Infection Control Risk Assesment and its relation to Patient Safety

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ISQua International Society for Quality in Health Care

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Calidad Seguridad del Paciente y Gestión Clínica
IECS

Goals of the presentation

- To discuss about Infection Control Risk Assesment (ICRA)
- To link ICRA to Patient Safety and Quality Improvement
- To share experiences about Infection Control Practices and Quality Improvement in Latin America

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Some facts about HAI in LMICs

- Health care-associated infections (HAI), a health care problem across the globe, is higher **in low and middle-income countries (LMICs).**
- The frequency of patient intensive care unit-acquired infections **is nearly three times higher than in high-income countries** (42.7 episodes per 1,000 days) and **Antimicrobial Resistance (AMR) is also higher in LMICs** (Yaghmai et al., 2016; Cox et al., 2017).
- **Antibiotic resistance (ABR) is a rapidly worsening problem worldwide**. Overuse and misuse of antibiotics, poor sanitation, low vaccination rates and poor infection prevention and control practices all contribute to the **high rate of drug-resistant infections in LMICs** (Laxminarayan et al., 2016).
- The misuse of antibiotics has contributed to antibiotic resistance, serious threat to public health. In comparison with infections caused by susceptible bacteria, **those caused by multidrug-resistant bacteria are associated with higher incidences of mortality and prolonged hospital stay** (de Kraker, Davey and Grundmann, 2011.
- **Serious adverse events occur in roughly 20 percent of hospitalized patients who receive antibiotics** (Tamma et al., 2017).

Why care about Infection Control?

- We can no longer rely on antibiotics
- Increased rates of nosocomial infections
- Patients who get infected:
  - Stay longer in the hospital
  - Die
  - Are treated with toxic and less effective drugs
  - Are prone to surgical site infections

https://www.who.int/patientsafety/education/curriculum/PSP_mpc_topic-09.pdf

The case for patient safety

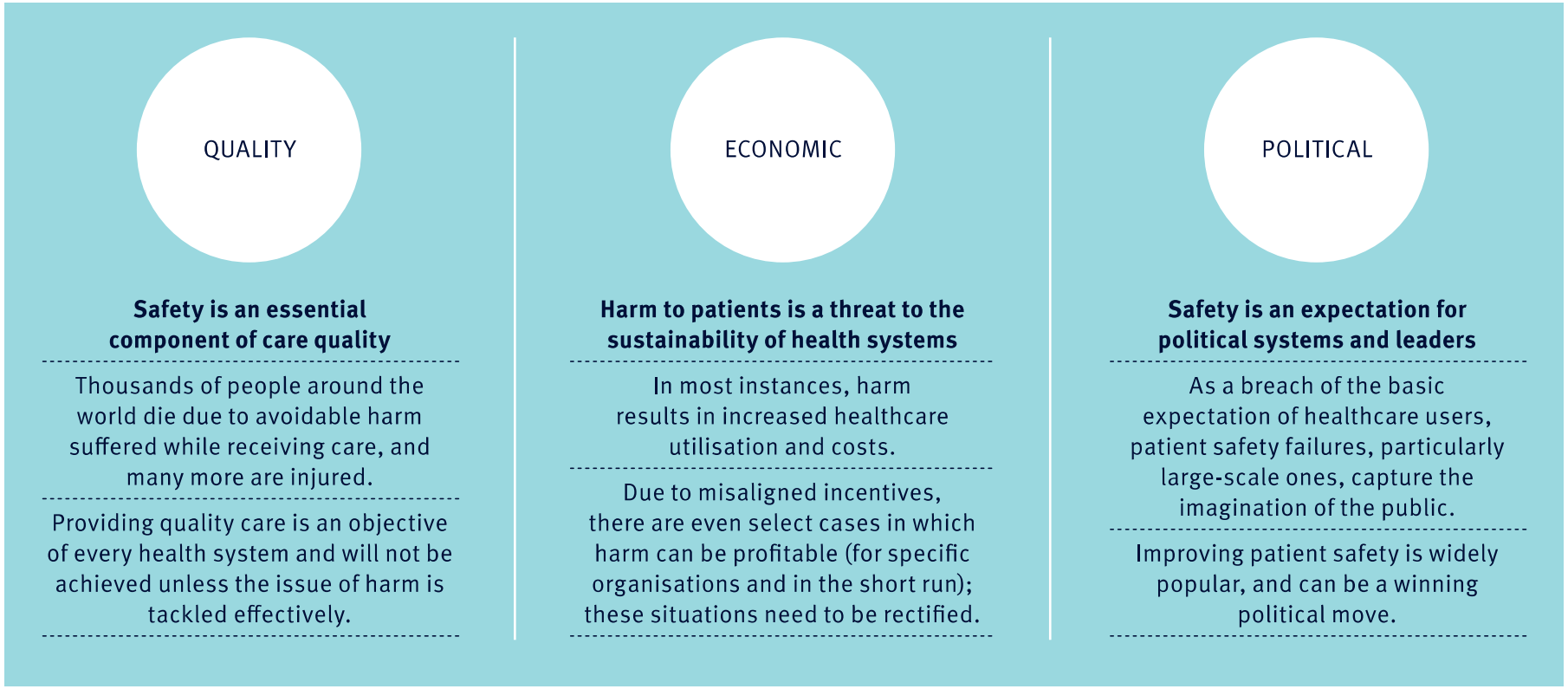


EXHIBIT 1: The case for patient safety

Yu A, Flott K, Chainani N, Fontana G, Darzi A. Patient Safety 2030. London, UK: NIHR Imperial Patient Safety Translational Research Centre, 2016.

Challenges for patient safety

Increasingly complex cases
The demographic shift towards an older population and the increase in multimorbidity add complexity to care delivery and new potential for error and harm.

Increasingly complex care
Advances in the tools available to healthcare are extremely promising, but are also bound to increase the complexity of care and potentially cause information overload for staff. Their introduction must be properly managed – adhering to the principles of interoperability, security and accountability.

Budget constraints
As complexity in care increases, budgets are stagnant or decreasing. Organisations and staff are likely to experience a reduction or limitation in the resources available for quality improvement.

Antimicrobial resistance
Among broader healthcare trends, the rise of antimicrobial resistance is particularly relevant for patient safety; it increases the risk that infections once considered under control could re-emerge, thereby further complicating efforts to limit patient harm.

Yu A, Flott K, Chainani N, Fontana G, Darzi A. Patient Safety 2030. London, UK: NIHR Imperial Patient Safety Translational Research Centre, 2016.

