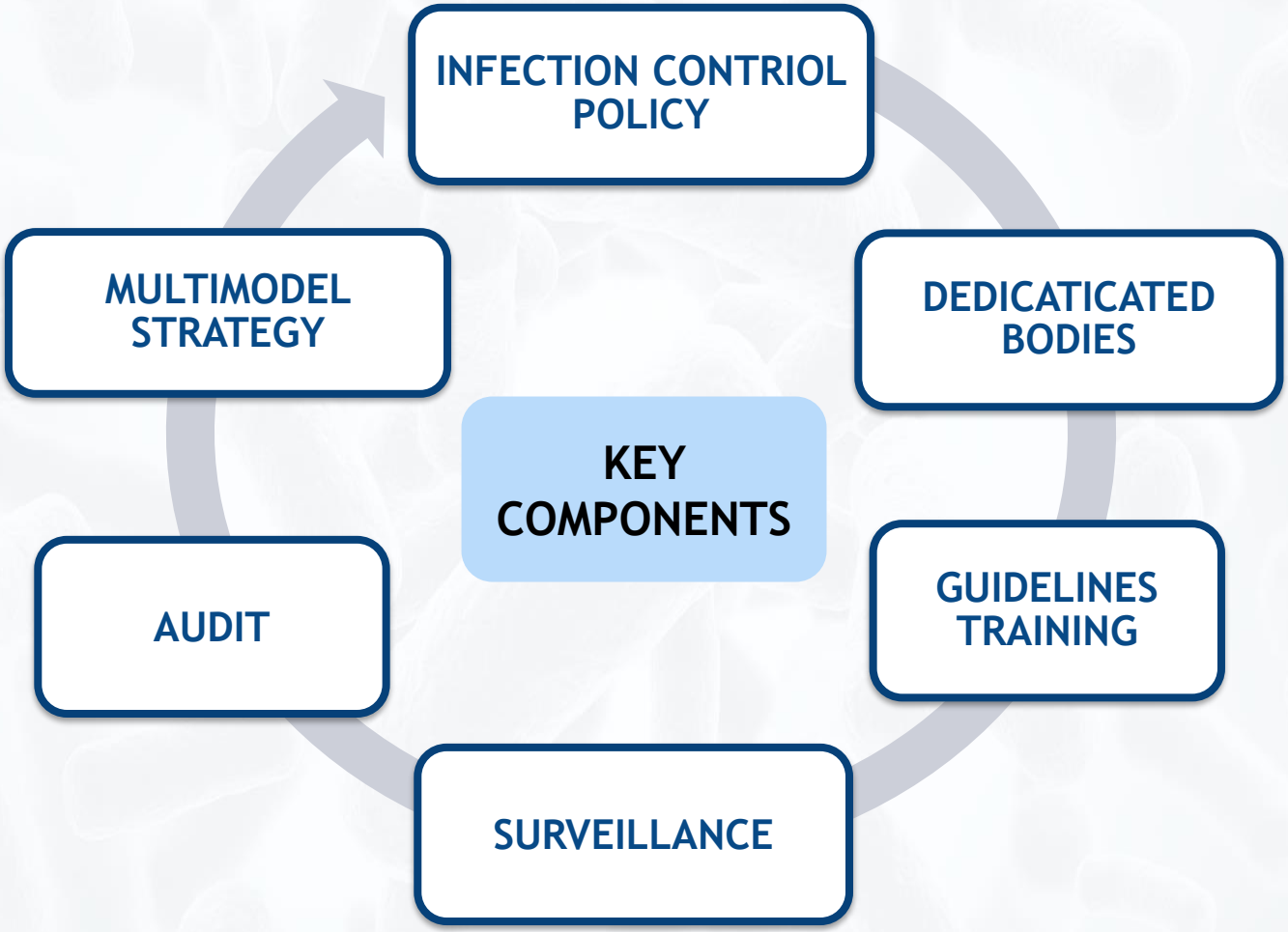


Guidelines on Core Components of Infection Prevention and Control Programmes at the National and Acute Health Care Facility Level

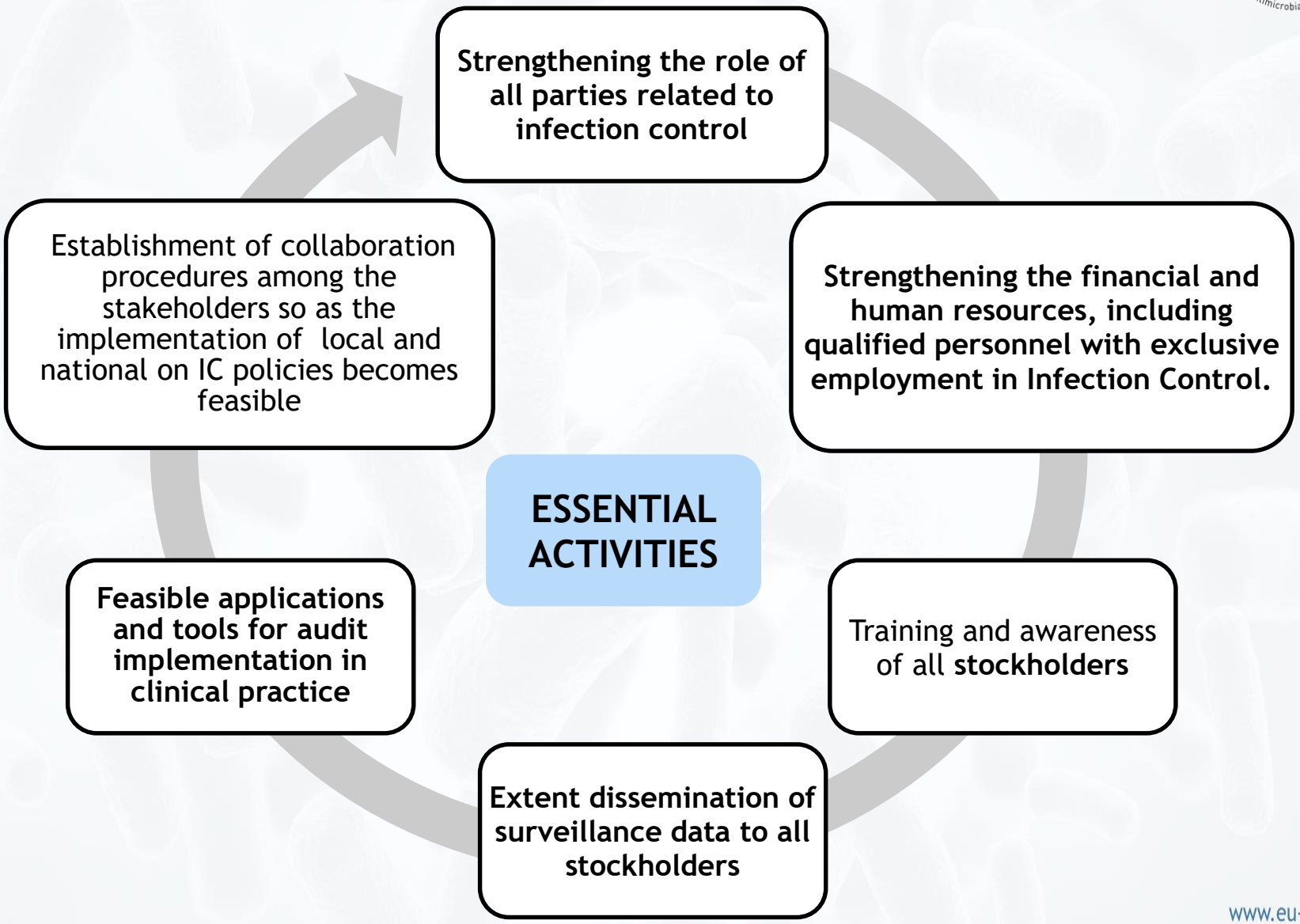
World Health Organization

November 2016

How can an organization built a program?



