SARI CLINICAL CARE TRAINING

QUALITY IN CRITICAL CARE

World Health Organization

HEALTH EMERGENCIES programme

Learning objectives

At the end of this lecture, you will be able to:

- Define high quality care.
- Describe global variation in critical care.
- Describe quality improvement (QI) work and its benefits.
- Describe a practical approach to carrying out QI work at your hospital using sepsis as an example.

Why quality matters in the ICU?

"We may think we're doing a great job, but impossible to know without measuring."

High quality care

- Safe
  - avoids harm to patients with care intended to help them
- Timely
  - reduces waiting for patients and those giving care
- Efficient
  - reduces waste
- Equitable
  - reduces gaps or disparities in care

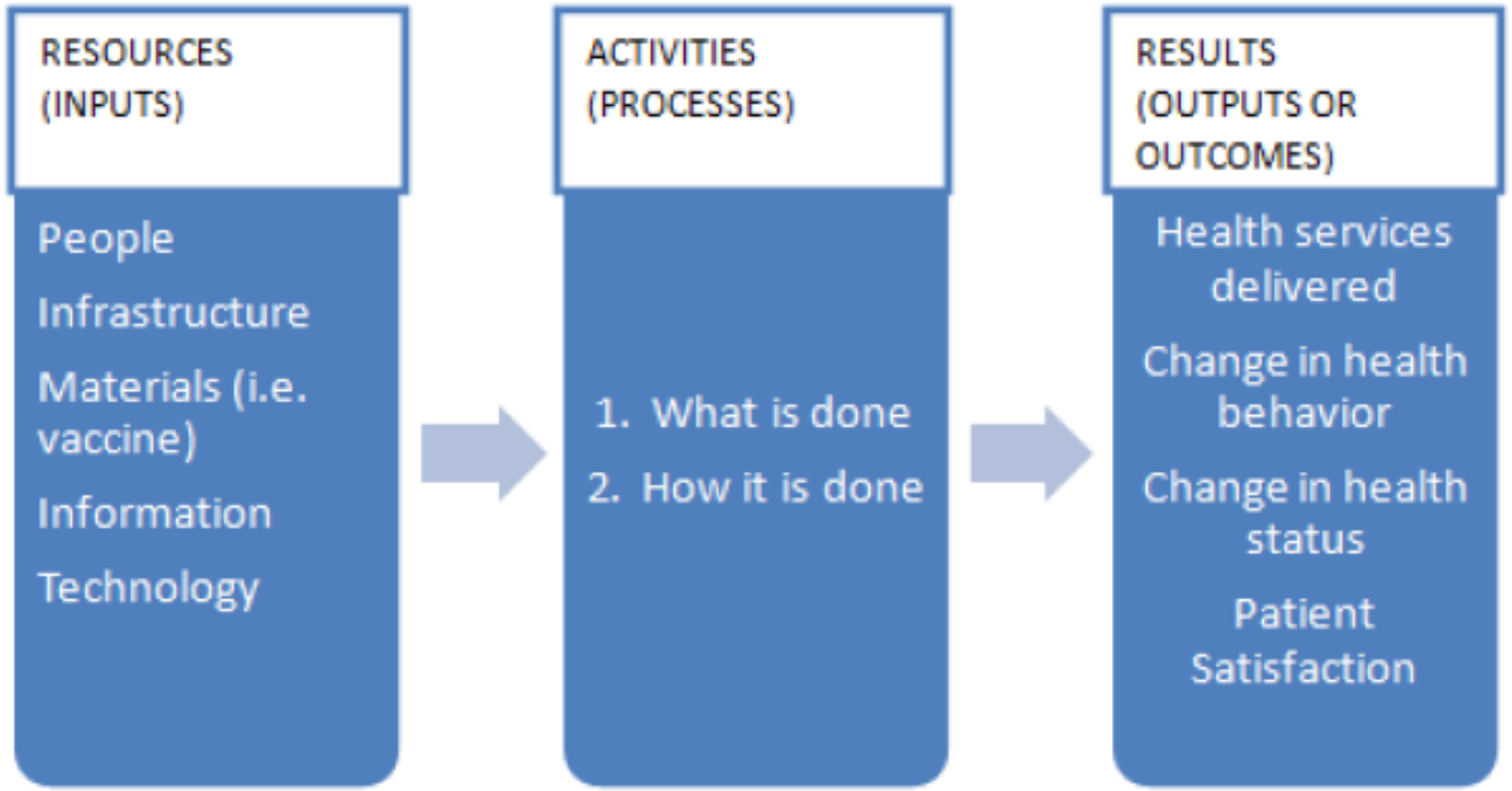
- **Effective**
  - **matches care to science,**
  - **avoids use of ineffective care and underuse of effective care**
  - **adheres to standards of care**
  - **measures processes of care and compares with benchmarks**
- **Patient-centred**
  - **respects the individual patient**