Antimicrobial resistence

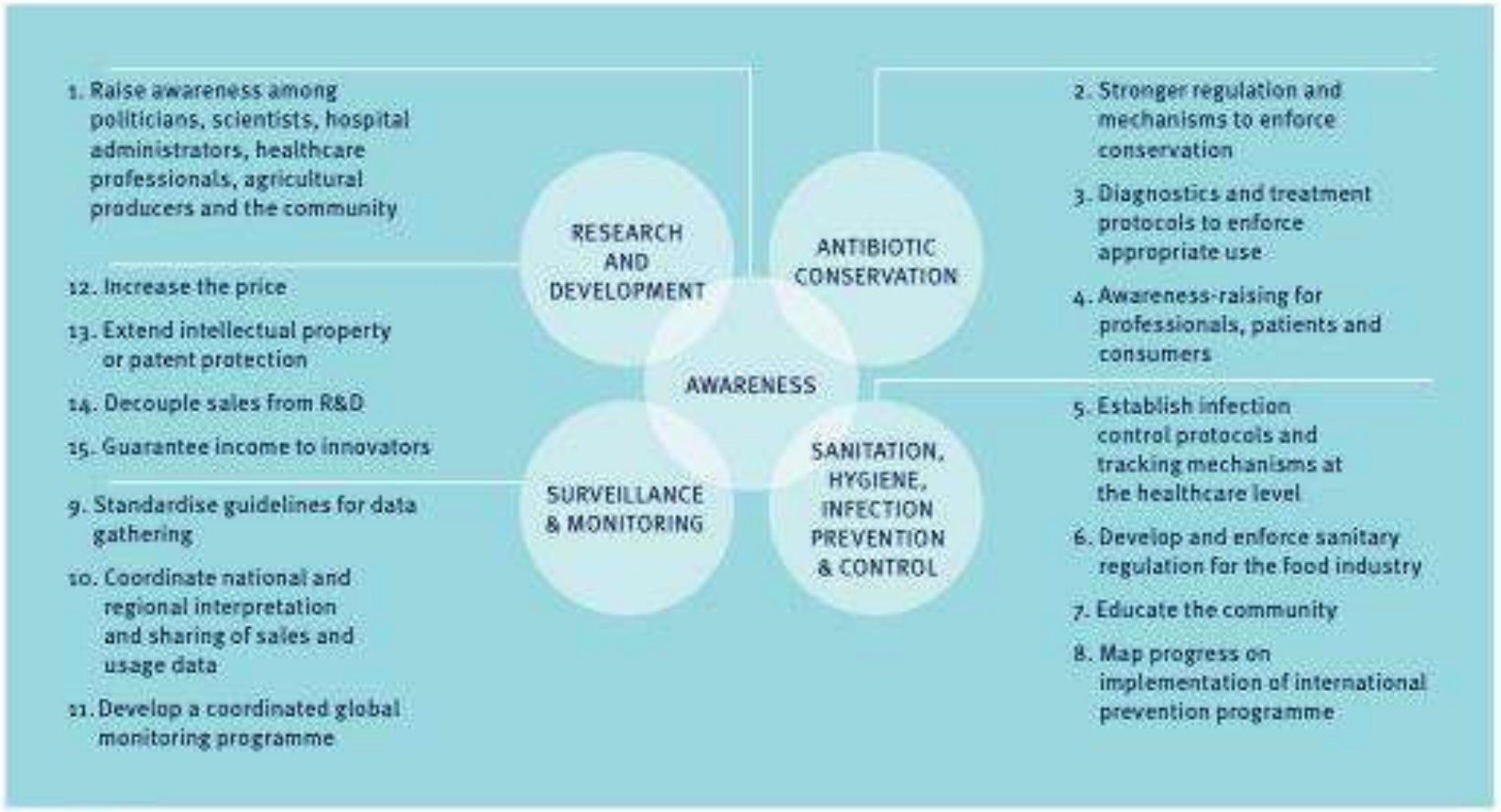


EXHIBIT 8: Five fronts of action to combat antimicrobial resistance[55]

Yu A, Flott K, Chainani N, Fontana G, Darzi A. Patient Safety 2030. London, UK: NIHR Imperial Patient Safety Translational Research Centre, 2016.

The problem: Facilities host MR germs

- 1 in 7 patients will develop a HAIs during and hospitalization in LMCIs
- MR germs are a frequent cause of HAIs
- Unprepared facilities offers lots of opportunities for germs to contaminate constructions and colonize patients/providers
- The SARS pandemic has put a lot of pressure on hospital design and flow

Allegranzi B, Bagheri Nejad S, Combescure C, Graafmans W, Attar H, Donaldson L, Pittet D. Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis. Lancet. 2011 Jan 15;377(9761):228-41.

Box 2

Epidemiological definitions used in this report

HCAI prevalence
Number of infection episodes or infected patients per 100 patients present in the health-care setting or ward at a given point in time.

HCAI incidence
Number of new infection episodes or new patients acquiring an infection per 100 patients followed up for a defined time period. Periods vary according to the patient population. For SSI, it is usually 30 days after surgery (1 year in the case of prosthesis or implant), whereas it refers to the duration of hospital or ward stay for other infections.

HCAI incidence density
Number of infection episodes per 1000 patient-days or device-days.

Developed countries
High-income countries according to the World Bank classification 2009.[6]

Developing countries
Low- and middle-income countries according to the World Bank classification 2009.[6]

Table 2.1

Main steps and components of a HCAI surveillance system

Surveillance steps	Components
1. Planning	• Assessment of available expertise, facilities and resources. • Identification of specific objectives, scope, and methods, according to the local reality. • Selection of standardized definitions and preparation of surveillance protocols.
2. Implementation	• Clinical data collection and other investigations conducted. • Completion and finalization of data collection forms. • Ongoing laboratory surveillance of sentinel microorganisms.
3. Analysis and feedback	• Data analysis and interpretation. • Local feedback adapted to the most appropriate means.
4. Interventions driven by surveillance	• Identification of appropriate and feasible interventions and priority areas according to specific results of surveillance. • Repetition of surveillance activities

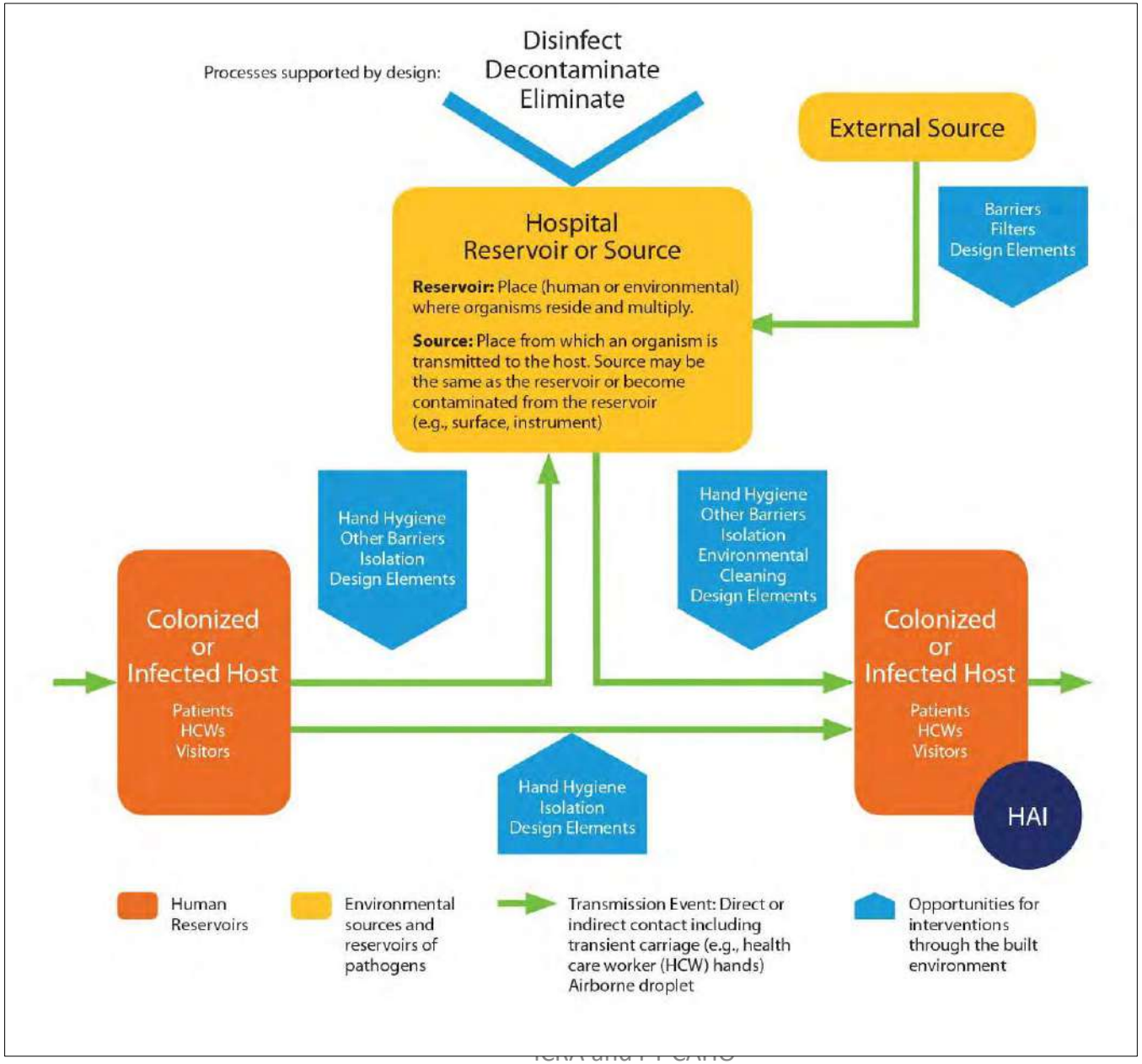
Understanding the Role of Facility Design in the Acquisition and Prevention of Healthcare-Associated Infections

