Is it time for an IC program bundle?

Dubai, Oct. 2019

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كليفلاند كلينك أبوظبي
Cleveland Clinic Abu Dhabi

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Disclosures

Nothing to disclose

This year so far…

WHAT'S ON — CITY — SECTION

UAE first space mission: 5 things you need to know

676

1. The first Emirati astronaut is headed to space today…

In a historic moment later today, Wednesday September 25, Hazzaa Al Mansoori will become the first Emirati astronaut to go to space. Blasting off just before 6pm from Baikonur Cosmodrome in Kazakhstan, the mission will see Al Mansoori journey to the International Space Station (ISS) for eight days, returning to earth on October 3.

Here are 5 things you need to know about the UAE's first mission to space.

Trump says US will withdraw from nuclear arms treaty with Russia

Experts warn of 'most severe crisis in nuclear arms control since the 1980s' as Trump confirms US will leave INF agreement

▲ Donald Trump in Nevada on Saturday. He said: 'We're going to terminate the agreement and we're going to pull out.' Photograph: Jonathan Ernst/Reuters

Donald Trump has confirmed the US will leave an arms control treaty with Russia dating from the cold war that has kept nuclear missiles out of Europe for three decades.

"We'll have to develop those weapons," the president told reporters in Nevada after a rally. "We're going to terminate the agreement and we're going to pull out."

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shooting — This article is more than 6 months old

49 shot dead in attack on two Christchurch mosques

- New Zealand PM says attack was terrorism
- Man in 20s charged with murder
- Police find explosives attached to cars
- New Zealand attack - latest updates

most viewed

Live Japan v Scotland: Rugby World Cup 201

Diplomatic immunity longer applies to Anne Sacoolas, says Foreign

In Europe….

- Approximately 4 100 000 patients are estimated to acquire a healthcare-associated infection in the EU
- 33000 people died as a direct consequence of antimicrobial resistant bacteria
- The burden of the infections is comparable to that of influenza, tuberculosis and HIV/AIDS combined
- 75% of these infections were healthcare-associated infections (HAIs)

European Centre for Disease Prevention and Control retrieved from https://ecdc.europa.eu/en/news-events/33000-people-die-every-year-due-infections-antibiotic-resistant-bacteria last accessed: 08/09/2019

Challenge

The ways humans perceive AMR and HAI news

Airbus A330-300 typically carries 277 passengers

In Europe alone in 2018:

33000 people died as a direct consequence of antimicrobial resistant bacteria

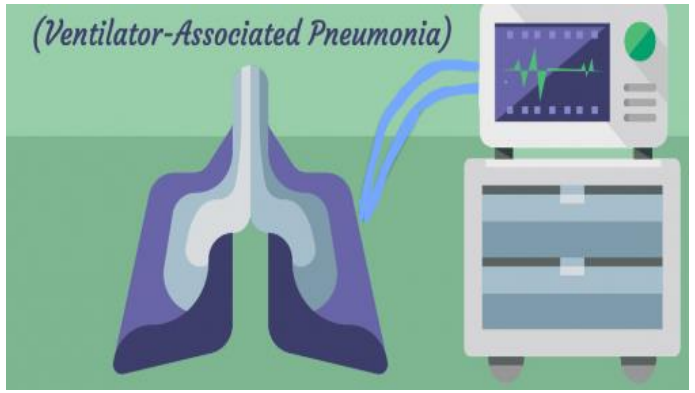
In Europe alone in 2018:

1 airplane crashed every 3 days in Europe and all passengers died

2017 National and State HAI Progress Report

Data from Acute Care Hospitals only

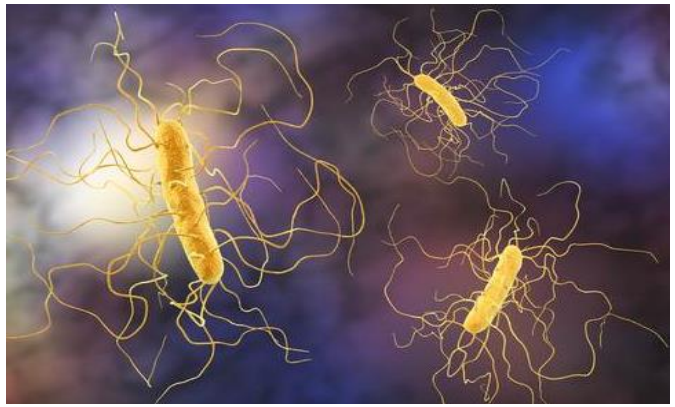
VAE: 24,491



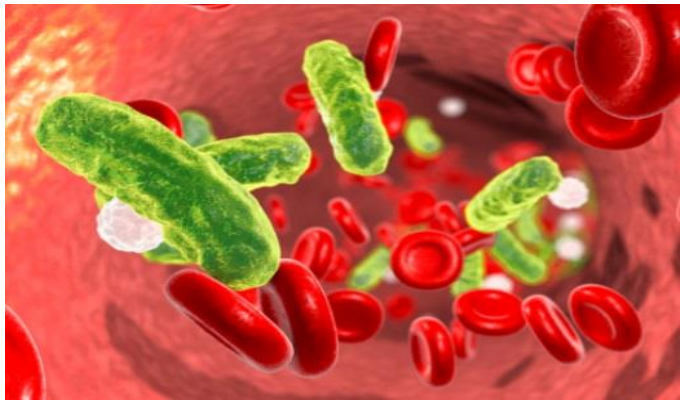
SSI: 20,152

CLABSI : 21,173

C.difficile: 81,942

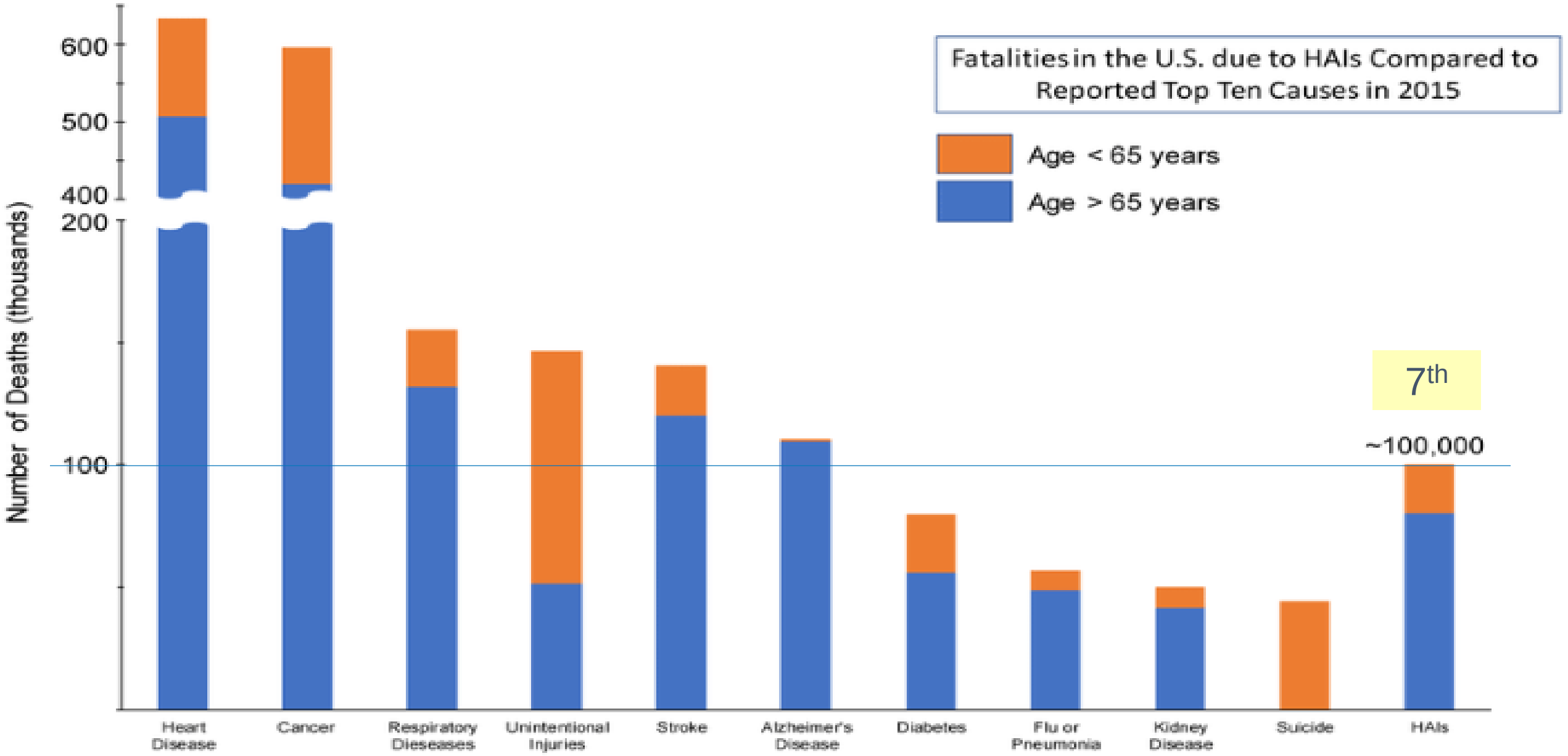


MRSA bacteremia: 8,102



CAUTI: 24,865

2017 National and State Healthcare-Associated Infections Progress Report. Retrieved from https://www.cdc.gov/hai/data/portal/progress-report.html#Data_tables last accessed: 11/10/2019

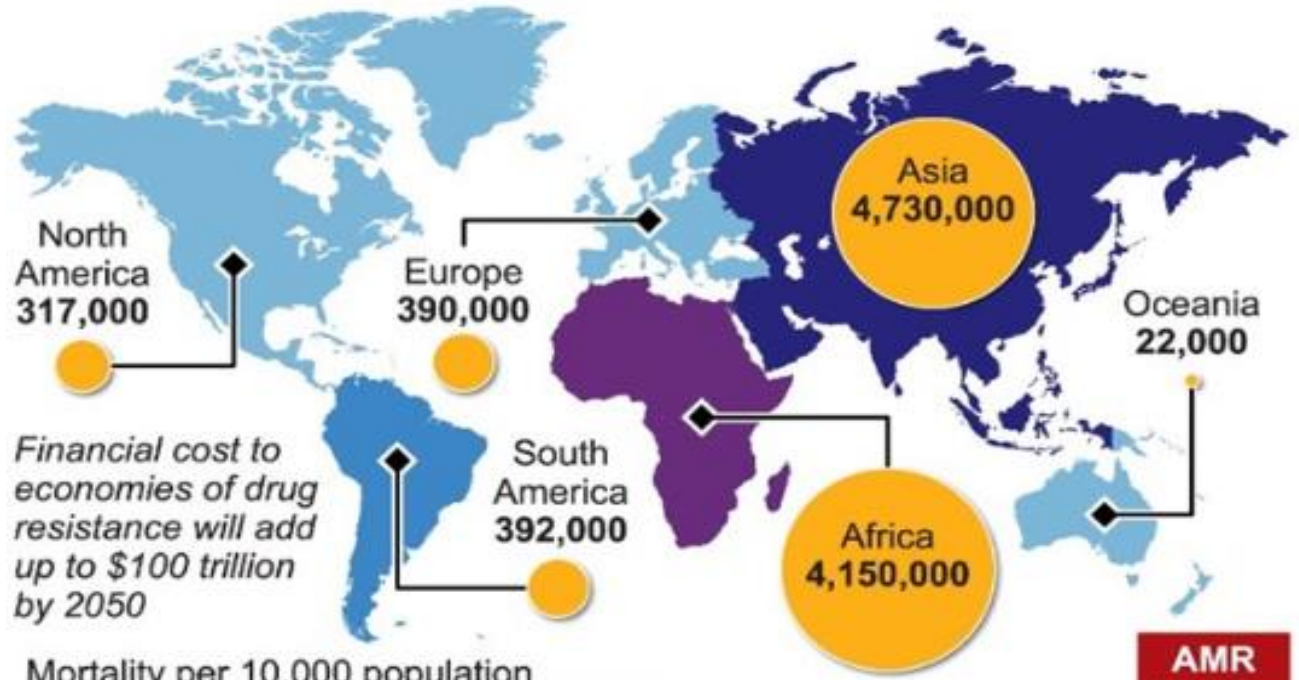


CDC reported top ten causes of death in 2015 1 compared to the reported number of HAI fatalities 2 .