(Institute of Medicine, Washington DC, 2001)

What's special about a critical care system?

- Interdisciplinary team of health care workers.
- Frequent monitoring, lots of information processing.
- Complex, expensive technology and equipment.
- Rapid clinical-decision making.
- Complex risk-benefit analysis.
- Invasive (risky) interventions.

Health care delivery system



Critical care as a system

Resources	Processes	Outcomes
ICU organization •number of beds •architecture/location •integration into health care system . **Availability of equipment and supplies** •medicines, ventilators, etc. **Availability of staffing** •intensivists, physician, specialists •ICU nurses, patient ratio •pharmacists, dieticians, respiratory therapists, physiotherapists, biomedical technicians, etc.	Refer to any interventions done for patients, i.e. procedures, medications, etc. •Implementing appropriate IPC when caring for influenza patients. •Administering appropriate antimicrobial therapy for patients with sepsis. •Application of LPV for patients with ARDS. •Implementing ABCDE bundle for patients.	• Mortality: adjusted for patient diagnosis, severity of illness at admission. • ICU length of stay. • Re-intubation rate. • Rate of readmission within 48 hours of ICU discharge. • Quality of life in ICU survivors.



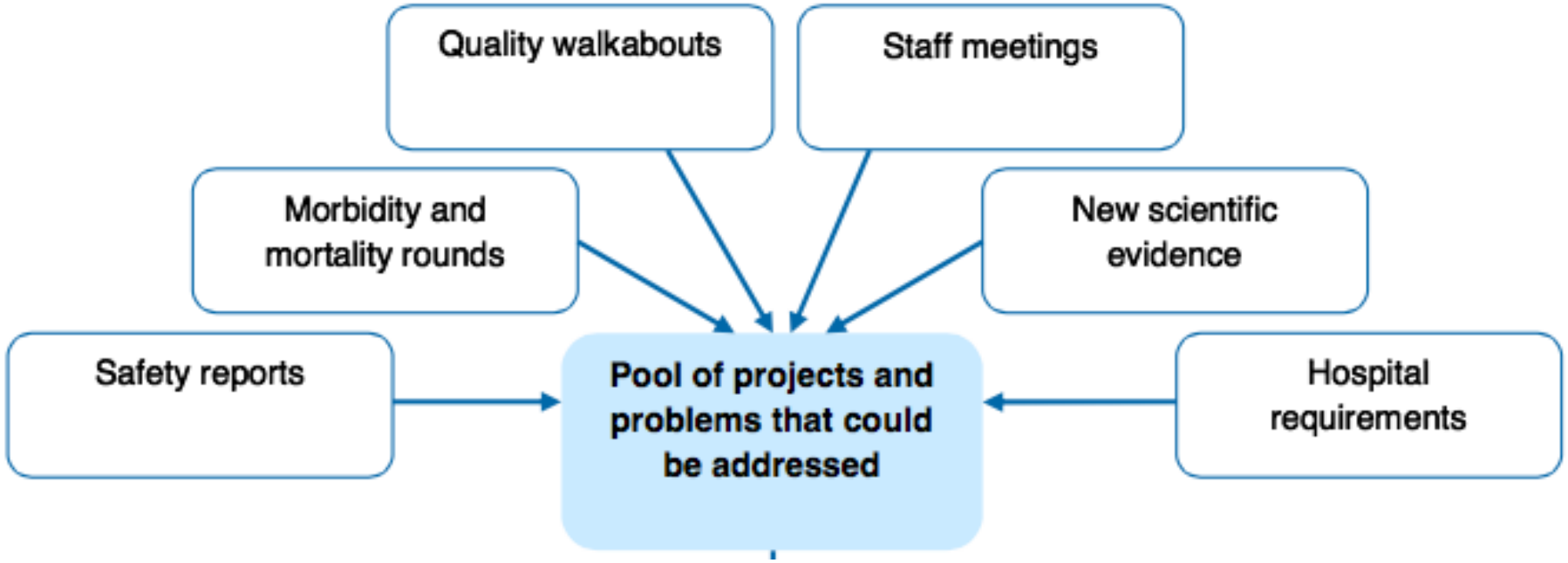
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Quality improvement (QI) is systematic and continuous activities that improve outcomes