Kendall K. Hall, MD, MS, and Douglas B. Kamerow, MD, MPH

There is also growing evidence that the built environment plays a significant role in the transmission of pathogens in healthcare settings. Abundant data demonstrate widespread environmental contamination with major nosocomial pathogens (Hota, 2004), well-described outbreaks of HAIs with molecular epidemiologic linkage to an environmental source, and outbreaks that have been interrupted only after interventions to eliminate the environmental source of the pathogen (Weber, Rutala, Miller, Huslage, & Sickbert-Bennett, 2010).

PREFERRED CITATION: Hall, K. K., & Kamerow, D. B. (2013). Understanding the role of facility design in the acquisition and prevention of healthcare-associated infections. *Health Environments Research & Design Journal 7*(Supp), 13–17.

Figure 3: The chain of transmission adapted from Zimring et al., 2013[49]



Zimring, C., Jacob, J. T., Denham, M. E., Kamerow, D. B., Hall, K. K., Cowan, D. Z., … Steinberg, J. P. (2013). The role of facility design in preventing the transmission of healthcare-associated infections: Background and conceptual framework. *Health Environments Research & Design Journal, 7*(Suppl), 18–30.

ICRA - Infection Control Risk Assesment -

- **Definition:** An ICRA is multidisciplinary, organizational, documented process that after considering the facility's patient population and program:
- Focuses on reduction of risk from infection,
- Acts through phases of facility planning, design, construction, renovation, facility maintenance, and
- Coordinates and weighs knowledge about infection, infectious agents, and care environment, permitting the organization to anticipate potential impact.

https://www.premiersafetyinstitute.org/safety-topics-az/building-design/infection-control-risk-assessment-icra/

ICRA: **Design Phase**

- The design area requires "**long-range planning**" for new or renovated buildings and adds a new element "finishes and surfaces" a critical feature over the lifetime of the facility. Considerations include:
- **Number, location, and type of airborne infection isolation and protective environment rooms**.
- Location of **special ventilation and filtration** such as emergency department waiting and intake areas.
- **Air handling and ventilation needs** in surgical services, airborne infection isolation and protective environment rooms, laboratories, local exhaust systems for hazardous agents, and other special areas.
- **Water systems** to limit Legionella sp. and other waterborne opportunistic pathogens.
- Finishes and surfaces.

https://www.premiersafetyinstitute.org/safety-topics-az/building-design/infection-control-risk-assessment-icra/

ICRA: Construction Phase

- The building and site areas anticipated to be affected by construction shall include consideration of the following:
- Impact of disrupting essential services to patients and employees.
- **Determination of the specific hazards** and protection levels for each.
- **Location of patients by susceptibility** to infection and definition of risks to each.
- **Impact of potential outages or emergencies** and protection of patients during planned or unplanned outages, movement of debris, traffic flow, cleanup, and testing and certification.
- Assessment of external as well as internal construction activities.
- Location of known hazards.

https://www.premiersafetyinstitute.org/safety-topics-az/building-design/infection-control-risk-assessment-icra/

ICRA: Infection Control Risk Mitigation Phase

- The mitigation recommendations from the ICRA panel shall address the following:
- **Patient placement and relocation**.
- **Standards for barriers** and other protective measures required to protect adjacent areas and susceptible patients from airborne contaminants.
- **Temporary provisions or phasing for construction or modification of heating, ventilating , air conditioning and water supply systems.**
- **Protection from demolition.**
- Measures taken to train hospital staff, visitors and construction personnel.

https://www.premiersafetyinstitute.org/safety-topics-az/building-design/infection-control-risk-assessment-icra/

Question 1: Type of work to be done

- Looking specifically for DUST GENERATION or SPORE ARESOLIZATION
  - Minor cutting/drilling
  - New flooring/walls/doors/cabinetry
  - Removal or addition of building structures
  - Complete demolition/renovation

- Duration
  - Hours? Days? Weeks? Months?

Question 2: 4 “types” of construction activity

- **Type A: Inspection and noninvasive activities**
  - Removal of ceiling tiles for visual inspection only, limited to one tile per 50 square feet (or 8 square feet of tile)
  - Painting (but not sanding)
  - Wall covering replacement
  - Electrical trim work
  - Minor plumbing
  - Activities which do not require cutting into walls/ceilings/floors other than for visual inspection

Question 2: 4 “types” of construction activity

- Type B: Small-scale, short duration activities that create minimal dust
  - Short duration = 1 day
  - Installation of telephone and computer cabling
  - Access to chase spaces
  - Cutting of walls or ceiling where dust migration can be controlled

Question 2: 4 “types” of construction activity

- Type C: Work that generates a moderate to high level of dust or requires demolition or removal of any fixed building components or assemblies
  - Sanding of walls for painting or wall covering
  - Removal of floor/wall coverings, ceiling tiles, and casework
  - New wall construction
  - Minor duct work or electrical work above ceilings
  - Major cabling activities
  - Any activity that cannot be completed within a single work shift

Question 2: 4 “types” of construction activity

- Type D: Major demolition and construction projects
  - Activities that require consecutive work shifts
  - Activities that require heavy demolition or removal of a complete cabling system
  - New construction

Where?

- Nursing unit
  - Hallway?
  - Patient room?
  - Ceiling?
  - Flooring?
  - Nurses' station?
- Patient Care area?
- Occupancy?
  - Business hours work?
  - Night/weekend work?
  - Patient care vs staff only?

Which areas of the hospital?