How an organization can built an IPC culture?



Which factors are critical for the effective ICP implementation?

Contribution of **administration**

Existence of **dedicated trained** personnel

Clear authorities & duties of contributed parties

Existence of **communication** and **collaboration** procedures

Hospital's Administration Intervention: Effective contribution to ICP's implementation

Healthcare administrator involvement in infection control processes can improve administrators' awareness of the rationale and resource requirements for following recommended infection control practices.

CDC Guidelines 2007

Infection preventionists must work together with hospital leadership to improve patient outcomes and improve the financial health of the organization.

Basic intervention elements of Hospital Administration according to recent bibliography

1. Specialised personnel dedicated in HAIs prevention
2. Sufficient personnel to accommodate patients' needs (bedside nurses)
3. Microbiology lab equipped for timely & correct diagnosis of pathogens & AMR Surveillance
4. Materials and technological equipment
5. Risk Assessment and management of conditions contributing to pathogens transmission or blocking the implementation of control and prevention measures
6. Sharing and evaluating surveillance data to department's supervisors as well as all healthcare personnel

CDC 2007 Isolation Precautions

Infection Control Policy: Institutional bodies

Having a specialized professional or group working on IC in hospitals is a crucial factor for an effective ICP implementation.

This organizational body should have specific authorities aiming at promoting all the appropriate interventions needed for HAI prevention and control.

STRENGTHENING THE ROLE & THE CONTRIBUTION OF ALL PARTIES RELATED TO INFECTION CONTROL

Main activities at hospital level

CHECK LIST	
Establish an IC policy with goals	✓
Determine roles and responsibilities	✓
Involve the hierarchy to the ICP implementation	✓
Engage all the professionals to Patient Safety	✓
Develop a safer work environment for the HCWs	✓

INFORMATION-AWARENESS-TRAINING

Implementing an effective ICP requires continuous education and training of healthcare professionals.

Training of healthcare workers at any level on evidence-based IC practices should be based on national and regional guidelines and be established as a priority of national and hospital policy.

STRENGTHENING THE TRAINING OF ALL CONTRIBUTED PARTIES BASED ON NATIONAL & LOCAL GUIDELINES

Main activities at hospital level

CHECK LIST	
Dedicated training team	✓
Annual training program	✓
Guidelines	✓
Multimodal training methods	✓
Training of all the hospital personnel	✓
Evaluation of training effectiveness	✓

COMMUNICATION-COOPERATION

The communication and cooperation among the parties of the IC Pyramid (PH authorities, HA, ICCs & clinicians) is an important condition for an effective ICP implementation.

It reflects the organizational culture regarding the promotion of IC implementation in clinical practice and the dynamic environment into all these activities aiming at the sustainability of an ICP.

Also, it reflects the capability of any healthcare system to support multimodal and multisector strategies in order to promote the effective implementation of the national policy.

ESSENTIAL ACTIVITIES

GOALS	ESSENTIAL ACTIVITIES
Development of communication & collaboration channels	Establishment of formal procedures of communication and reporting among all parties and all clinical departments
	Promote the quality improvement of communication between interested parties for increasing individual, team and organizational ICP performance
Promote leadership & role models	Develop an organizational vision
	Reveal professionals with leadership skills and attitudes and inspire, encourage, and motivate them to lead
	Keep leaders close and in regular contact with clinical teams in wards and units
Foster Team work	Promote clear and known roles and tasks for team members in a respectful atmosphere and shared responsibility for team success
	Foster Team work regular and routine communication and information sharing
	Provide an enabling environment, including access to resources needed

Main activities at hospital level

CHECK LIST	
Formal procedure of collaboration communication - communication channels	✓
Awareness of the importance of adequate and timely communication	✓
Promotion of leadership	✓
Development of proper environment for team work promotion	✓
Evaluation of multidiscipline collaboration schemes	✓
Evaluation of training effectiveness	✓

SURVEILLANCE

Surveillance is the main tool for the ICP implementation. Infection surveillance data is used to measure the progress of infection prevention and control programs, to identify areas for improvement, and to identify events of major importance for public health.

The success of surveillance depends not only on establishing a reliable system responding to national and local needs, but also on promoting the awareness and activation of all the stakeholders and contributed parties through the proper dissemination of the surveillance data.

STREGHENING THE FEEDBACK TO ALL PARTIES AND THE EXTENT DISSEMINATION OF SURVEILLANCE DATA

BASIC PRINCIPLES FOR A FUNCTIONAL & EFFECTIVE SURVEILLANCE SYSTEM

- Linking Surveillance indicators and ICP goals
- Training and raising awareness of surveillance system's users
- Using new, handy surveillance tools
- Having comparable data according to national and international standards
- Management of surveillance data

Essential Activities for establishing a functional surveillance system at hospital level

GOALS	ESSENTIAL ACTIVITIES
Data Production	Linking Surveillance indicators and ICP goals
	Production of comparable data according to national & international standards
	Using new, handy surveillance tools
Functionality	Healthcare personnel's participation in surveillance process
	Access and use of surveillance data
Data Management	Training & awareness of users
	Evaluation of Surveillance system

Main activities at hospital level

CHECK LIST	
Establish of a functional surveillance system	✓
Aware the clinicians for the significance of surveillance in clinical practice	✓
Disseminate the information to all interested parties	✓
Ensure that they have understand the messages	✓
Use surveillance data for evaluation of implemented interventions	✓

Evaluation of IC Policy

The aim of auditing IC practices and feedback is to evaluate the effectiveness of implemented practices and guiding to appropriate changes for the achievement of ICP targets.

In order to achieve behavioural change and improvement of adherence to IC measures, feedback to all interested parties in IC pyramid should also be part of healthcare personnel training.

An effective process for auditing the ICP implementation should be developed as a key component for patients' safety.

STEIGHNING THE ESTABLISHMENT OF A FEASABLE AUDIT STRATEGY FOR IC PRACTICES AND ICP IMPLEMENTATION

Main activities at hospital level

CHECK LIST	
Dedicated auditing team	✓
Annual auditing plan	✓
HCWs awareness to the audit importance	✓
Evaluation of audit results and intervention planning	✓
Dissemination of audit results	✓

RESOURCES

The cost- benefit of HAIs prevention activities is an area of concern for all healthcare systems, and especially HAs who are responsible for the allocation of financial resources of their facilities.

Nevertheless, HAIs' costs is a quite complex issue which usually is not regarded by HAS resulting in misunderstanding the importance and leading to inadequate ICP funding.