- Improves patient health outcomes.
- Improves efficiency:
  - less system failures and redundancy.
- Reduces waste and costs:
  - avoid costs associated with process failures, errors and poor outcomes.
- Creates systems of care are reliable and predictable:
  - proactive processes that recognize and solve problems before they occur, culture of change.
- Improves communication with stakeholders.

Select a QI project



Assessment of Global Incidence and Mortality of Hospital-treated Sepsis

Current Estim

Carolin Fleischmann
Peter Schlattmann[6],
Trialists

Conclusions: Population-level epidemiologic data for sepsis are scarce and nonexistent for low- and middle-income countries. Our analyses underline the urgent need to implement global strategies to measure sepsis morbidity and mortality, particularly in low- and middle-income countries.



Figure 2. World map of included studies on sepsis and severe sepsis that present population-level incidence rates on hospital-treated sepsis and severe sepsis (United States, Germany, Australia, Taiwan, Norway, Spain, and Sweden). Note that only studies on hospital-treated sepsis and severe sepsis were included in the metaanalysis.

Annual estimates

31.5 million cases of sepsis

19.4 million severe sepsis

5.3 million deaths

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Assessment of the worldwide burden of critical illness: the Intensive Care Over Nations (ICON) audit

*Jean-Louis Vincent, John C Marshall, Silvio A Ñamendys-Silva, Bruno François, Ignacio Martin-Loeches, Jeffrey Lipman, Konrad Reinhart, Massimo Antonelli, Peter Pickkers, Hassane Njimi, Edgar Jimenez, Yasser Sakr, on behalf of the ICON investigators**

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See Comment page 343

*Details of ICON investigators are given in the appendix

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Summary

Background Global epidemiological data regarding outcomes for patients in intensive care units (ICUs) are scarce, but are important in understanding the worldwide burden of critical illness. We, therefore, did an international audit of ICU patients worldwide and assessed variations between hospitals and countries in terms of ICU mortality.

Methods 730 participating centres in 84 countries prospectively collected data on all adult (>16 years) patients admitted to their ICU between May 8 and May 18, 2012, except those admitted for fewer than 24 h for routine postoperative monitoring. Participation was voluntary. Data were collected daily for a maximum of 28 days in the ICU and patients were followed up for outcome data until death or hospital discharge. In-hospital death was analysed using multilevel logistic regression with three levels: patient, hospital, and country.