Low Risk	Medium Risk	High Risk	Highest Risk
▪ Office areas	▪ Cardiology ▪ Echocardiography ▪ Endoscopy ▪ Nuclear Medicine ▪ Physical Therapy ▪ Radiology/MRI ▪ Respiratory Therapy	▪ CCU ▪ Emergency Room ▪ Labor & Delivery ▪ Laboratories (specimen) ▪ Medical Units ▪ Newborn Nursery ▪ Outpatient Surgery ▪ Pediatrics ▪ Pharmacy ▪ Post Anesthesia Care Unit ▪ Surgical Units	▪ Any area caring for immunocompromised patients ▪ Burn Unit ▪ Cardiac Cath Lab ▪ Central Sterile Supply ▪ Intensive Care Units ▪ Negative pressure isolation rooms ▪ Oncology ▪ Operating rooms including C-section rooms

ICRA Matrix

IC Matrix - Class of Precautions: Construction Project by Patient Risk

Patient Risk Group	Construction Project Type: TYPE A	TYPE B	TYPE C	TYPE D
LOW Risk Group	I	II	II	III/IV
MEDIUM Risk Group	I	II	III	IV
HIGH Risk Group	I	II	III/IV	IV
HIGHEST Risk Group	II	III/IV	III/IV	IV

Note: Infection Control approval will be required when the Construction Activity and Risk Level indicate that **Class III** or **Class IV** control procedures are necessary.

http://www.premiersafetyinstitute.org/wp-content/uploads/ICRA-MatrixColorRevised-091109.pdf

Actions

http://www.premiersafetyinstitute.org/wp-content/uploads/ICRA-MatrixColorRevised-091109.pdf

Description of Required Infection Control Precautions by Class

	During Construction Project	Upon Completion of Project
CLASS I	1. Execute work by methods to minimize raising dust from construction operations. 2. Immediately replace a ceiling tile displaced for visual inspection	1. Clean work area upon completion of task.
CLASS II	1. Provide active means to prevent airborne dust from dispersing into atmosphere. 2. Water mist work surfaces to control dust while cutting. 3. Seal unused doors with duct tape. 4. Block off and seal air vents. 5. Place dust mat at entrance and exit of work area 6. Remove or isolate HVAC system in areas where work is being performed.	1. Wipe work surfaces with cleaner/disinfectant. 2. Contain construction waste before transport in tightly covered containers. 3. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area. 4. Upon completion, restore HVAC system where work was performed.
CLASS III	1. Remove or Isolate HVAC system in area where work is being done to prevent contamination of duct system. 2. Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. 3. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 4. Contain construction waste before transport in tightly covered containers. 5. Cover transport receptacles or carts. Tape covering unless solid lid.	1. Do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Prevention & Control Department and thoroughly cleaned by the owner's Environmental Services Department. 2. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. 3. Vacuum work area with HEPA filtered vacuums. 4. Wet mop area with cleaner/disinfectant. 5. Upon completion, restore HVAC system where work was performed.
CLASS IV	1. Isolate HVAC system in area where work is being done to prevent contamination of duct system. 2. Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. 3. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 4. Seal holes, pipes, conduits, and punctures. 5. Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave work site. 6. All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.	1. Do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Prevention & Control Department and thoroughly cleaned by the owner's Environmental Services Dept. 2. Remove barrier material carefully to minimize spreading of dirt and debris associated with construction. 3. Contain construction waste before transport in tightly covered containers. 4. Cover transport receptacles or carts. Tape covering unless solid lid. 5. Vacuum work area with HEPA filtered vacuums. 6. Wet mop area with cleaner/disinfectant. 7. Upon completion, restore HVAC system where work was performed.

The Importance of ICRA Awareness

- Recognize Hazardous Materials
- Control Exposure
- Routes of Entry
- Health effects
- Site-Specific Consideration
- Understanding work Practices
- Understanding that the Life safety of all is still in play during construction.

Regulatory Agencies and Organizations in the US

- Centers for Disease Control (CDC)
- The Joint Commission
- Centers for Medicare and Medicaid
- Association for Professionals in Infection control an Epidemiology (APIC)
- American Society for Healthcare Engineering (ASHE)
- Facilities Guidelines Institute (FGI)
- Infection Control Professionals (IP)

What has Changed in Healthcare Construction?

- Pre Construction Activities have increased.
  - Job sequence have changed to address Patient Safety.

- Work Activities
  - Barriers
  - Negative Air
  - Material Delivery and Storage
  - Increased Understanding of the work environment
  - Continue Life Safety during work being done

- Work Area Classifications
  - Primarily based around Patient risk group.

Where is Construction Infection Control Headed

- Becoming more the normal process while doing construction, renovation or maintenance in healthcare facilities
- There is an increased understanding by all parties addressing the effects that poor practices can have.
- There is increased oversite by regulatory agencies.
- Hospitals are being cited for Construction Infractions where they were not in the past.
- Record keeping and protocol is tighter than in the past
- Those in charge are more cognizant of things affecting the status of the Hospital through regulation.
- Other Markets ie. Schools / High Tech Manufacturing
- End users requiring Clean Air Quality standards

Tools for ICRA

- https://apic.org/course/basics-of-construction-and-renovation/
- https://www.ecri.org/solutions/infection-control-risk-assessment-icra
- www.healthdesign.org/sra
- www.healthdesign.org/insights-solutions/safety-risk-assessment-20
- http://activeriskcontrol.com/tools-and- templates/.
- https://www.premiersafetyinstitute.org/safety-topics-az/building-design/building-design-links/
- https://www.premiersafetyinstitute.org/safety-topics-az/building-design/infection-control-risk-assessment-icra/


Breathe

Latin America

- Growth levels of demand and health spending.
- High investment levels in some of its countries with mixed results.
- High participation of the state directly (50-60% or more) or through social security systems with a high level of regulation.
- High levels of waste due to fragmentation and misaligned interests.
- Great inequity in the provision of services
- Lack of systematic reports on levels of quality of care
- 625 M of people in 30+ countries

Call to action in Latinamerica

International Journal for Quality in Health Care, 2020, 1–2
doi: 10.1093/intqhc/mzaa062
Perspectives on Quality

Perspectives on Quality

The COVID-19 pandemic: A call to action for health systems in Latin America to strengthen quality of care

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We make a call to action to all interested parties in the Latin American region to incorporate quality and patient safety policies and implementation strategies into national health sector plans as part of the response to the COVID-19 pandemic.