NECESSARY RESOURCES FOR AN EFFECIVE ICP IMPLEMENTATION

NECESSARY RESOURCES FOR AN EFFECIVE ICP IMPLEMENTATION

- ✓ DEDICATED SPECIALIZED PERSONNEL
- ✓ TRAINING AND EDUCATION

- ✓ MICROBIOLOGY TESTS AND EQUIPMENT
- ✓ SUFFICIENCY AND QUALITY OF THE CONSUMABLES
- ✓ ADMINISTRATIVE SUPPORT

- ✓ ELECTRONIC SURVEILLANCE SYSTEMS
- ✓ INVESTMENT IN BUILDINGS, CAPITAL EQUIPMENT, AND INFRASTRUCTURE

3. SUCCESFUL STORIES

Implementing an infection control and prevention program decreases theincidence of healthcare-associated infections and antibiotic resistance in a Russian neuro-ICU

A prospective observational cohort study lasted from 2011 to 2016 and 2038 high-risk patients were included

A pioneering IPC program was implemented in a neuro-ICU included:

- hand hygiene compliance
- surveillance
- contact precautions
- patient isolation
- environmental cleaning measures

Antimicrobial Resistance and Infection Control (2018)

Main results

1. HAI cumulative incidence decreased significantly for respiratory HAIs (36.1% vs. 24.5%, *p*-value = 0.0003), urinary-tract HAIs (29.1% vs. 21.3%, p-value = 0.0006), and healthcare-associated ventriculitis and meningitis (HAVM) (16% vs. 7.8%, p-value = 0.004)
2. The incidence rate of EVD-related HAVM dropped from 22.2 to 13.5 cases per 1000 EVD-days.
3. The proportion of invasive isolates of *Klebsiella pneumoniae* and *Acinetobacter baumannii* resistant to carbapenems decreased 1.7 and 2 fold, respectively.
4. HAVM significantly impaired survival and independently increasing the probability of death by 1.43.

Ershova et al. Antimicrobial Resistance and Infection Control (2018) 7:94
https://doi.org/10.1186/s13756-018-0383-4

SUCCESFUL STORIES

A decade of investment in infection prevention: A cost-effectiveness analysis

The study reviewed the literature on HAIs and modeled life years gained and cost savings realized due to infection prevention programs.
This study estimated that 15 life years were gained per ICU due to infection programs and ICU costs were reduced by $174,000 for central line-associated bloodstream infections and $160,000 for ventilator-associated pneumonia.

Multifaceted HAI prevention programs are cost-effective. The results underscore the importance of maintaining ongoing investments in HAI prevention. The welfare benefits implied by the advantageous ICERs would be lost if the investments were suspended.

Am J Infect Control (2015)

Key points

- The development and implementation of ICP should be a priority of hospital policy
- ICP has to be based on the initial assessment of the current situation and the needs of the organization and all the available resources
- The hierarchy of the organization has to be contributed actively promoting the appropriate culture of safety and teamwork
- Each of the key components of ICP need to be communicated in such way that promote the behavour change of health professionals aiming to the sustainability of the action

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Infection Control is a Teamwork!

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Co-funded by the
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of the European Union

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The cost effectiveness of ICP

What should Hospital's Administrators know?

Introduction

→ Healthcare-associated infections (HAIs) are defined as infections that occur after exposure to healthcare, that are neither present nor incubating when a patient enters hospital.

→ They developed in a hospital or other health care facility 48 hours or more after hospital admission, or within 30 days after having received health care.

The truth is that .....

NO health-care facility,

NO country,

NO health-care system

in the world

is free of this major public health problem

The burden of HAIs- Incidence of HAIs

- ✓ Hundreds of millions of patients are affected by health care-associated infections worldwide each year, leading to significant morbidity, and mortality
  - Developed world: 5–10% patients
  - Developing countries: risk is at least 2 times higher and can exceed 25%
  - ICU - 30% patients; attributable mortality as high as 44%
- ✓ Major threat to patient safety as it is the most frequent adverse event in health-care delivery worldwide

The challenges for infection control (IC) in the 21st century are enormous:

- Patients more informed than ever
- Evolution to benchmarking in healthcare settings
- Lack of compensation for specific infections (hai)as they are concidered potential predictable events
- Increasing pressure for public surveillance reporting
- Simplistic approaches are not effective against some complex problems such as antimicrobial resistance
- Other innovative methods that apply concepts from other areas such as quality control and behavioral sciences prove to be more effective in achieving compliance improvements in appropriate practices

In the era of quality of care and patient safety

- Hospital Administrators are not able to devote sufficient resources to IC programs
  - Possible deterioration in some countries as a result of the economic crisis
- Beyond their negative impact on morbidity and mortality, there are significant economic consequences -financial losses on the nation's healthcare system
- Although more research is needed in this area there is no doubt that investment in prevention is cost effective

Hansen et al., ID Week, 2012, Abstract 37186, Martinet al., 21st ECCMID, 2011, Abstract P1313

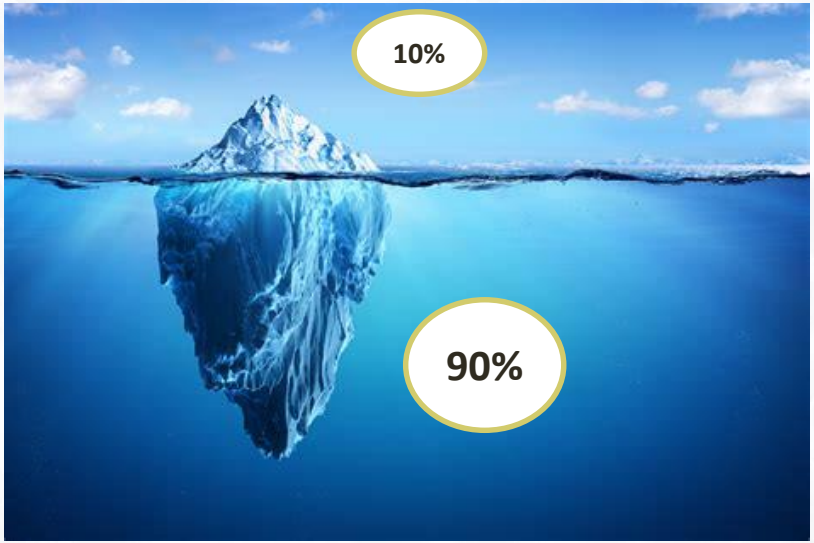
The economic burden

- Treating a hospital acquired infection imposes an additional burden on the hospital and may also result in additional costs to general practitioners, district nursing services, additional length of stay and a range of other healthcare and community services.
- The annual national direct medical costs:
  - EU: 7 billion EUR
  - USA:$28.4 to $33.8 billion
  - NHS : £1 billion each year

Economic Dimension of HAIs

- It is a broader concept of hospital costs because it includes socio-cultural and environmental impacts with economic feedback
- The Iceberg Theory

Direct cost



Indirect cost or Hidden cost

The Social Costs of Hospital- Associated Infections

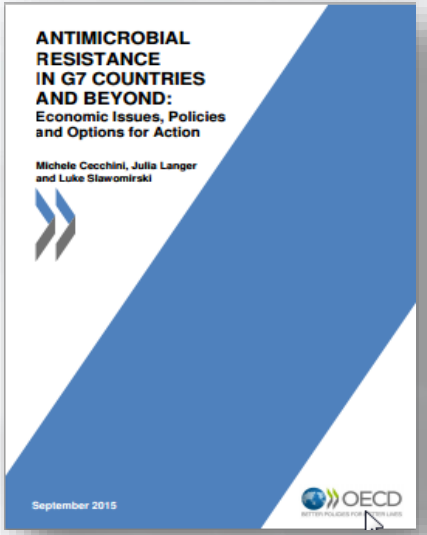
Table 1: The Social Costs of Hospital-Associated Infections