Superbugs "bigger risk than cancer"

An extra 10 million people could die every year by 2050 unless sweeping global changes are agreed to tackle increasing resistance to antibiotics

Deaths per year attributable to Antimicrobial Resistance (AMR) by 2050



Financial cost to economies of drug resistance will add up to $100 trillion by 2050

Mortality per 10,000 population

5 6 7 8 9 10 >

Deaths per year attributable to AMR compared to other major causes of deaths

Source: Review on Antimicrobial Resistance Picture: Associated Press

Before we proceed…

Each country has it is unique health system

- Public health policy
- Health coverage
- Accreditation of care facilities
- Basic benefit packages (the range of goods and services covered by basic health care coverage)
- Case management programs
- Health budget and co-insurance
- Licensing of Caregivers
- Challenges
- **Motto: "first, to do no harm."**

Each institution has its unique way operation

- Mission, vision and values
- Culture
- Structures
- Process
- Challenges
- **Motto: "first, to do no harm."**

Before we proceed…

Mottos:

“Preventing HAI is everybody's business”

“first, do no harm"

These are not supposed to be just mottos

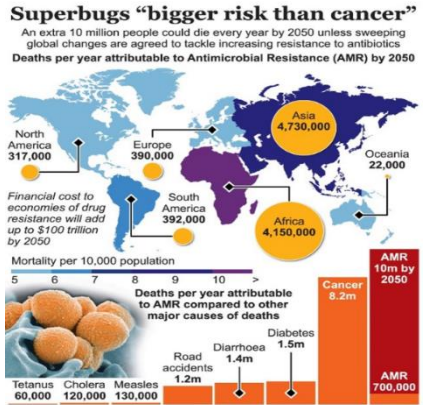
Not just statements used to express the principles of patient safety

[after men were asked to join the militia, but no one initially seemed to be interested]

"Will you now, when you are needed most, **stop at only words**?. Is that the sort of men you are?. I ask only that you **act upon the beliefs** of which you have so strongly spoken, and in which you so strongly believe".

We **ALL** need to take actions…

Globally



The Patriot (2000 film)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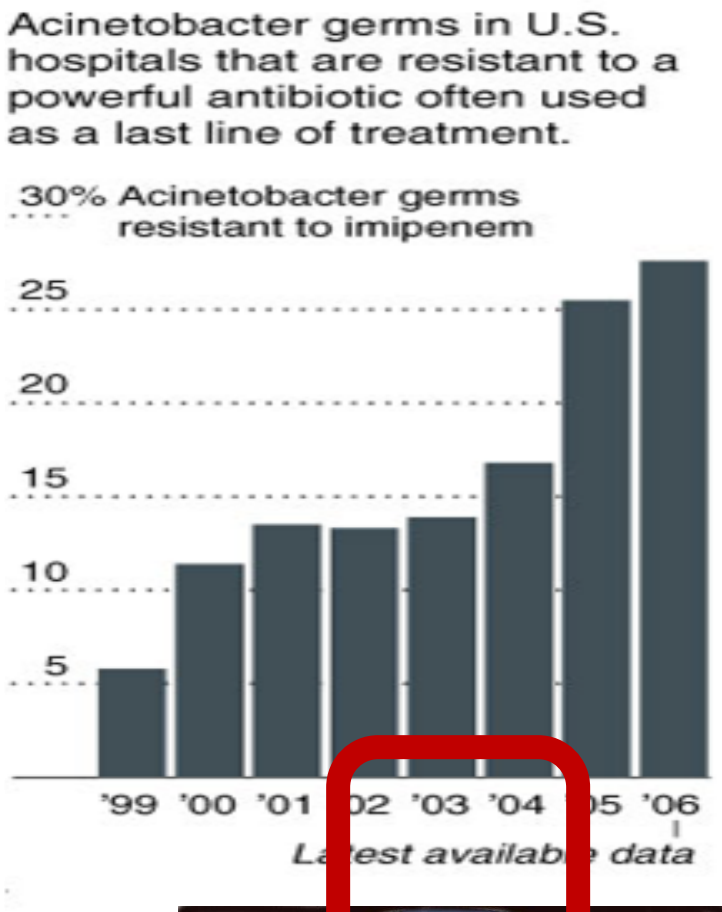
LIVE AIR TRAFFIC
Arctic Ocean
Greenland Sea
Baffin Bay
Barents Sea
Kara Sea
East Siberian Sea
Norwegian Sea
Northwestern Passages
Greenland
Iceland
Sweden
Finland
Russia
Canada
United Kingdom
Portugal
Spain
Kazakhstan
Uzbekistan
Turkmenistan
Kyrgyzstan
Afghanistan
Pakistan
Mongolia
Syria
Iraq
Tunisia
Morocco
Algeria
Libya
Egypt
Western Sahara
Mauritania
Mali
Niger
Chad
Sudan
Yemen
Burkina Faso
Guinea
Nigeria
South Sudan
Ethiopia
Somalia
Kenya
Gabon
DR Congo
Tanzania
Angola
Zambia
Mozambique
Namibia
Zimbabwe
Botswana
Madagascar
South Africa
Arabian Sea
Indian Ocean
South Atlantic Ocean
North Pacific Ocean
Guatemala
Nicaragua
Puerto Rico
Ecuador
Peru
Bolivia
Paraguay
Chile
Argentina
Uruguay
Papua New Guinea
Coral Sea
Tasman Sea
WHAT HAPPENS IN VEGAS DOES
NOT ALWAYS STAY IN VEGAS

Example 1

From Iraq to the US "Iraqibacter"



Impact of "iraqibacter" on the US:

- High incidences of bacteremia associated with infected combat troops returning from conflict zones.[2]
- Dramatic increase in the incidence of multidrug-resistant (MDR) strains.[2]

1. *The Center For Disease Dynamics, Economics & Policy: Acinetobacter* bacteria causing infections in United States hospitals were increasingly resistant to imipenem over the period 1999-2006. https://cddep.org/tool/acinetobacter_resistance_imipenem_united_states_hospitals_1999_2006/. Accessed:10/18/019.
2. Howard, A., O'Donoghue, M., Feeney, A., & Sleator, R. D. (2012). Acinetobacter baumannii: an emerging opportunistic pathogen. Virulence, 3(3), 243–250. doi:10.4161/viru.19700

Example 2
Country-to-Country transfer of patients and MDRO

Aim: To assess the risk of influx of MDRO from patients transferred from abroad to Heidelberg University Hospital (HUH), one of Central Europe's largest hospitals.

Methods: Screened All patients transferred from other countries were screened.
Variables studied: Presence of MDRO, CRE, Colonized vs infected, country of origin, etc…
The type of swabs obtained for screening were nasal, rectal, wound and stoma (when applicable).