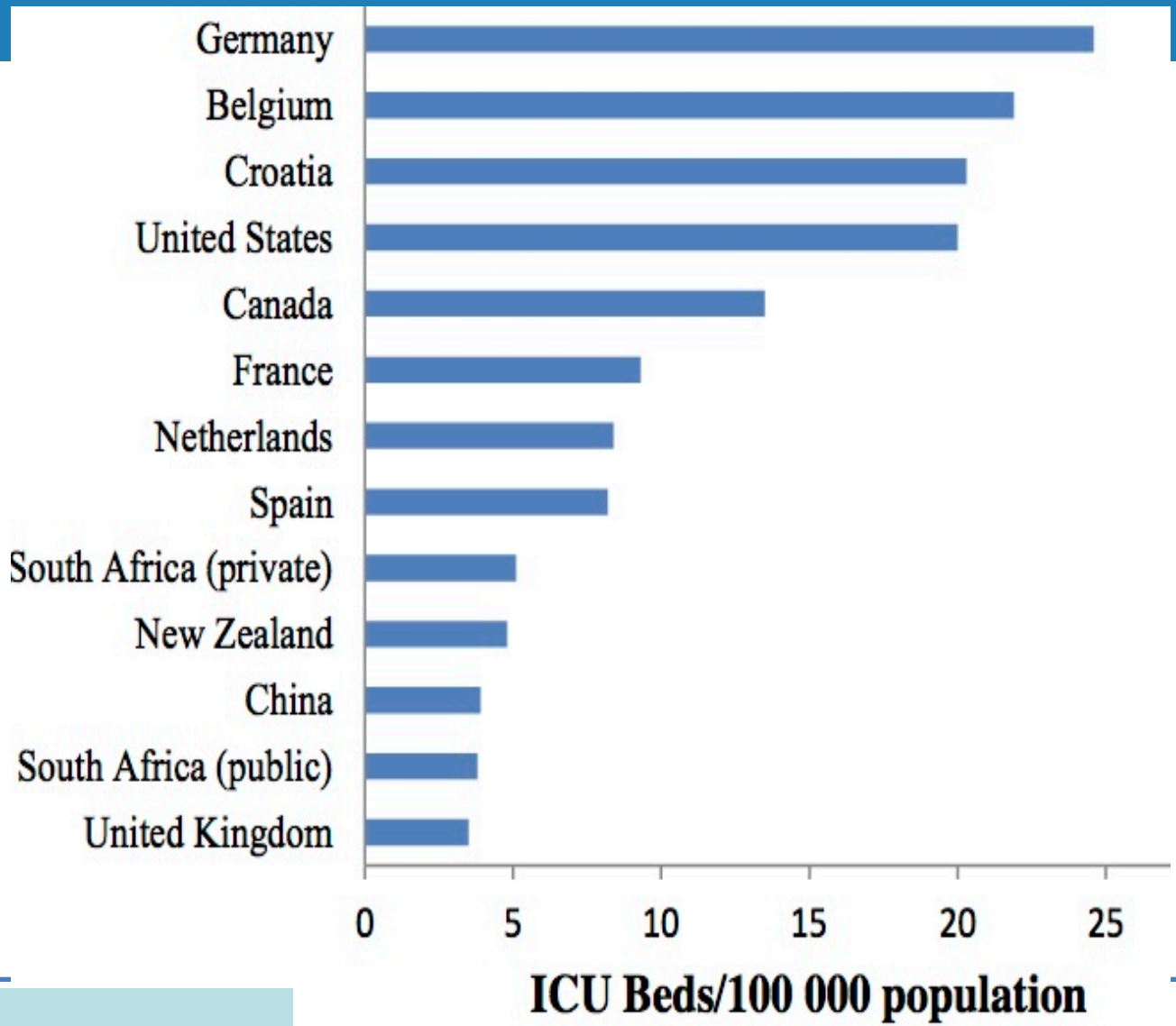
Findings 10 069 patients were included from ICUs in Europe (5445 patients; 54·1%), Asia (1928; 19·2%), the Americas (1723; 17·1%), Oceania (439; 4·4%), the Middle East (393; 3·9%), and Africa (141; 1·4%). Overall, 2973 patients (29·5%) had sepsis on admission or during the ICU stay. ICU mortality rates were 16·2% (95% CI 15·5–16·9) across the whole population and 25·8% (24·2–27·4) in patients with sepsis. Hospital mortality rates were 22·4% (21·6–23·2) in the whole population and 35·3% (33·5–37·1) in patients with sepsis. Using a multilevel analysis, the unconditional model suggested significant between-country variations (var=0·19, p=0·002) and between-

84 countries (3 African countries included: Morocco, Tunisia and South Africa). Increase risk of sepsis-related death in-hospital associated with decreasing in national income

Global variation in ICU

Substantial variation exists globally and within countries, some of which may influence patient outcomes:

- **e.g. # ICU beds per population**
- **e.g. physician staffing (low vs high intensity)**
- **e.g. availability of medicines, technology and supplies.**



Murthy and Wunsch, *Critical Care*, 2012.