Categories of Cost*		
Direct Hospital Costs	Fixed Costs	Buildings Utilities Equipment/Technology Labor (laundry, environmental control, administration)
	Variable Cost:	Medications Food Consultations Treatments Procedures Devices Testing (laboratory and radiographic) Supplies
Indirect Costs	Lost/Wages Diminished worker productivity on the job Short term and long term morbidity Mortality Income lost by family members Forgone leisure time Time spent by family/friends for hospital visits, travel costs, home care	Disability - pensions (allowances / pensions)
Intangible Cost	Psychological Costs (i.e., anxiety, grief, disability, job loss) Pain and suffering Change in social functioning/daily activities	Loss of social capital Negative nursing predisposition

The Direct Medical costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention,R. Douglas Scott II, Economist, 2009

Indirect medical cost of antimicrobial resistance

- ✓ In 2000 US population, lost $ 35 billion (0.35% of National GDP,) due to loss of productivity and early deaths
- ✓ In 2007, according to ECDC, European population lost 600 million EUR due to productivity loss



Michele Cecchini et al.,Antimicrobial Resistance in G7 Countries and Beyond:Economic Issues, Policies and Options for Action, OECD 2015

Predictions for antimicrobial resistance are rather ominous!!!

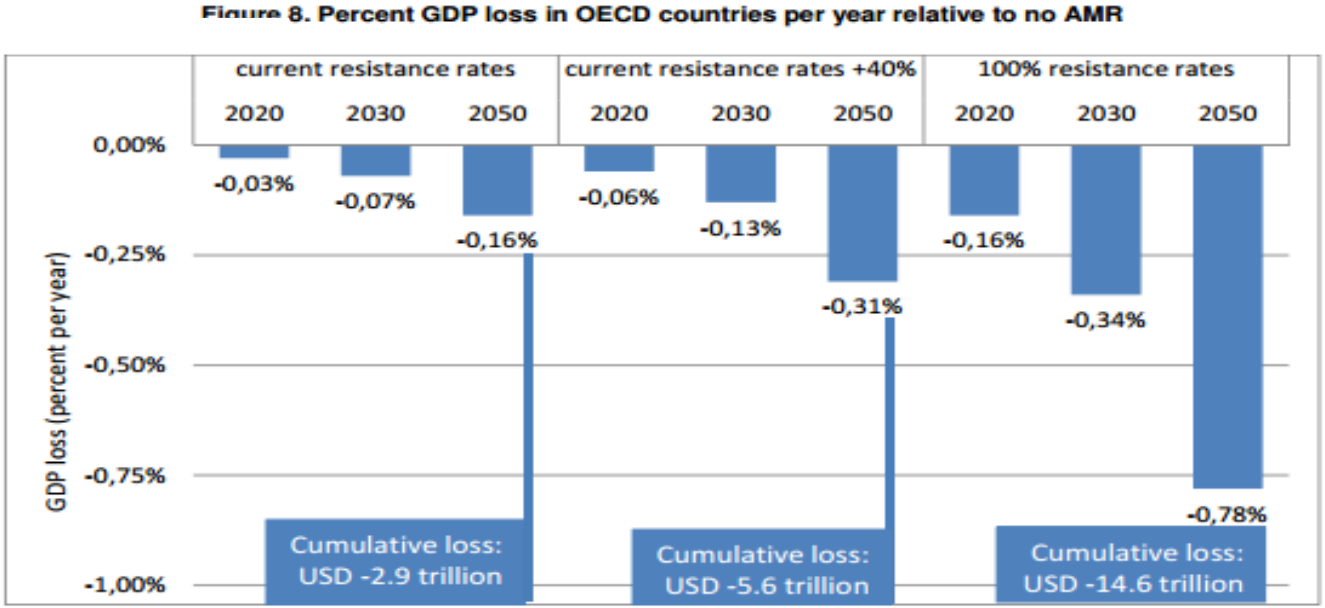


Figure 8. Percent GDP loss in OECD countries per year relative to no AMR

Source: Taylor et al., 2014

Economic Dimensions

- National economy
- Budgetary balance
- Social security system
- Health-spending system
- Pharmaceutical industry - inefficiency

- Hospital
- Business-production
- Person-loss of income-loss of profit
- Family carers
- Research
- Human resource

We have measured the problem, now we have to solve it

BUSINESS CASE STUDY

For Infection Control

Because →

- We need resources for an effective infection prevention and control program
- We are interested in the viability of our healthcare settings
- Possibly the third party (insurer) will not pay in the future for potentially predictable events

As a rule...

A business case has to articulate a clear path to an attractive return on investment

Prerequisites for the initial Business Plan

- Number and type of HAIs over a period of time (in hospital)
- Attributable Costs for each type (from the hospital or literature)
- Type of Payor (Payor mix)
- List of those who will not be compensated

- Expenditure on staff
- Expenditure on equipment (computers,copiers etc)
- Software programs
- Capital equipment and infrastructure
- Supplies
- Communication
- Education
- Risk assessment

Before the decision making for an IC investment we need to know

- What is the cost of a given disease/condition (e.x CLABSI, SSI etc)?
- What is the cost of a given intervention?
- How does benefits provided by this intervention relates to its costs?

Funding infection control activities

"While society would benefit from a reduced incidence of nosocomial infections, there is currently no direct reimbursement to hospitals for the purpose of infection control, which forces healthcare institutions to make economic decisions about funding infection control activities. Demonstrating value to administrators is an increasingly important function of the hospital epidemiologist because healthcare executives are faced with many demands and shrinking budgets."

Eli N. Perencevich et al.Raising Standards While Watching the Bottom Line: Making a Business Case for Infection Control,Infect Control Hosp Epidemiol 2007; 28:1121-1133

We have to be prepared that …

- Infection Control Programs are not revenue producers
- IC programs cost
- The basis / issue for adopting a Business Plan for the prevention and control of Infections is to prove its effectiveness

- An IC program should save more money than the cost to finance it

AND..

this financial return on investment comes in a reasonable amount of time.

WHILE

reasonable profit can be achieved through profit, loss reduction, or cost avoidance.

How can we assess the cost and additional length of stay (LOS) of healthcare care associated infections considering the following priority infection sites?

- Surgical site infections (SSI)
- Catheter associated urinary tract infections (CA-UTI)
- Ventilator associated pneumonia (VAP)
- Central line associated bloodstream infection (CVC-BSI)

By using……..