Mutters et al. Influx of multidrug-resistant organisms by country-to-country transfer of patients BMC Infectious Diseases (2015) 15:466

Table 1 Country of origin of screened patients

Area code	Number / Percent
Middle East	238 / 57.5
Non-EU-Europe	74 / 17.9
EU	54 / 13.0
Africa	35 / 8.5
Asia	10 / 2.4
Americas[a]	2 / 0.5
Australia[a]	1 / 0.2
Total	414

EU (including EFTA [European Free Trade Association] countries Switzerland & Norway); Non-EU-Europe (including Russia)
[a]:excluded from the logistic regression analysis

87 Patients of 414 were colonized with MDRO:

MRSA 4.1 %
VRE 2.9 %
MDR Gram-negatives 12.8 %
Extensively MDR Gram-negatives 3.4 %

Extensively MDR Gram-negatives included:

- NDM– New Delhi metallo–beta–lactamase
- KPC-Klebsiella pneumonia carbapenemase
- OXA–23/48 oxacillinase group beta–lactamase 23/48

Table 4 Influence of region of origin on colonization status

Effect	Odds ratio	95 % CI	*P* value
Country Area (Reference: EU)			
Africa	2.493	[0.785; 7.914]	0.121
Asia	0.833	[0.088; 7.869]	0.873
Middle East	2.366	[0.980; 5.715]	0.056
Non-EU-Europe	1.411	[0.489; 4.077]	0.524
Age	1.012	[0.999; 1.025]	0.064
Diagnosis related groups [a]			
Surgical diseases	0.938	[0.100; 8.799]	0.956
Mild internal diseases	1.758	[0.500; 6.184]	0.379
Internal medical diseases (all others)	1.220	[0.322; 4.619]	0.769
Hereditary genetic disorders	1.737	[0.435; 6.925]	0.434
Malignancies	2.856	[1.200; 6.798]	0.017
Infection	2.709	[0.820; 8.944]	0.102
Trauma	6.067	[2.108; 17.458]	<0.001

[a]No diagnosis (none) defined as reference; CI: confidence interval

Example 3
Effect of war in a region on the globe: *Refugees*

Aim: Compare what is known about antimicrobial resistance in Syria and neighboring countries hosting Syrian refugees before and after the onset of the conflict

Method: lit. review on antimicrobial resistance in Syria pre and post the onset of conflict

Keywords: ‘Syria’ ‘antibiotic resistance’ ‘refugee’, ‘antimicrobial resistance’, ‘screening’, ‘war-injury’

MEDLINE, PubMed, Embase, and the World Health Organization (WHO) Global Health Library

A. Abbara et al. **summary and appraisal of existing evidence of antimicrobial resistance in the Syrian conflict.** International Journal of Infectious Diseases, 2018-10-01, Volume 75, Pages 26-33

Classifications

Divided into pre and post onset of the conflict in Syria

- Pre-conflict
- Post commencement of the conflict – Syria
- Post commencement of the conflict – outside Syria

Post commencement of the conflict – outside Syria					
Teicher et al. (2014)	2011–13	Amman Jordan	Médecins Sans Frontières surgical project managing MDR defined as: (1) ESBL-expressing *Enterobacteriaceae*; (2) *P. aeruginosa* and *A. baumannii* isolates resistant to at least one agent in three antimicrobial categories typically used for treatment; or (3) MRSA	61 Syrian orthopaedic patients with suspected infections undergoing surgical sampling intraoperatively	• Age 26 years (IQR 22–34 years); 98% male • Injury to admission approximately 5 months (IQR 1.2–8.1 months): gun-shot wounds $n = 31$, explosion wounds $n = 20$ • 45 of these patients had at least one organism, with 69% (31/45) MDR organisms: *P. aeruginosa* (10/31), *E. coli* (5/8), carbapenem-resistant *A. baumannii* (4/5), MRSA (7/17)
Kassem et al. (2017)	2013–2016	Israel	Microbiological surveillance screening of severely ill or injured Syrian children Screened for: ESBL, CRE, MRSA, MDR *A. baumannii*, and VRE	128 children	• MDR carriage found in 83%, with NDM CRE most prevalent • 24/128 had MDR infections (90% were wounded): ESBL 66%, MDR *A. baumannii* 20%, CRE 15%
Angeletti et al. (2016)	2016	Italy	Microbiological surveillance using rectal, pharyngeal, and nasal swabs	48 refugees	• High rates of Gram-negative non-lactose-fermenting organisms such as *Pseudomonas* and *Aeromonas* species, with 5 carbapenem-resistant isolates • No CRE • 24% (6/25) of *S. aureus* isolates were methicillin-resistant
Bhalla et al. (2016)	2016	Amman, Jordan	Observational study at the Médecins sans Frontières surgical programme hospital managing chronic trauma-related infections colonized or infected with AMR organisms	NA	NA
Abbara et al. (2017)	2015	Amman, Jordan	Microbiological samples from infected injuries (bone and soft tissue) amongst injured Syrian refugees	75 patients	• 20% had osteomyelitis, 53% had prosthetic material • 30 bacterial isolates of which 97% were GNB • 66% were MDR and 37% were carbapenem-resistant
Ravensbergen et al. (2016)	2016	Groningen, Netherlands	Screening of asylum seekers for MDROs upon admission to hospital	130 asylum seekers; 36.5% Eritrean and 18.6% Syrian	• 31% colonized with an MDRO: 7.7% with MRSA; 20% ESBL (20 *E. coli*, 4 *K. pneumoniae*, 1 *M. morganii*, and 1 *E. cloacae*) • 10% resistant to fluoroquinolones • No carbapenemases

					• No carbapenemases
Reinheimer et al. (2016)	2015	Germany	Microbiological surveillance screening of patients admitted to Frankfurt hospital for MDROs, for GNB (ESBL and *A. baumannii*), and MRSA	143 refugees, including 47 (43%) from Syria, 29 from Afghanistan, 14 from Somalia	• 60.8% colonized with MDR GNB in Refugee population compared to 16.8% in the general population • ESBL *E. coli* and *K. pneumoniae* were significantly more common (23.8% vs. 4.9% and 4.2% vs. 0.8%) • 1 CRE and 2 carbapenem-resistant *A. baumannii* • MRSA 5.6% vs. 1.2% in the general population
Heudorf et al. (2016)	2015	Frankfurt, Main, Germany	Microbiological surveillance screening of unaccompanied minors (aged <18 years) screened for MDR *Enterobacteriaceae* in stool samples	119 individuals, 7 Syrians	• Total: 35% had ESBL *Enterobacteriaceae*, including 8% GNB resistant to three antibiotic groups • Syrians: 3 had ESBL *Enterobacteriaceae*; none had MDR
Tenenbaum et al. (2016)	2015–2016	Germany	Retrospective observational study of screening of paediatric refugee patients admitted to hospital	325 patients	• MDR detected in 33.8% • 110 of 113 samples GNB • 87 MDR GNB/ESBL • 22 MRSA • 1 VRE
Heydari et al. (2015)	2014	Turkey	Microbiological surveillance screening of all *A. baumannii* resistant to carbapenems collected over the year period and screening for NDM-1-producing organisms	2 Syrian refugees admitted to ICU	· 1 isolate of 2 from a Syrian refugee admitted to ICU with acute renal failure and gastritis
Peretz et al. (2014)	2014	Galilee Medical Centre, Israel	Microbiological surveillance screening of Syrians admitted to hospital Screened for: ESBL, CRE, MRSA, MDR *A. baumannii*, and VRE	27 children and 60 adults	• Children: 21 isolates of MDROs in 19/27 patients; 20/21 ESBL *Enterobacteriaceae*; MRSA = 1/21 • Adults: 28/60 carriers; 5 patients, CRE (2 × NDM); 11 patients, MRSA; 5 *A. baumannii*; 7 ESBL
Rafei et al. (2014)	2012	Lebanon	Syrians admitted to Lebanese hospitals Carbapenem-resistant *A. baumannii* isolates investigated using PCR to identify OXA and NDM producing organisms	4 patients with war wounds	• All 4 had carbapenem-resistant *A. baumannii* identified as carrying the *bla*-NDM-1 gene • These organisms all had phenotypic susceptibility to aminoglycosides, colistin, and tigecycline
Rafei et al. (2015)	2011–13	Lebanon	Review of isolates from Lebanese and Syrian wounded; respiratory, wound, urine, catheters, and blood isolates	116 isolates	• 90 male, 26 female • 70/116 (60%) had carbapenem-resistant phenotype (including NDM-1 and OXA-23) • Syrian refugees had a greater number of carbapenem-resistant *A. baumannii* (74% vs. 47%)