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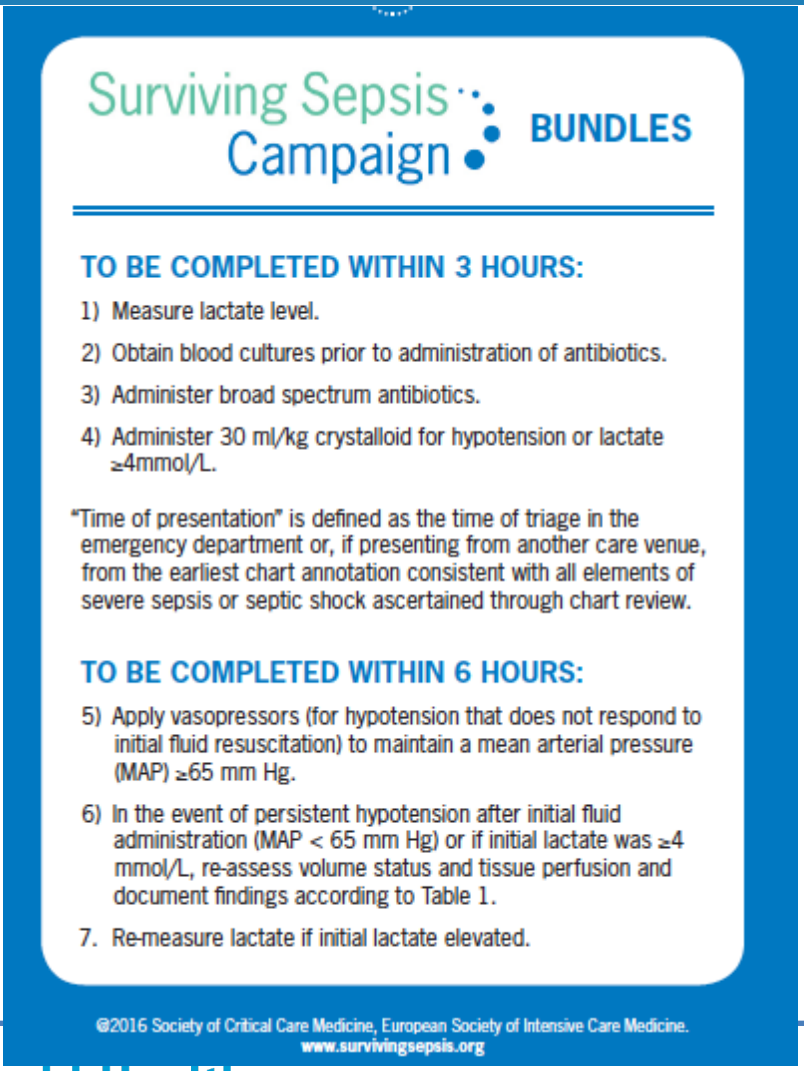
Global Variation in ICU

Possibility to implement all sepsis resuscitation bundles

	African countries	High income countries	p value
- **Lactate**	64 (24.3)	43 (97.7)	< 0.001
- **Cultures**	188 (71.5)	44 (100)	< 0.001
- **Antibiotics**	204 (77.6)	44 (100)	< 0.001
- **Hypotension**	238 (90.5)	44 (100)	0.03
- **CVP/$ScvO_2$**	70 (26.6)	41 (93.2)	< 0.001

Baelani et al Crit Care 2011

QI project example: adherence to SSC bundles



Surviving Sepsis Campaign BUNDLES

TO BE COMPLETED WITHIN 3 HOURS:

1) Measure lactate level.
2) Obtain blood cultures prior to administration of antibiotics.
3) Administer broad spectrum antibiotics.
4) Administer 30 ml/kg crystalloid for hypotension or lactate ≥4mmol/L.

"Time of presentation" is defined as the time of triage in the emergency department or, if presenting from another care venue, from the earliest chart annotation consistent with all elements of severe sepsis or septic shock ascertained through chart review.

TO BE COMPLETED WITHIN 6 HOURS:

5) Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥65 mm Hg.
6) In the event of persistent hypotension after initial fluid administration (MAP < 65 mm Hg) or if initial lactate was ≥4 mmol/L, re-assess volume status and tissue perfusion and document findings according to Table 1.
7. Re-measure lactate if initial lactate elevated.