- Our own cost estimates / metrics for the management of α specific category of healthcare care associated infection

- Data from researchers cost studies

Average attributable cost per patient and per category of infection

Infection site	Low Estimate of average attributable Costs ($ base year)	High Estimate of average attributable Costs ($ base year)	Low estimate adjusted to 2007 $ using CPI-U	High estimate adjusted to 2007 $ using CPI-U	Adjusted to 2007 $ using CPI for Inpatient Hospital Services	Adjusted to 2007 $ using CPI for Inpatient Hospital Services
SSI	$10,443[18] (2005)	$25,546[3] (2002)	$11,087	$29,443	$11,874	$34,670
CLABSI	$ 5,734[19] (2003)	$22,939[19] (2003)	$ 6,461	$25,849	$ 7,288	$29,156
VAP	$11,897[20] (1999)	$25,072[18] (2005)	$14,806	$27,520	$19,633	$28,508
CAUTI	$ 589[21] (1998)	$ 758[18] (2002)	$ 749	$ 832	$ 862	$ 1,007
CDI	$ 5,042[22] (2003)	$ 7,179[22] (2003)	$ 5,682	$ 8,090	$ 6,408	$ 9,124

The Direct Medical costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention,R. Douglas Scott II, Economist, 2009

Estimation of attributable costs

Table 1. Estimates of Costs and LOS Attributed to the 5 Major Health Care–Associated Infections for the US Adult Inpatient Population at Acute Care Hospitals[a]

Health Care–Associated Infection Type	Cost, 2012 $US	LOS (as Total, ICU), d
Surgical site infections	20 785 (18 902-22 667)[b]	11.2 (10.5-11.9)[b]
MRSA	42 300 (4005-82 670)[b]	23.0 (14.3-31.7)[b]
Central line-associated bloodstream infections	45 814 (30 919-65 245)[b,c]	10.4, 6.9 (6.9-15.2, 3.5-9.6)[b,c]
MRSA	58 614 (16 760-174 755)[c]	15.7 (7.9-36.5)[c]
Catheter-associated urinary tract infections	896 (603-1189)[b]	NR
Ventilator-associated pneumonia	40 144 (36 286-44 220)[b,c]	13.1, 8.4 (11.9-14.3, 7.8-9.0)[b,c]
Clostridium difficile infections	11 285 (9118-13 574)[b]	3.3 (2.7-3.8)[b]

Systematic review
2319 articles
(1986 - 2013)

"Health Care–Associated Infections-A Meta-analysis of Costs and Financial Impact on the US Health Care System"
Eyal Zimlichman, & al., Original Investigation, 2040 JAMA Internal Medicine December 9/23, 2013 Volume 173, Number 22

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY JANUARY 2009, VOL. 30, NO. 1

ORIGINAL ARTICLE

Incidence Rate and Variable Cost of Nosocomial Infections in Different Types of Intensive Care Units

Yin-Yin Chen, RN, PhD; Fu-Der Wang, MD; Cheng-Yi Liu, MD; Pesus Chou, DrPH

Duration of research: 2years (2003 – 2005)

401 infections were recorded in 320 of the 2,757 patients monitored

ICU	incidence NI (%)	cost	increase in average variable cost
Internal ICU	**12.1**	**$13,456 BSI, VAP**	**3.52**
surgical ICU	**14.7**	**$ 5,433**	**2.46**
mixed ICU	**16.7**	**$ 6.748**	**2.74**
BSI: $6.056 > RTI: $ 4,287 > UTI: $ 1.955 > SSI: $ 1.051			

Estimated COST benefit of preventing infections

	Range of Estimates (billions $)	20% of infections preventable (billions $)	50% of infections preventable (billions)	70% of infections preventable (billions)
2007 CPI-U	$28.4 - $33.8	$5.7 - $6.8	$14.2 - $16.9	$19.9 - $23.7
2007 CPI hospital inpatient services	$35.7 - $45.0	$7.1 - $9.0	$17.9 - $22.5	$25.0 - $31.5

The Direct Medical costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention,R. Douglas Scott II, Economist, 2009

Do we estimating the cost correctly?

- If, for example, the cost of an infection is € 20,000,

  → the hospital does not lose or earn € 20,000

- A certain percentage of this cost is covered

<u>The attributable costs for the hospital result from this difference</u>

Estimating the Cost of HAIs: Mind your p's & q's

Cost studies estimate the gross cost which is really high and far exceeds the amount of expenditure required for the program.

These create ……

increased expectations for decision makers

In order to fully evaluate an infection control strategy, accurate estimates are required as:

- the additional costs required to implement the strategy,
- the cost to be saved from the anticipated number of infections to be avoided
- clinical outcomes and health benefits

Estimating the cost correctly

- The main cost of an infection is the extra hospital stay

- Problematic seems to be the method used to recover the monetary value of lost days of hospitalization, which is often based on costing practices rather than financial principles.

Graves N et al.,Estimating the cost of health care-associated infections: mind your p's and q's,Clin Infect Dis. 2010

We need to focus…

The marginal number of days of hospitalization and other resources released as well as the cash saved from the variable costs

WHY?

- Because, the limiting number of days released from infection control can have a positive financial value in the next best alternative use **(Opportunity Cost)**.
- They can be used to increase productivity and treat more patients.

Graves N et al.,Estimating the cost of health care-associated infections: mind your p's and q's, Clin Infect Dis. 2010

Measurement HAIs cost

$$(q)*(p)+VC$$

(q): The number of bed-days lost to a case of HAI

(p): *A* positive economic value or price *(a certain price that someone- patient, insurance company, health care system- is willing to pay to access the marginal bed-day)*

(Variable Cost): *Cost of consumable items used to treat the infection and personel fees*

SUCCESSFUL EFFORTS

Example 1

Cost-benefit analysis (in Canadian $) was used to evaluate the effectiveness of a regional IPC program in preventing incident cases of HAIs. The costs of managing these infections, as well as the operational costs of the IPC program were compared against reductions in HAI rates over a 4-year period. Benefits were calculated as cost avoided by reducing HAI cases year over year.

$66.3m was spent to manage 24,937 infections over a 4 year period.

A 19% decrease (4,739) resulted in a $9.1m avoidance in 4 years

The operating cost for the IC program for this period was $6.7m.

Benefit from avoiding costs by reducing infections $2.4m.

Health economic evaluation of an infection prevention and control program: are quality and patient safety programs worth the investment?
Raschka et al. Am J Infect Control. 2013

Example 2

650 Bed Hospital Oncology Unit

Prevention Strategic Cost (15 Interventions) for one year: $ 116,515

Cost of VRE bacteraemia avoided (LOS: 13.7 Days):	$123,081
Cost of fewer VRE colonisations:	$2,755
Reductions in antibiotic use:	$179,997 +
Total cost avoided	$305,833

Net benefit for the year: $189,318

Infect Control Hosp Epidemiol. 2001 Jul;22(7):437-42.
Costs and savings associated with infection control measures that reduced transmission of vancomycin-resistant enterococci in an endemic setting.

Example 3

- **Twenty-eight community hospitals in the southeastern region of the United States.**
- Hospitals budgeted a median of $129,000 (IQR, $92,500-$200,000) for infection control
- The median annual cost of HAIs was 4.6 (IQR, 3.4-8.0) times the amount budgeted for infection control.

Infect Control Hosp Epidemiol. 2007 Jul;28(7):767-73. Epub 2007 May 31.
Under resourced hospital infection control and prevention programs: penny wise, pound foolish?

Critical components for an effective ICP

1. Organisation of infection control at hospital level
2. Ward occupancy and workload
3. Materials, equipment, and ergonomics
4. Use of guidelines, education, and training
5. Team-oriented and task-oriented education and training
6. Standardisation of audits
7. Prospective surveillance, feedback, and networks
8. Development of multimodal strategies and tools
9. Identification and engagement of strategy champions
10. Creating a positive organisational culture

Hospital organisation, management, and structure for prevention of health-care-associated infection: a systematic review and expert consensusZingg W et al.Lancet Infect Dis. 2015Link: http://www.thelancet.com/pdfs/journals/laninf/PIIS1473-3099(14)70854-0.pdf

How to measure the profitability of an investment in a social level

According to...