In essence…..

Antimicrobial resistance has been linked to the misuse of antimicrobials, with poor compliance in recommended infection control practices.[1]

“It is no longer acceptable not to implement evidence based infection control science”.[2]

1. Boyce, J.M. Consequences of Inaction: Importance of Infection Control Practices. *Clin Infect Dis.* 33(3):S133–S137.
2. Tannous,E. The urgency of an infection prevention and control bundle against AMR – A proposal. AMR 2019.

It is time to have an

Infection Control Program Bundle

1A quality of evidence is not only in these

Category 1A: A strong recommendation supported by high to moderate–quality evidence suggesting net clinical benefits or harms

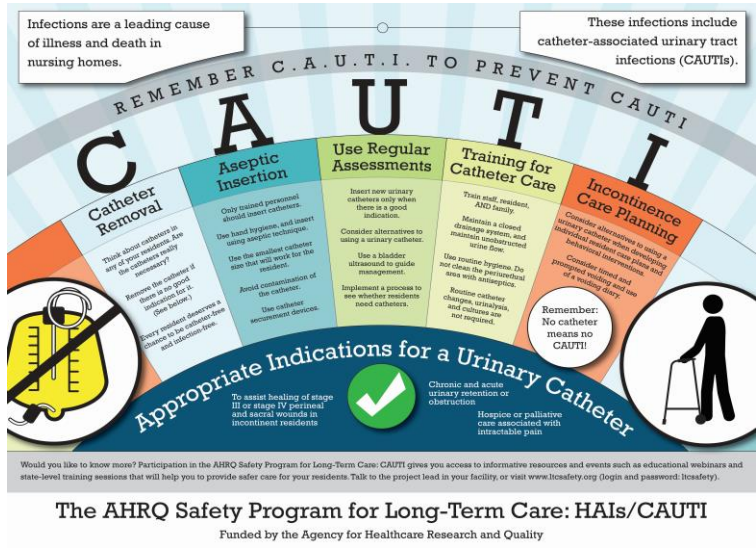
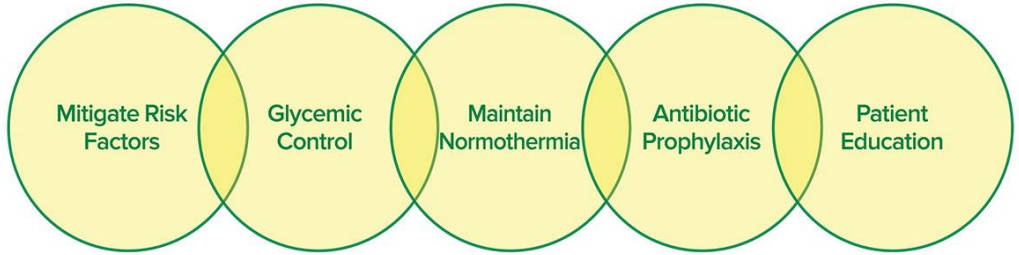


Figure 1: Bundle components can work synergistically to decrease rates of surgical site infections and improve patient outcomes.



Care Bundles also called Evidence-Based Care Bundles

It is a structured way of improving the processes of care and patient outcomes

A small, straightforward set of evidence-based practices — generally three to five — that, when performed collectively and reliably, have been proven to improve patient outcomes.

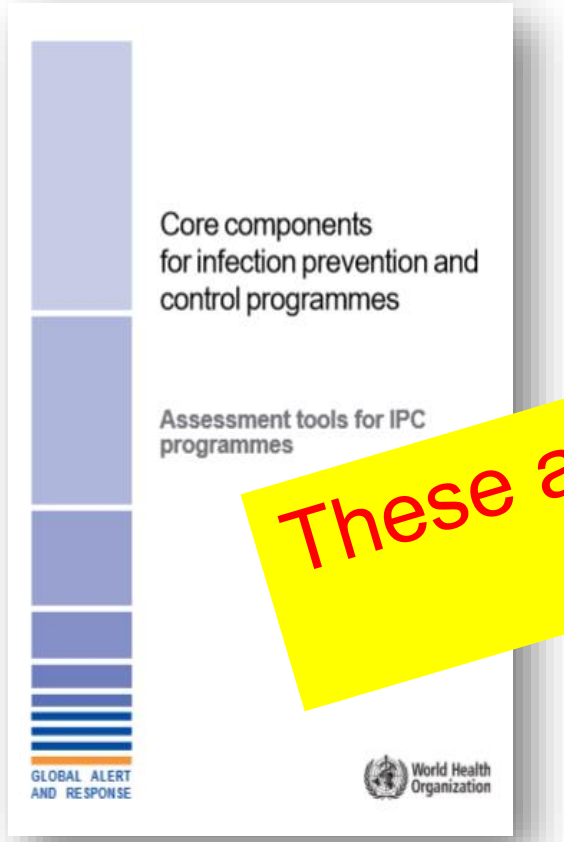
http://www.ihi.org/resources/Pages/ImprovementStories/WhatIsaBundle.aspx

Infection Control Program Bundle

It is a structured way of improving the structures and processes of IC programs, which will ultimately improve outcomes.

A small, straightforward set of evidence-based practices — generally three to five — that, when performed collectively and reliably, have been proven to improve patient outcomes.