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www.survivingsepsis.org

- **Is it measurable?**
- **Is it linked to quality and patient safety?**
- **Is it a hospital requirement?**
- **Is it synergistic or interfering with other projects**
- **How easy is it to change?**

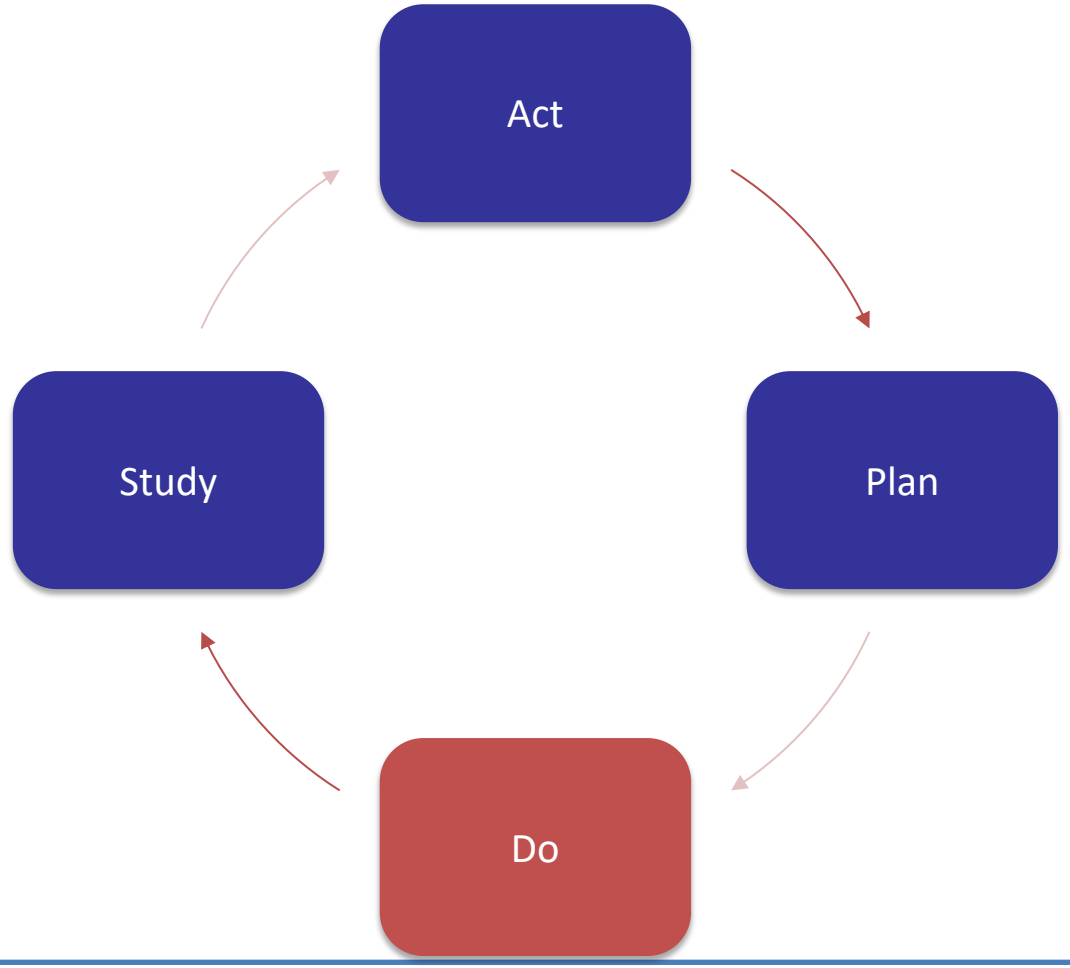
Create a QI culture and team

- A large inclusive quality team to prioritize projects:
  - clinical leaders, technical experts, day-day leaders, interdisciplinary team members, sponsors.

- Smaller teams to focus on implementation and measurement for each project selected.

- A culture of quality and safety:
  - this is everyone's responsibility and opportunity
  - the objective is to improve care, not to punish workers.