Extrawelfarist view of economics: to maximize the

amount of health

gained from a defined pot of scarce resources

“biggest bang for your buck”

Health benefits ↓

Cost ↓

Extrawelfarist approach

Health benefits

QALYs

quality-adjusted life-years

The number of QALYs gained from infection
control demonstrate improved quality of care, because lives are saved and events that reduce the quality of life for hospital patients are avoided

Cost

Monetary terms

(Additional costs to implement the strategy, the anticipated benefit of infections avoided)

The extrawelfarist decision rule can be written as:

$$\frac{\Delta C}{\Delta E} < \lambda$$

ΔC : *the total dollar costs under a new intervention less the total dollar costs for the existing practice*

ΔE : *the change in health outcomes that arises from a decision to invest in a new health intervention (*QALYs after intervention – QALYs before intervention)

λ : *The maximum willingness of a society to pay for any QALY*. The value varies and is influenced by the principles of equity and fairness

Other methods

Cost-effectiveness analysis. Cost-effectiveness analysis compares interventions or products that have different costs and different levels of effectiveness. The benefits of an intervention are measured, such as the number of lives saved or infections prevented. Programs are then compared in terms of cost per unit (e.g., dollars per life-year gained or dollars per infection prevented).

Cost-utility analysis. The benefits of a specific intervention are adjusted by health preference scores or are utility weighted. In this type of analysis, programs are compared in terms of quality-adjusted life-years (QALYs) gained.

Cost-benefit analysis. One in which all aspects of the analysis, including the consequences of the intervention, are valued in monetary or dollar terms. If an intervention's benefits measured in dollars exceed its costs, then this analysis considers it worthwhile. The major impediment to the use of cost-benefit analysis in healthcare decision making is the requirement to set a monetary value on human life or health benefits.

Drummond MF, Sculpher MJ, Torrance GW, O'Brien BJ, Stoddart GL. *Methods for the Economic Evaluation of Health Care Programmes.* 7th ed. Oxford: Oxford University Press; 2005.

Which element is really frustrating ?

Comparison of cost-effectiveness of representative preventive medical practices in comparison with infection control programs

Intervention	Estimated cost/y of life saved (inflation adjusted to 1999 dollars)
Papanicolaou smears every 2 y	$650,000*
Papanicolaou smears every 3 y	$20,500*
Mammograms yearly between ages 40-49 y	$208,000*
Mammograms yearly between ages 50-65 y	$130,000*
Cholesterol reduction in high-risk persons ≥ 40	$32,500*
Infection control program	$2000-$8000†

*Data from Russell.[6]
†Data from Wenzel.[7]

Victoria J.et al.,The business of health care epidemiology: Creating a vision for service excellence *AJIC: 30:2, April 2002*

We have to change this.....the proofs already exist

Total LifeYears (LY) and QALYs gained per ICU due to ICP

- A cohort of 17,537 elderly Medicare patients admitted to 31 hospitals during 2002 with clinical data about HAI(NNIS)
- Assessment of long-term health outcomes and health care utilization attributable to HAIs using five years of Medicare data

Health benefits

15.55 LY and 9.61 QALY for CLABSI

10.84 LY and 6.55 QALY for VAP

Reductions in index admission ICU costs

$174,713.09 for CLABSI

$163,090.54 for VAP

The incremental cost-effectiveness ratios (ICERs)

$14,250.74 per LY gained

$23,277.86 per QALY gained

Dick et al.,A decade of investment in infection prevention: A cost effectiveness analysis,Am J Infect Control. 2015 January ; 43(1): 4–9. doi:10.1016/j.ajic.2014.07.014.

AREAS FOR IMPROVEMENT & ESSENTIAL ACTIVITIES

DEDICATED SPECIALIZED PERSONNEL

- At least one member should be dedicated to IC prevention in a full time basis. The best ratio of the number of infection control nurses must be one to every 100 beds.
- A consultant infection control doctor should also be dedicated to IC prevention always after assessment of the size of the hospital, casemix, throughput and the need to provide 24 hour cover.

TRAINING AND EDUCATION

Implementing an effective ICP requires continuous education and training:

- The cost of training of healthcare professionals must be part of the budget and must include all available educational aids, videos, posters etc.

- Training and education of IC team members is crucial so, provision of books, subscriptions to international journals, participation in international conferences and seminars are expenditures that must be considered as profitable investment.

MICROBIOLOGY TESTS AND EQUIPMENT

- Infection control activities and thus HAIs' prevention demand strongly participation of the laboratory in AMR monitoring, early detection of HAIs' outbreaks, screening for multi-resistant organisms etc.

- Tests, Molecular diagnostics techniques should be available resources in order to help clinicians to prudent use of antibiotics and treatment of infections.

SUFFICIENCY AND QUALITY OF CONSUMABLES

- Lack of availability of appropriate and qualitative consumables makes it difficult for health professionals to follow good practices.

- Moreover, use of evidence based new products, or products - care models (e.g. catheter insertion cart) should not be considered as waste of money.

CLERICAL SUPPORT

- Most IC doctors and nurses claim that they spent a disproportionate amount of their own time on administrative and clerical activities, leaving less time for surveillance, prevention and control activities.

- **Funding clerical support can only be profitable in the infection control.**

ELECTRONIC SURVEILLANCE SYSTEMS

- Lack of computer hardware and software is a major constraint for IC professionals to carrying out their infection control duties effectively.
- IC professionals need information systems so as to identify patients who have been readmitted to hospital, access to pharmacy prescribing and consumption data, access to laboratory data & information automatically.
- Using electronic surveillance systems result in spending their time more productively.

INVESTMENT IN BUILDINGS, CAPITAL EQUIPMENT, AND INFRASTRUCTURE

- These financial expenditures represent fixed costs that can be high investments which could not have a financial return in a reasonable time frame.
- Nevertheless, an apparently high-risk investment in building as isolation rooms can contribute in reduction of transmission and save costs. The benefit of this investment can arise in long term from results, damage limitation and cost avoidance.

RISK ASSESSMENT

Risk assessment becomes increasingly critical in infection control with numerous results, summarised as follows:

- Frames the problem
- Ranks risks by score to determine organizational priorities
- Identifies organizational areas of weakness
- Assists in determining where to focus available resources
- Provides basis for developing The Infection Control Plan
- Identifies gaps in infection prevention measures and processes
- Identifies environmental issues/concerns
- Identifies organization’s gaps in health and safety standards
- Helps emergency preparedness (Internally and Externally)
- Guides Patient Safety Goals
- Represent a communication tool

Conclusions I

IC Programs

- Contribute to patient safety through protecting patients from infections
- Protect health care workers and visitors to health care facilities from infections
- Reduce the economic impacts of hais on individual health facilities, health systems and the national health care industry

Conclusions II

The cost- benefit of HAIs prevention activities is an area of concern especially for Hospital Administrators(HAS) who are responsible for the allocation of financial resources of their facilities and their viability.

Conclusions III

- There seems to be a need for more awareness and information of Hospital Administrators (HAs)for the importance of funding arrangements for infection control in hospitals.
- HAs MUST be convinced that hospital-acquired infections take up scarce health sector resources by prolonging patients' hospital stay.
- By adopting effective infection-control strategies these scarce resources are saved and can be released for alternative uses which most of the times have a different and higher value.