“But there are lot of tools to evaluate IC program”…



These are assessment tools and checklists not bundles

CDC Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

A-Z Index

Healthcare-associated Infections

CDC > Healthcare-associated Infections (HAI) >

Healthcare

and Organisms +

Preventing HAIs −

Staph BSI Prevention Strategies

CDI Prevention Strategies

Assessment Tools

elements of an infection prevention program are designed to prevent the spread of infection in healthcare settings. When these elements are present and practiced consistently, the risk of infection among patients and healthcare personnel is reduced.

The Infection Control Assessment Tools were developed by CDC for awardees under the Epidemiology and Laboratory Capacity (ELC) Infection Control Assessment and Response (ICAR) Program to assist health departments in assessing infection prevention practices and guide quality improvement activities (e.g., by

The following definitions have been developed to assist with the implementation of elements of the CDC ICAR assessment tools related to infection prevention competency, training, auditing and feedback.

Healthcare Personnel Infection Prevention (IP) Competency: The proven ability to apply essential knowledge, skills, and abilities to prevent the transmission of

Elements

1. *Science with conscience*
2. Aseptic techniques and precautionary measures
3. Healthy Environment: *The environment of care and The work environment*
4. Safe Equipment
5. Competent staff *competent staff and healthy staff*

Enabling factors

It is a bundle of having

the **will** (wanting)
the **capability** (ability)
the **culture**

that makes an infection control programme successful.

1. Tannous,E. The urgency of an infection prevention and control bundle against AMR – A proposal. AMR 2019.

1- Science with conscience

Fortunately,

- IC guidelines and recommendations from trusted sources exist. CDC-WHO-APIC, Others…
- The quality of evidence is graded and explained for each recommendation
- Available and accessible to policy-makers to guide the development of policies.

Regrettably,

On numerous IP are required to search for answers and evidence outside these guidelines because:

1. Important details are sometimes lacking
2. Concern around the delayed updates in these guidelines.

https://www.cdc.gov/infectioncontrol/guidelines/ssi/index.html

Infection Control

CDC > Infection Control > Guideline Library

- Infection Control
- How Infections Spread
- Infection Control Basics +
- **Guideline Library** −
  - Disinfection and sterilization
  - Environmental infection control

Surgical Site Infection (SSI)

Guideline for Prevention of Surgical Site Infection (2017)

Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection

Previous Guideline

Guideline for the Prevention of Surgical Site Infection (1999)

1- Science with conscience

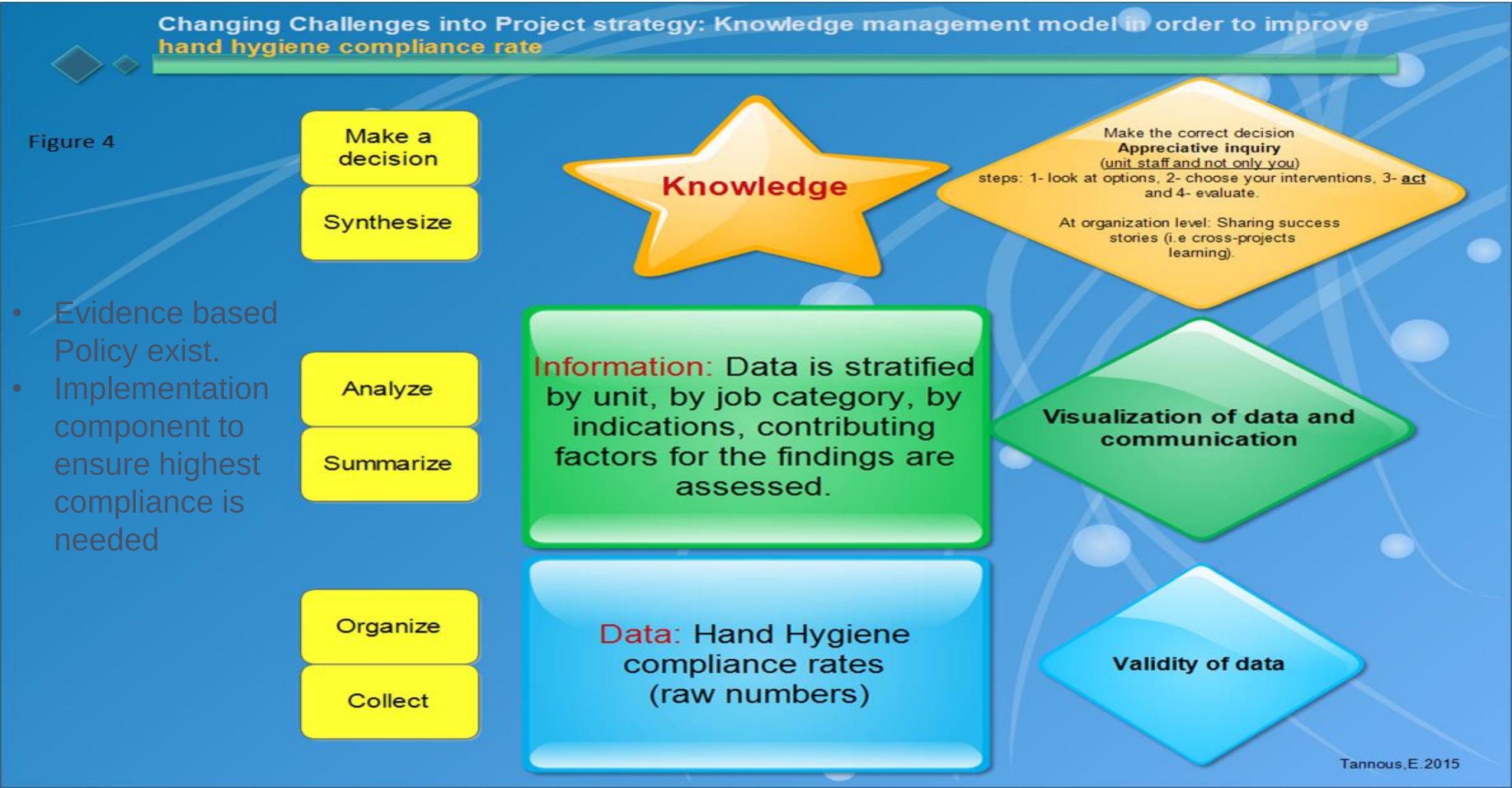
It is a must that IP:

a) Have access to latest evidence

b) Are capable of critically appraising research findings to recognize flaws and to reject weak evidence

c) Have the mindset of designing an implementation plan or establishing the clinical application for each recommendation

Example of a model on managing acquired knowledge



- Evidence based Policy exist.
- Implementation component to ensure highest compliance is needed

Conceptual Model For Preventing Healthcare-associated Infections and The Transmission Of Mutli-Drug Resistant Organisms

Tannous, E. 2015.