Special attention should be paid:

- *the strengthening of care processes for vulnerable populations,*
- *reorganize the flow of patients,*
- *strengthen supply chain systems,*
- *promote self-protection,*
- *care for the well-being of healthcare providers, including second victims*
- *and ensure person-centered care with adequate communication between providers, patients, and families*

Quality in Practice

'Adiós Bacteriemias': a multi-country quality improvement collaborative project to reduce the incidence of CLABSI in Latin American ICUs

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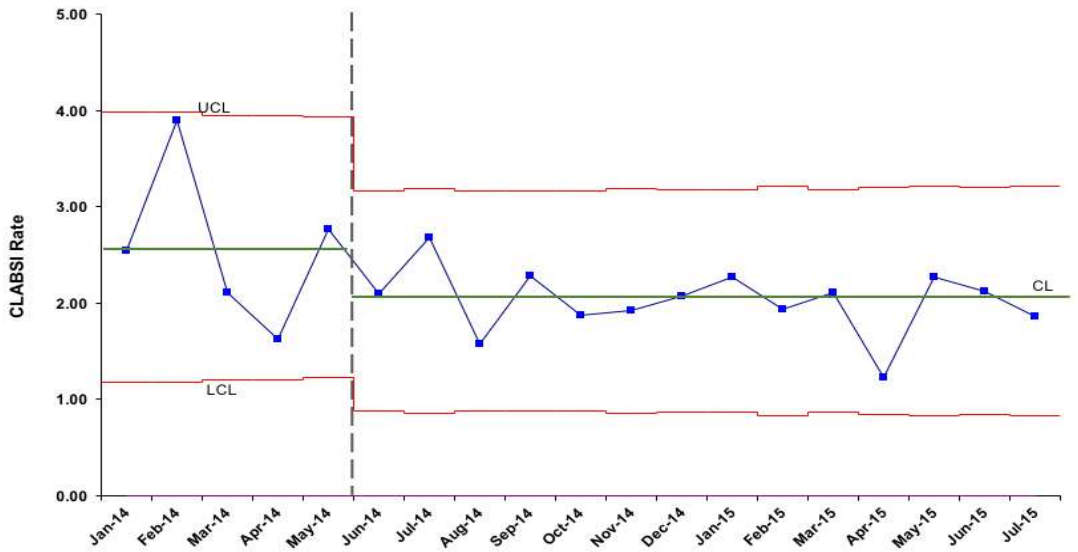

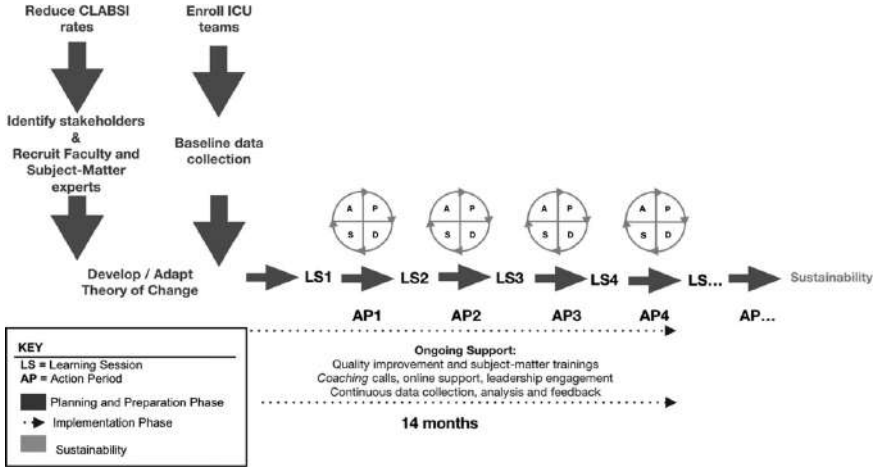

Figure 1 Adaptation of IHI's Breakthrough Series (BTS) Collaborative Model.

CLICSS 10 años
Consorcio Latinoamericano de Innovación, Calidad y Seguridad en Salud

International Journal for Quality in Health Care, 2015, 27(5), 405–411
doi: 10.1093/intqhc/mzv065
Advance Access Publication Date: 7 September 2015
Quality in Practice

Quality in Practice

A multimodal intervention to improve hand hygiene in ICUs in Buenos Aires, Argentina: a stepped wedge trial

VIVIANA RODRIGUEZ[1], CAROLINA GIUFFRE[2], SILVIA VILLA[2], GRISELDA ALMADA[2], NITTITA PRASOPA-PLAIZIER[3], MONICA GOGNA[4], LUZ GIBBONS[1], EZEQUIEL GARCÍA ELORRIO[1], and THE ARGENTINIAN GROUP HAND HYGIENE IMPROVEMENT[1]

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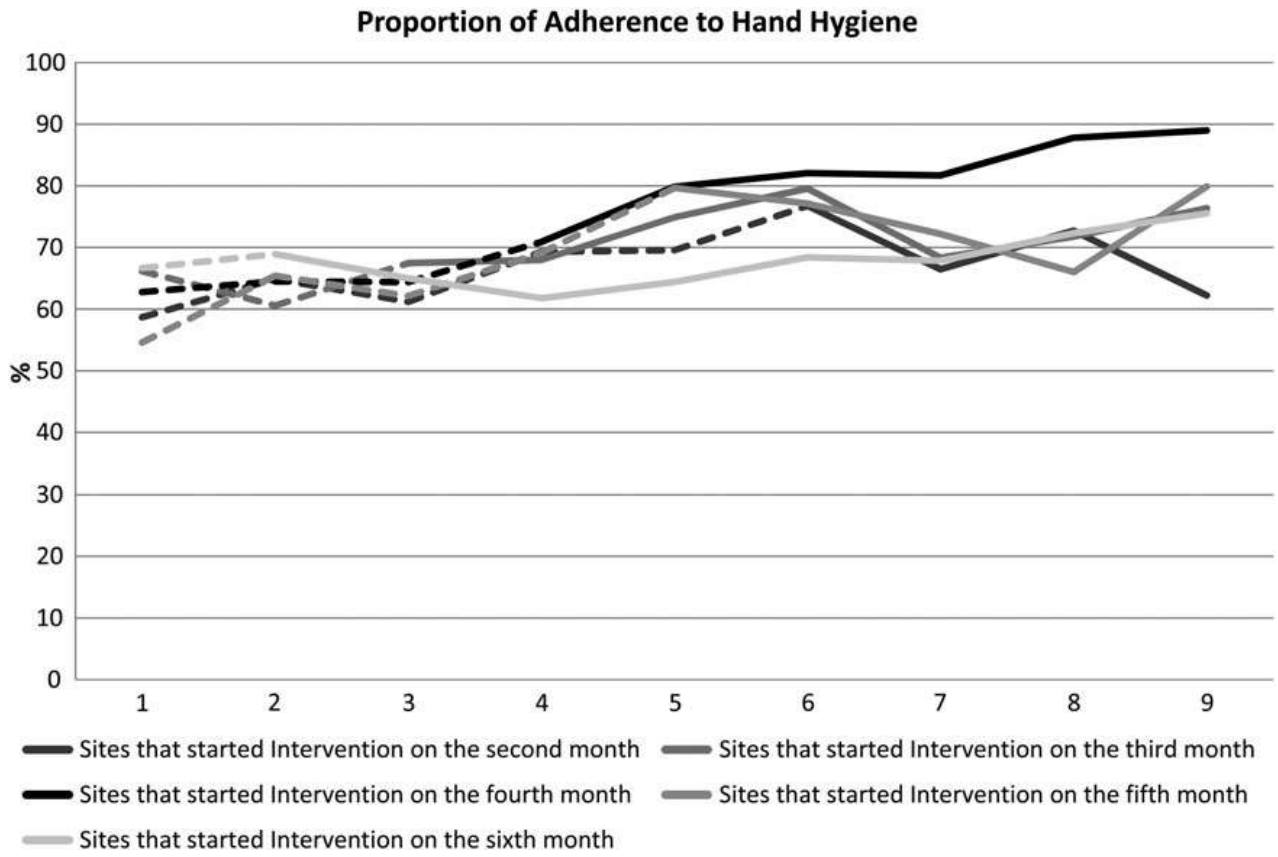
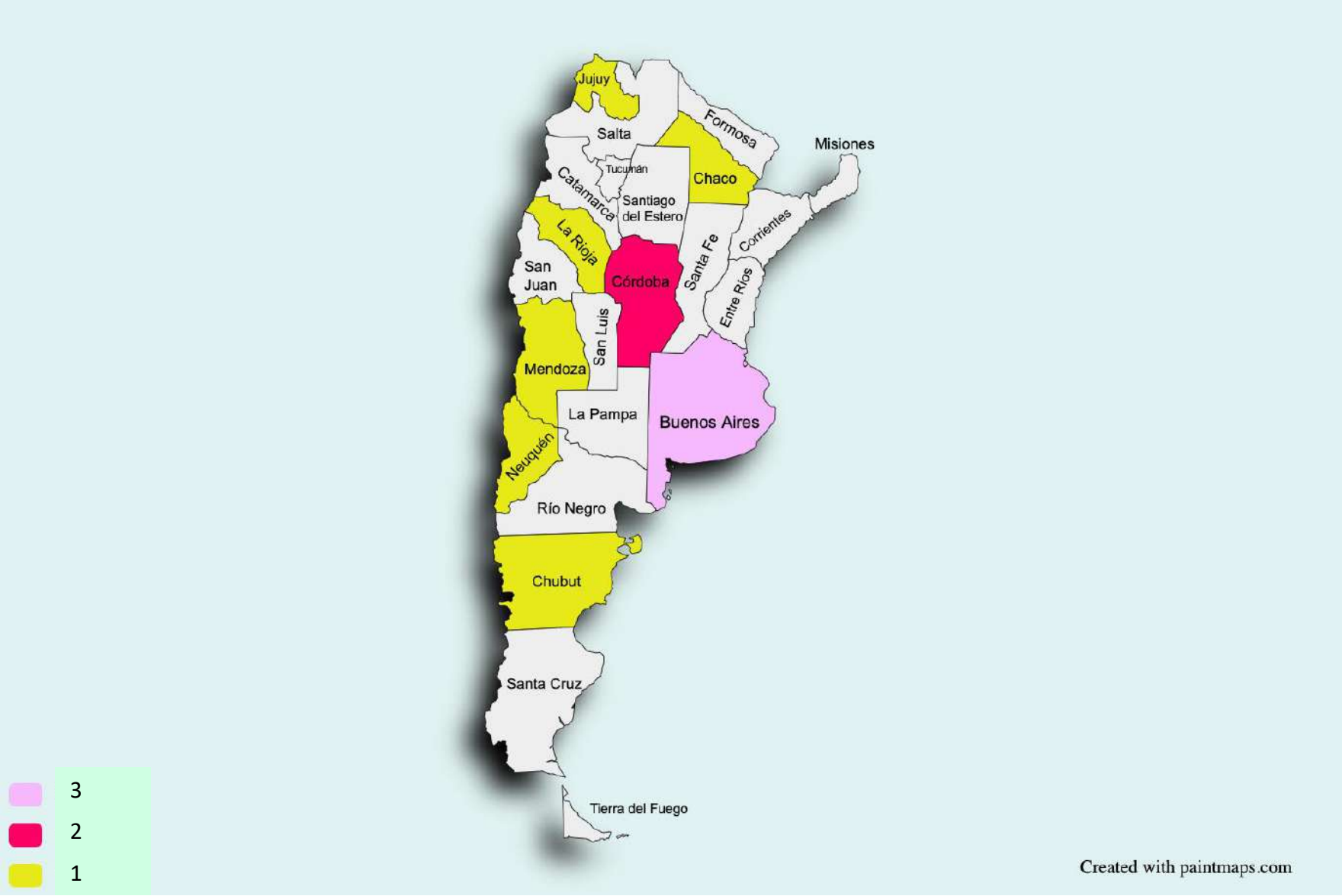