Conclusions IV

- ICP are costly themselves but, preventing HAIs, they can be credited with generating cost savings. An ICP is a big investment that demands financial expenditures that should be compared to the savings.
- Healthcare facilities need to have flexibility in the use of their resources but there are advantages for the planning and implementation of an effective infection control program if infection control teams have a separate budget for routine infection control work.

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Joint Action
Antimicrobial Resistance and
Healthcare-Associated Infections

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Health Programme
of the European Union

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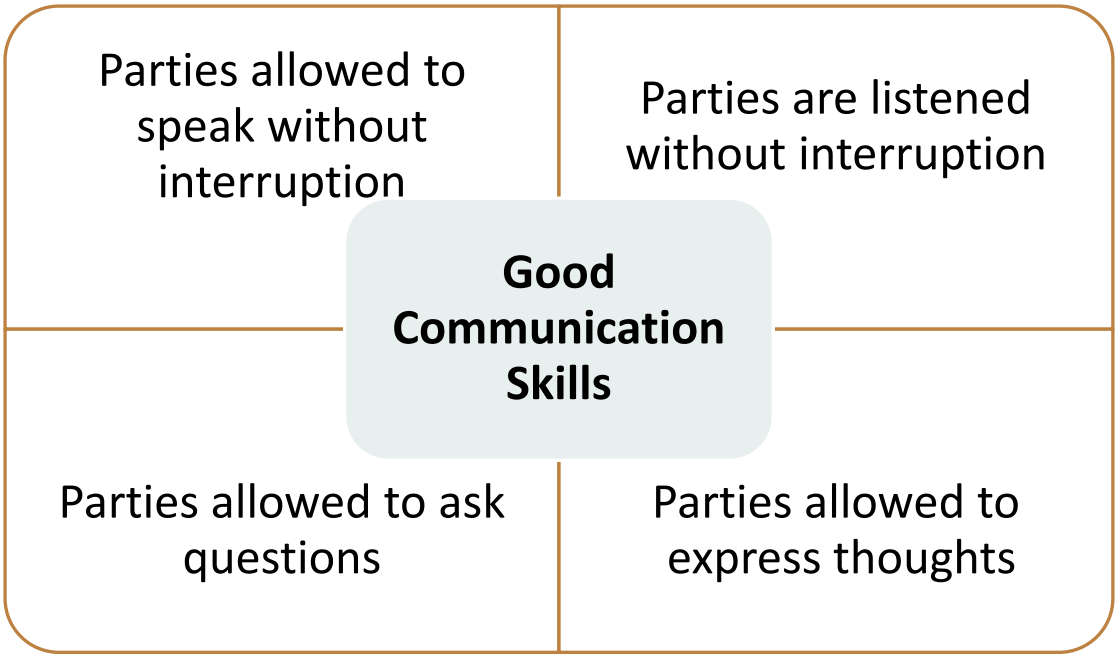
Joint Action
Antimicrobial Resistance and
Healthcare-Associated Infections

Communication & Collaboration Tool

INITIAL PRESENTATION OF THE TRAINING TOOLS

I. COMMUNICATION TOOL

Effective communication is critical in IPC leadership



When to use communication skills?

- To develop leaflets for patients and family members or personnel.
- To lead multidisciplinary teams during outbreak investigations.
- To report to hospital administration on performance indicators.
- To inform to journalists about hospital performance.
- To present a successful intervention
- To advocate for more resources (including resources for ICP implementation).

Essential key elements to disseminate information

Step 1

- People involved
- Message(s) sent

Step 2

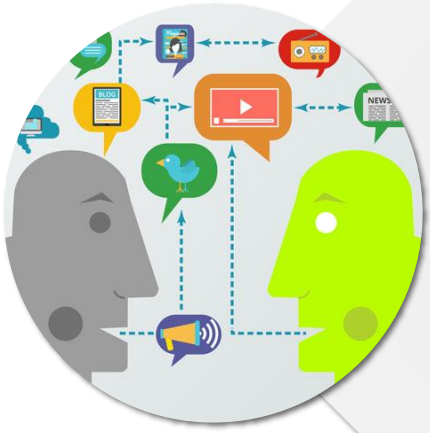
- Channel(s) used
- Context where communication happens

Step 3

- Feedback sent in response

Step 4

- Effect on the people involved



COMMUNICATION CHANNELS

- Direct communication
- Radio
- Banners/posters
- Practice regulations
- Education
- SMS/ Telephone communication
- Mass media
- Meetings
- Policy, guidelines
- Care pathways
- Information packs
- Handbooks
- Formal education
- Informal training
- E-learning systems
- Intranet/Internet
- E-mail
- Social networks

INCREASE THE ACCURACY OF COMMUNICATION BY FOSTERNING PATIENT SAFETY CULTURE

Improve Communication

- Develop & implement communication tools
- Implement strategies to decrease distraction
- Managers at all levels accountable

Promote respect among colleagues

- Encouraging honesty
- Encouraging collaborative practice
- Team members accountable for their behaviour
- Establish patient safety goals
- Establish process for conflict resolution

Collaboration with other team members

- Giving timely and specific feedback
- Questioning attitudes
- Assuming the best intent of each team member
- Crosschecking & monitoring
- Using evidence based practice

II. LEADERSHIP TOOL

Strong leadership skills in IC are essential for effective decision-making, efficient use of resources and the provision of high-quality, effective ICP implementation with a focus on patient's safety. A strong leader supports and motivates healthcare personnel to their daily practice so as to achieve reduction of patient harm due to HAIs and AMR.

This type of leadership must be aligned – from the hospital's administration team to the executive and specialist infection control team, to clinical and non-clinical staff.

Figure 1: **Leading a Culture of Safety: A Blueprint for Success**, *American College of Healthcare Executives, 2017*

LEADERSHIP IMPROVEMENT TOWARDS PATIENT'S SAFETY

1. Establish a compelling vision for safety

The vision must be aligned with the administrator's & healthcare personnel's core values. Such a vision enhances performance, promotes change, motivates individuals and develops tools to decision making. Hospital's administrator should collaborate with all the departments, clinical and non-clinical, so as to assess the internal and external landscape of their organisation. By this, a deeper acknowledge and understanding of the current situation could be achieved.

A shared vision should include all parties, the clinicians' attitudes and perceptions, experiences, practices and any other trends or events that may occur.

While all hierarchy should be involved during the development of this vision, it is up to administrator to model and implement it. Unofficial leader should also be visibly committed into its implementation and support actions promoting patient's safety.

2. Build trust, respect & inclusion

Trust and respect are core values to create a safe working environment. How conflicts will be managed and communicated with, practicing inclusion, honesty and transparency among the personnel are some tools to improve the relationship through the IC hierarchy.

It is essential for administrators to display their trust and confidence in the personnel, by holding both themselves and the personnel accountable to policies and behaviours that reflect the agreed values.

3. Select, develop & engage all Board members

Hospital's administrator should be responsible for training and raising awareness to the importance of quality, safety and culture.

Also, the Board is responsible for making sure the correct oversight is in place, that quality and safety data are systematically reviewed, and that safety receives appropriate attention as a standing agenda item at all meetings.

In order to create and maintain a culture of safety, certain competencies, skills and experiences are required.

4. Prioritize safety in the selection and development of leaders

Hospital's administrator is responsible to develop and support activities so as to educate and develop leaders throughout IC hierarchy who embody and prioritize the shared values focused on safety culture. The key is to identify and promote "Champions of Safety", as they are seen as "role models" and have positive impact on both culture and safety.