1- Science with conscience: surveillance

It is a must that IP:

- Don’t try to make the patient or situation fit the definition
- Don’t try to make the definition fit the situation
- Do not “bend” the protocol to make data look more favorable
- Use only the facts of the case and the details of the situation and apply the criteria as it’s written!

It is a must that Leaders in healthcare don’t put pressure on the IP to do any of the above

IP: Able to redesign HAI surveillance to address

Lack of Random Error (Precision)	Lack of Systematic Error (Validity)
Study Size and Statistical Power	Misclassification Bias
	Selection Bias
	Observation Bias
	Confounding

2- Aseptic techniques and precautionary measures

1. ***Standard precautions***
2. ***Transmission-based precautions: Airborne, droplet and contact***
3. ***Aseptic techniques: medical and surgical.***

They are all mentioned in recommendation with 1A quality of evidence-

Category 1A: A strong recommendation supported by high to moderate–quality evidence suggesting net clinical benefits or harms

Siegel J, Rhinehart E, Jackson M, Chiarello L. and Health Care Infection Control Practices Advisory Committee. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Health Care Settings. *Am J Infect Control*. 35(10 Suppl 2):S65-164.

3. Healthy environment

Two facets

1. the environment of care[1]:
   - ✓ The effect of the design and the environment of care on patient safety
   - ✓ Sufficient studies showed healthcare built features corresponding to better patient safety indicators
2. the work environment:
   - ✓ Embodied in a culture that accurately promotes safety by not accepting mediocre outcomes.
   - ✓ Manifested through teamwork, transparency, open communication, support, innovation, soft skills, recognition, social connections and a responsible and engaged workforce – who can and will report safety events without hesitation

Tannous, E, Rollins M. 2017. Healthcare built: a unique environment with unique infection control considerations. The Arab Health Issue 5.

4. Safe equipment

Expensive equipment and medical supplies do not necessarily yield safe quality care.

Safe medical equipment entails:

- ✓ Good evaluation process before procurement, taking into account desired outcomes, potential users' complications, regular maintenance/inspection and the cost
- ✓ Infection risks and reprocessing
- ✓ Consideration of evidence-based guidelines and recommendations

5. Competent staff

Competent staff:

- ✓ An infection control program is **everybody**'s business
- ✓ Competent staff includes **any staff placed on an organizational chart** of an institution
- ✓ Ardent infection prevention professionals with IC knowledge and technical skills coupled with soft skills and leadership qualities **(3 savoirs)**

Healthy staff

- ✓ Not solely a disease-free employee; rather it includes an employee with a healthy lifestyle and living conditions coupled with occupational health and safety.

Table 1: Recommended tools for each element of the infection control bundle

Science with conscience:
Evidence-based policies
Reliable and valid HAI surveillance systems (processes and outcomes and where bias and confounding factors are assessed and provide information on potential causalities, not just numbers)
Knowledge management processes
Antibiotic stewardship programme

Aseptic techniques and precautionary measures:
Clinical competency with the three domains (knowledge, skills and attitudes) for medical asepsis, surgical asepsis, standards precautions and transmission-based precautions
Clinical audits on: adherence to standards precautions, transmission-based precautions, safe use of PPE, hand hygiene, environmental cleanliness to include the evaluation of the terminal cleaning of patient rooms, linen management, occupational exposures and infectious diseases exposures
Active surveillance testing, flagging system for MDRO with communication plans

Healthy Environment:
Environment of care rounds
Indoor air, water and food quality assessment tool & inaction guidance tool
Engagement survey
Cultural survey
Infection control survey (knowledge and perceptions)
Plans for managing infectious diseases threats (i.e., pandemics, novel viruses, etc.)

Safe Equipment:
Inspection, testing, and maintenance plans tool
Product evaluation tool
Safe use of medical equipment and supplies tool
Products recalls and alerts policy and procedure

Competent staff
Occupational and non-occupational health programmes
Infection control professional competencies (technical skills, soft skills and leadership skills)
Continuous professional development programmes
Caregivers infection control competencies

It is a bundle of having
the **will**,
the **capability** and
the **culture**
that makes an infection control programme successful.

Elias Tannous: The urgency of an infection prevention and control bundle against AMR – A proposal. AMR CONTROL 2019 p.41- 45

Challenges in implementation

Examples:

- Education department and infection control
- IT department and infection control