Figure 2 Proportion of adherence to hand hygiene by month (1–9) and sites (according to the intervention starting month). Note: The dotted line shows the control period and the straight line shows the intervention period.

5C: Site distribution



Aims

To support ICUs during the Pandemic

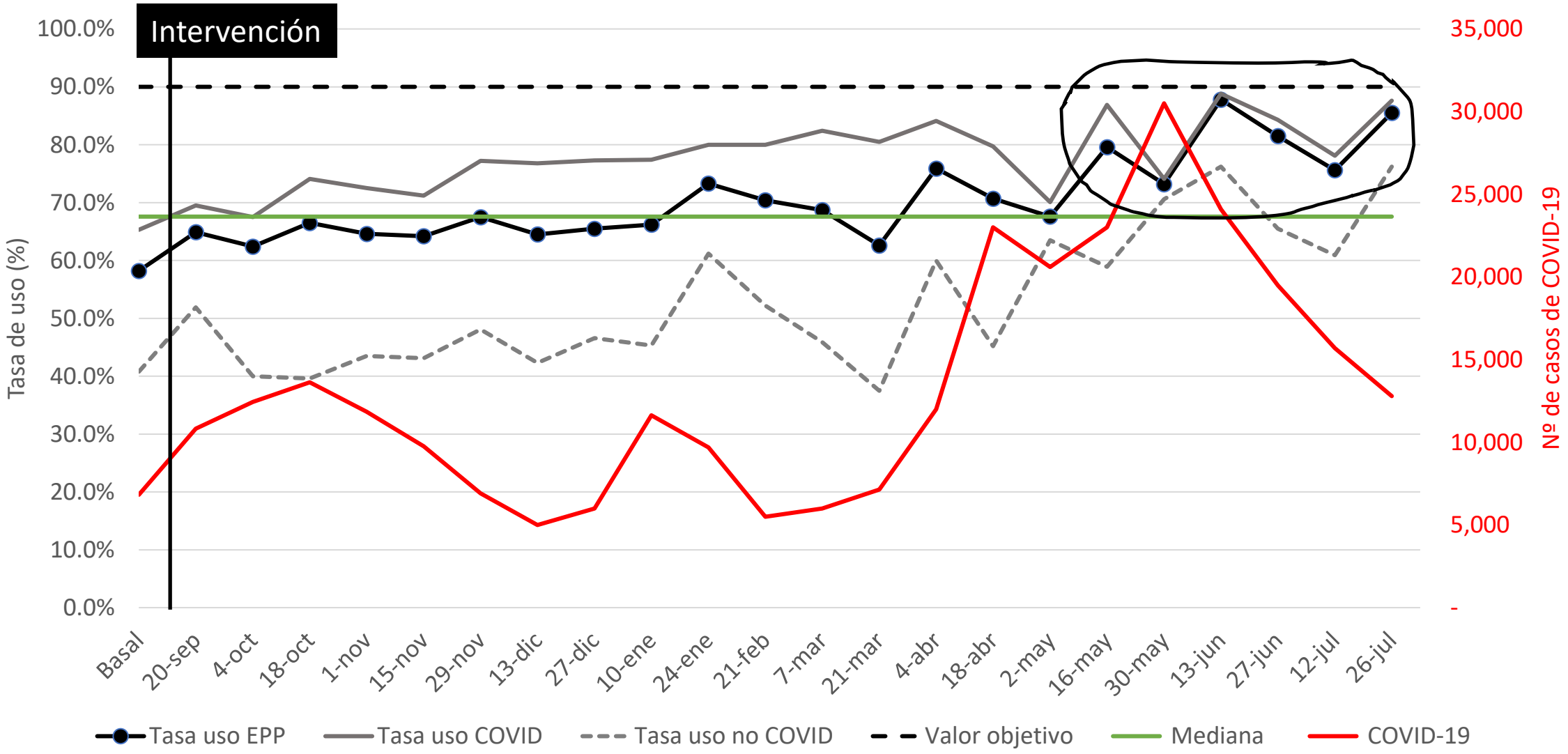
- Achieve adequate use of PPE in 90% of encounters with the patient,
- Achieve 90% compliance with objectives related to patient flow,
- Provide 90% of professionals with emotional support tools.
- Maintain a 90% performance in patient safety indicators.