Hospital's administrator should train these champions in improving their non clinical skills, such as professionalism, emotional intelligence, communication, and team building. Another essential element is to provide regular feedback to the personnel regarding the culture of safety, by reviewing input both by themselves and the healthcare personnel.

5. Lead & reward on culture promoting just culture

"Just Culture: A culture that recognizes that individual practitioners should not be held accountable for system failings over which they have no control. A just culture also recognizes that many individual or "active" errors represent predictable interactions between human operators and the systems in which they work. Just culture distinguishes between human error, at-risk behaviour and reckless behaviour."

A successful organizational culture is a culture when all parties understand the basic elements of patient's safety and recognize a shared value based on specific defined behavioural standards. A just culture is not a blame-free environment; clinicians and the workforce are still held accountable for following protocols and procedures. The vast majority of errors are not a result of individual failures, but are the result of systems that are inherently flawed and create environments of risk.

A just culture acknowledges that punishing people for mistakes discourages reporting, fails to correct problems in the system, and sets up the likelihood of recurrence. Also, reporting systems providing timely feedback regarding what and WHY it went wrong, and procedures to avoid the revision are an essential element in just culture. HA should ensure that

all personnel is trained in the principles of just culture, while also HA should be transparent about this approach in all hierarchy.

JUST CULTURE PRINCIPLES

TYPE OF ERROR	DESCRIPTION	RESPONSE
HUMAN ERROR	An inadvertent slip or lapse. Human error is expected, so systems should be designed to help people do the right thing and avoid doing the wrong thing	Support the person who made the error. Investigate how the system can be altered to prevent the error from happening again
AT-RISK BEHAVIOR	Consciously choosing an action without realizing the level of risk of an unintended outcome.	Counsel the person as to why the behaviour is risky; investigate the reasons they chose this behaviour, and enact system improvements if necessary.
RECKLESS BEHAVIOR (NEGLIGENCE)	Choosing an action with knowledge and conscious disregard of the risk of harm.	Disciplinary action

6. Establish organization behaviour expectations

A culture of safety requires a set of behaviour expectations that apply to all healthcare personnel and describes hospital's mission, vision and values.

The administrator should set the tone and promote accountability for these behavioural norms for all personnel. Surveys focused on patient safety culture could be used in order to identify the areas for improvement, strength and weaknesses with the purpose of understanding the current behavioural system.

Organizational safety behaviour expectations are the daily demonstration of a true culture of safety, therefore HAs not only should hold the personnel accountable to demonstrate them, but also, they should commit to them themselves.

What is the relation between leadership and effective IPC?

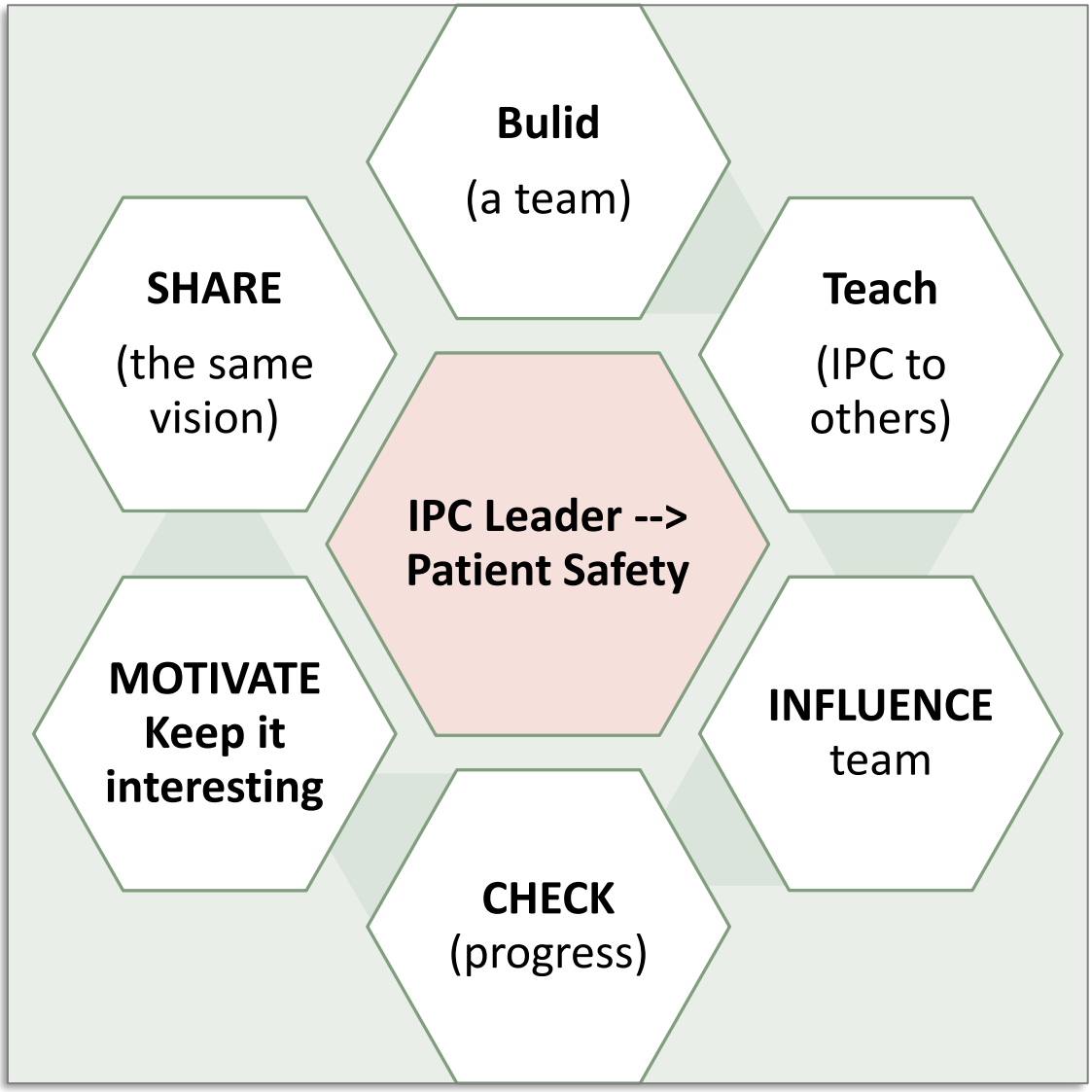
- Leaders in close and regular contact with clinical teams in wards and units positively influence quality of care.
- Leaders support others to develop, implement and evaluate their own solutions to problems.
- Leadership associated with improved practices for hand hygiene, gowning and gloving.
- Staff engagement and hospital leadership are significantly associated with knowledge related to IPC.
- Positive leadership behaviours are associated with a reduced incidence of pneumonia and urinary tract infections

Research has uncovered the importance of a safety culture based on the principles of high reliability, including coordination, cooperation, cognition, conflict resolution, coaching and, communication.

This evidence demonstrates how a culture of safety instead of safety culture can be achieved through development of nontechnical skills such as situational awareness, decision making, leadership, communication and teamwork.

When these skills become ingrained in standardized processes as part of the cultural norm within a health care facility, patients can experience safe, high quality care.

COLLABORATE EFFECTIVELY → IMPLEMENT ICP EFFECTIVELY



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