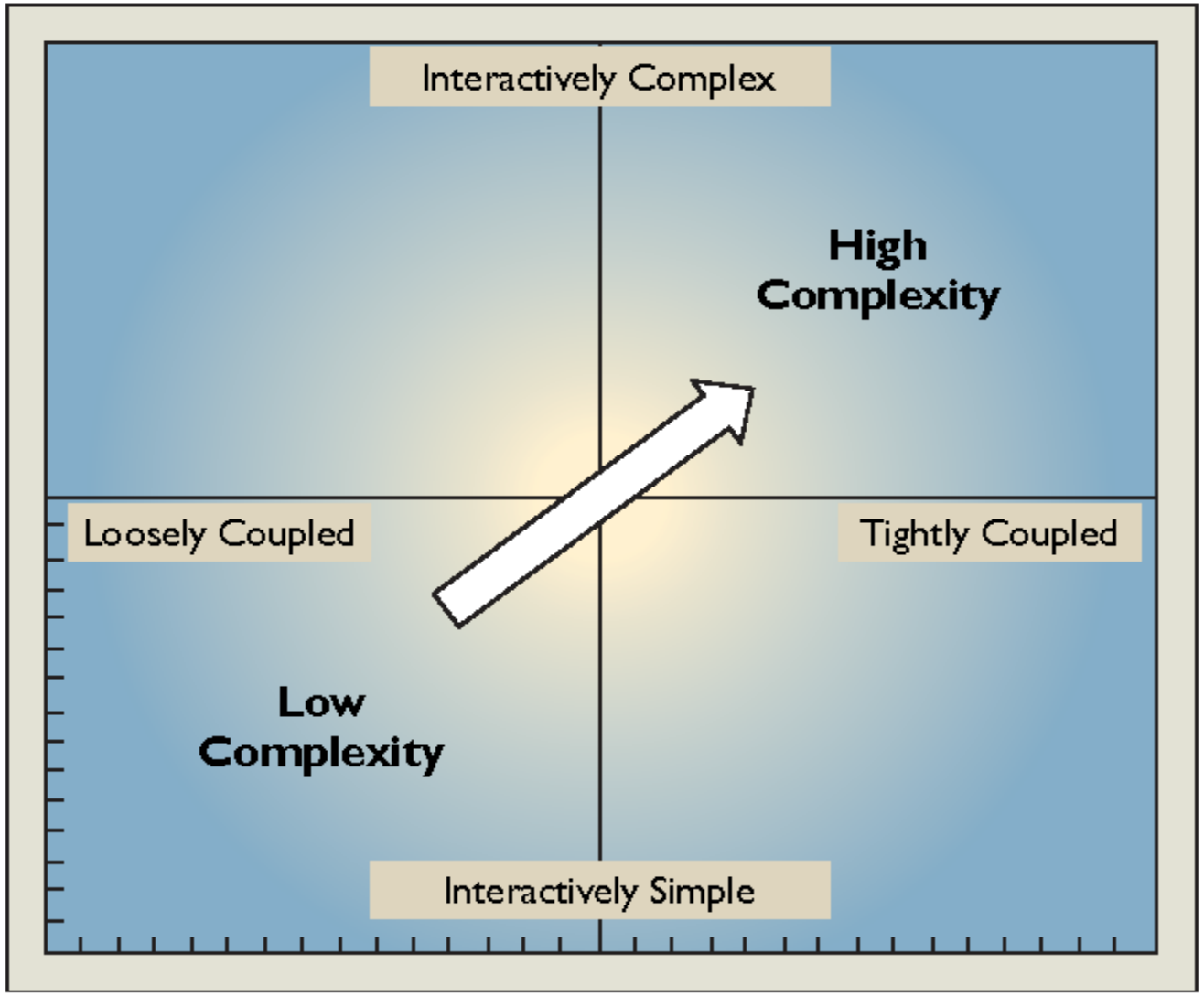


Figure 1. Perrow's Framework of Complexity [5].

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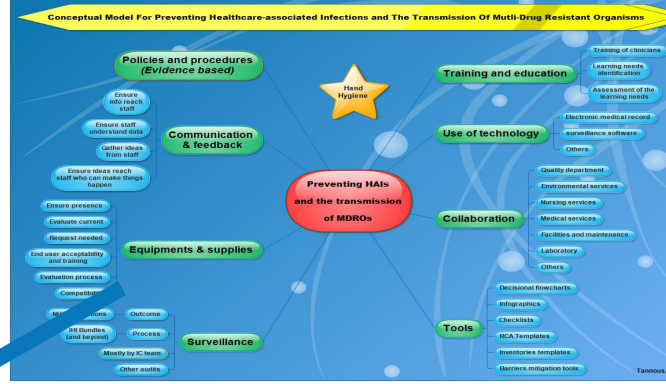
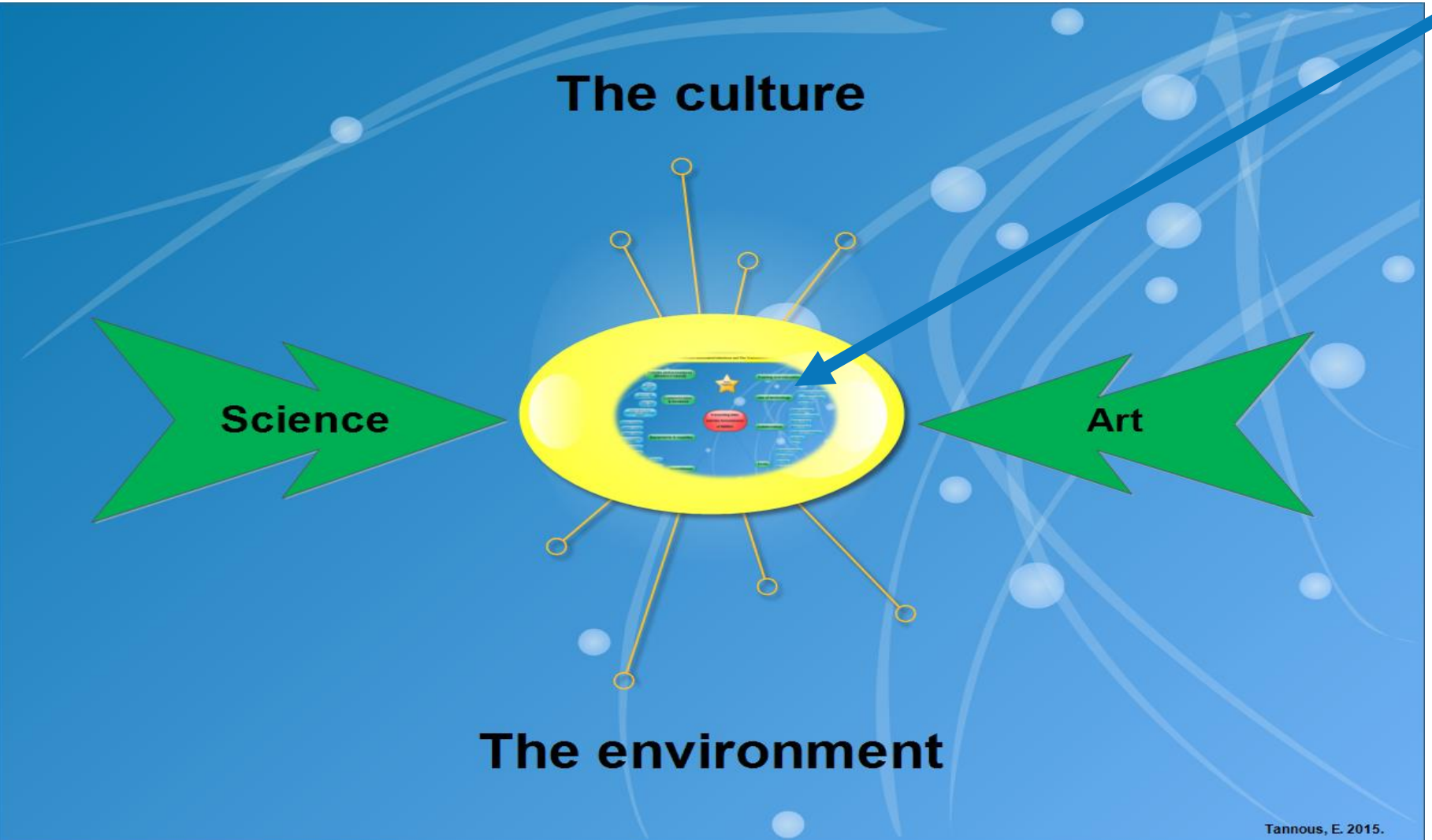
Health care and services delivery systems as complex adaptive systems

Joseph K. Tan, H. Joseph Wen, Neveen Awad

Final thoughts





The super duper IC professional who knows only IC is just an "idiot savant"

Thank you

كليفلاند كلينك أبوظبي
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