Methods

- We develop a quality improvement collaborative in 14 public sector ICUs
- Design: interrupted, uncontrolled time series
- Over a period of 56 weeks:
  - 6-week pre-intervention period (baseline measurement)
  - 50 week intervention period (intervention)

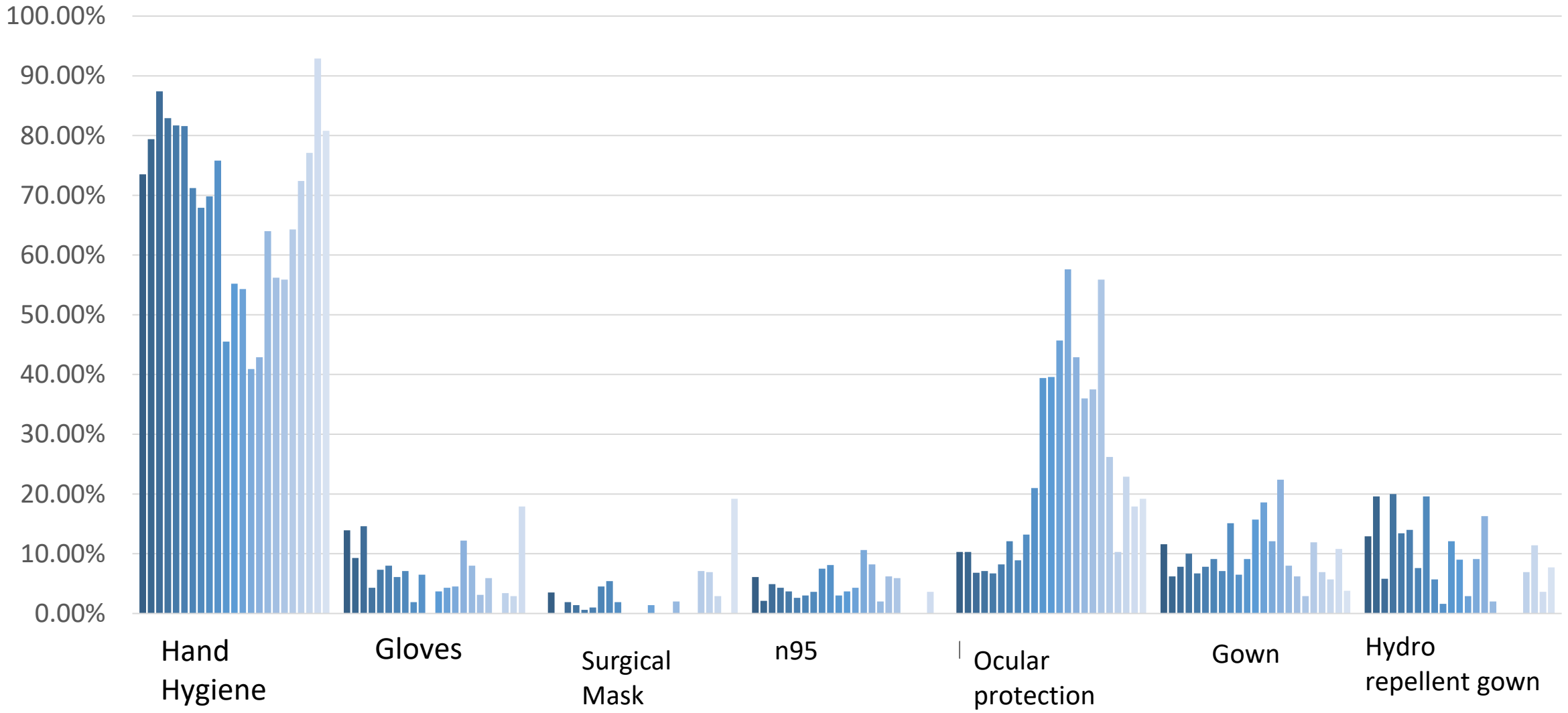
Garcia-Elorrio, E. *et al.* (2019)
Jandoc, R. *et al.* (2015)
Wilson, T., Berwick, D. M. and Cleary, P. D. (2003)

PPE Usage

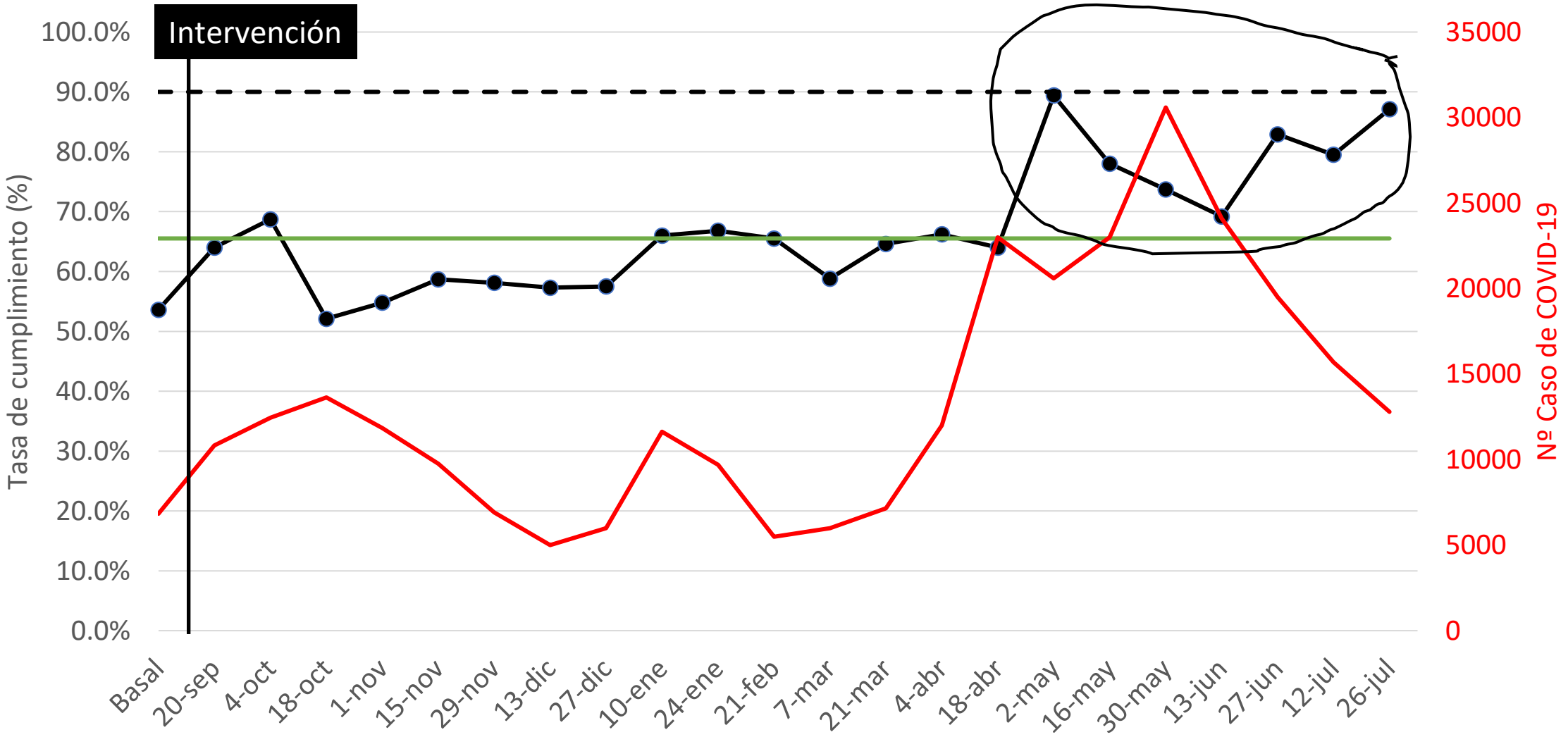


Rocco JP, 2011

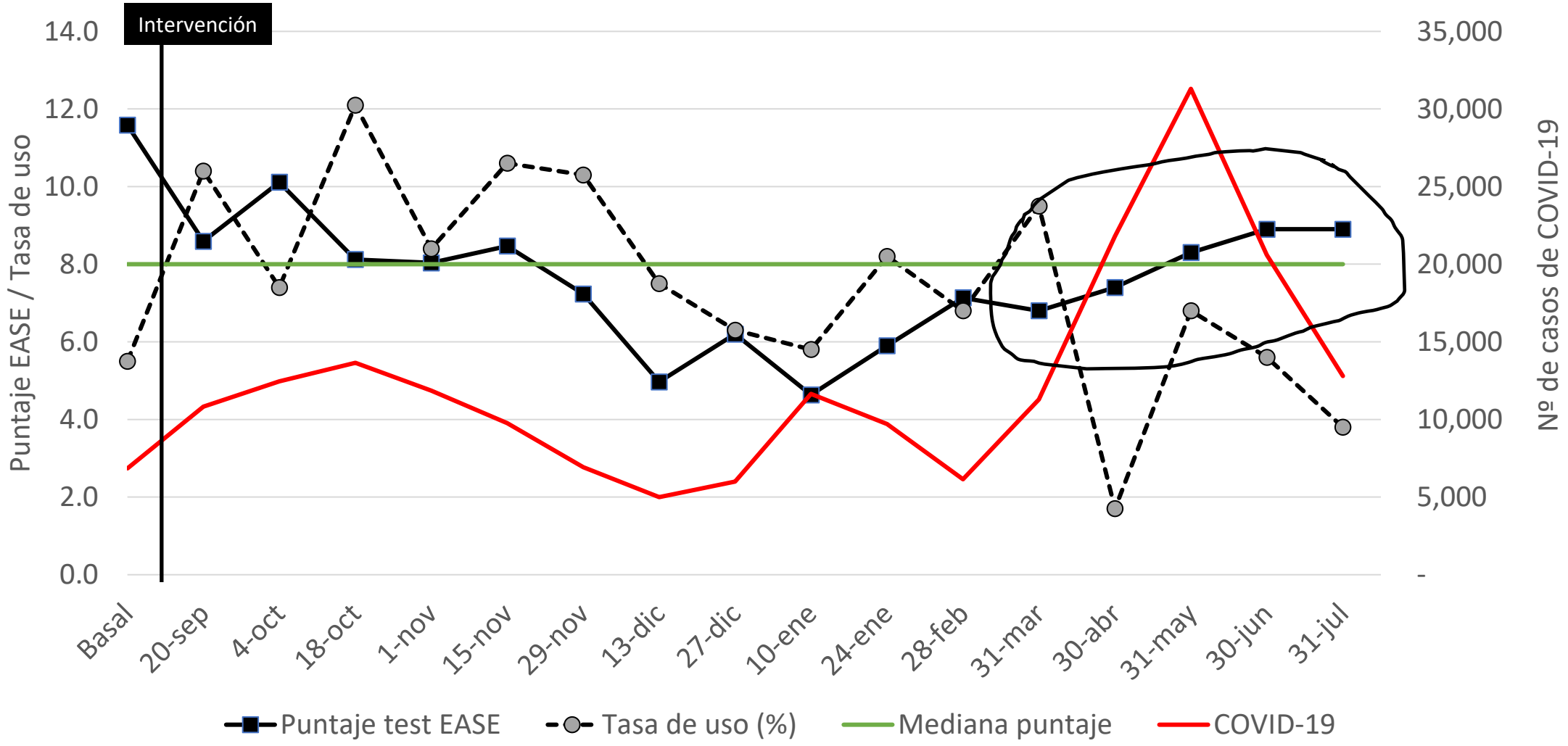
Causes of EPP misusage



Usage of Daily goals checklist



Emotional impact during the pandemic screening



Antibiotic Stewardship Programs (ASPs)

- Antibiotic Stewardship Programs (ASPs) have been developed for **optimizing the treatment of infections, to reduce infection-related morbidity and mortality**, to and to reduce unnecessary a**limit the appearance of multidrug-resistant organisms (MDROs),** ntimicrobial use.
- This practice ensures the optimal **selection, dose, and duration of antimicrobials** and leads to the best clinical outcome for the treatment or prevention of infection (Álvarez-Lerma et al., 2018).
- **Intensive care units (ICUs) have been taking the heaviest toll in terms of resource** use, affected staff and burden of disease and there are many global cases describing the impact in performance during the COVID-19 pandemic (Cook, Marshall and Fowler, 2020).

The Covid Aftermath

- During the first part of the COVID-19 pandemic period in March 2020, **a rise in the consumption of molecules included in the treatment protocols for the treatment of COVID-19,** such as ceftriaxone and azithromycin, was noticed. In subsequent months(April--May 2020), an increase in the consumption of extended-spectrum drugs was observed, which may be related to an increment in the device-related (mainly catheter-related bloodstream infections) and super infections (Grau et al., 2021).
- **In the first 6 months of the pandemic, nearly three-quarters of patients received antibiotic therapy (Langford et al., 2021)**. Bacterial co-infection rates for SARS-CoV-2 have been estimated between 6.1% and 8.0%. As such, antibiotic prescribing is significantly higher than the prevalence of bacterial co-infection suggesting that a large number of antibiotic prescriptions are unnecessary, increasing the risk of preventable harm including adverse events, Clostridium difficile infections, and antimicrobial resistance.

The proposed solution

- **Hospital antibiotic stewardship programs can increase infection cure rates while reducing** (Karanika et al., 2016; Baur et al., 2017; Davey et al., 2017):
  - Treatment failures
  - C. difficile infections
  - Adverse effects
  - Antibiotic resistance
  - Hospital costs and lengths of stay
- To address gaps in performance, Quality improvement collaboratives (QIC) have been used to improve health care for several decades disseminating evidence and learnings from implementation science (Wells, 2018; Garcia-Elorrio, 2019).

Conclusions

- Infection control is a critical component of quality of care and patient safety.
- AMR is becoming even a more important factor for healthcare than in previous years. The Pandemic made worsened the situation.
- ICRA it is an important strategy to reduce the burden of HAIs through adequate planning and control during construction and renovation.
- QI and Infection control can play very well along together.

Global reference on ICRA

https://www.ashe.org/infectionprevention

Thanks!

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