Testing changes:
in real-work settings

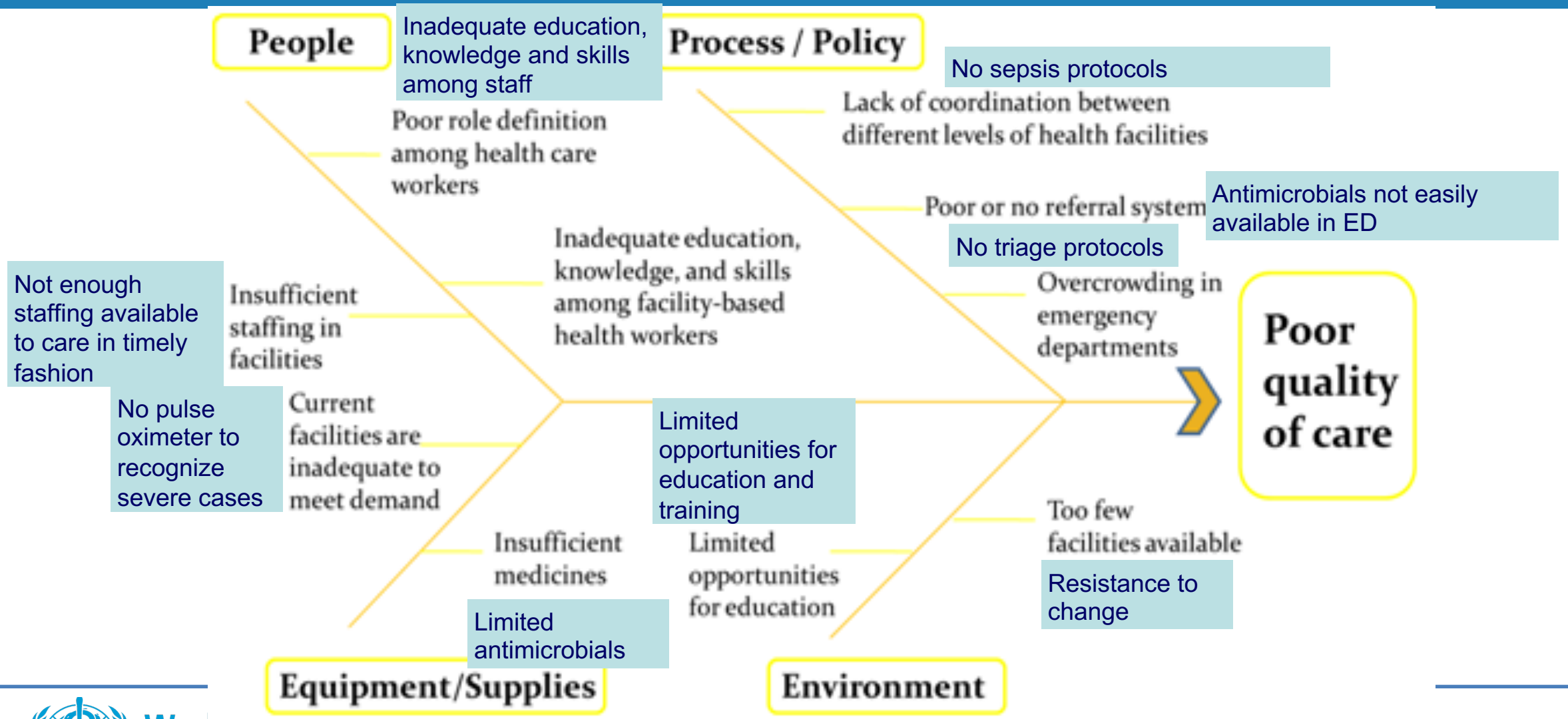


Step 1: Plan (1/4)



- Create a process map:
  - diagram the journey of the patient over time in the health care system, including the ICU
  - identify areas where challenges exist.
- Create a cause and effect diagram:
  - Diagram the potential root causes of the challenges faced by the patient.

Sample fishbone diagram for QI project "Timely antimicrobial administration to patient with sepsis in the ED"



Adapted from Yale Global Health Leadership Institute
http://nexus.som.yale.edu/ph-tanzania/?q=node/131

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Step 1: Plan (3/4)



- What are we trying to accomplish?
  - time-specific, measurable, patient focused.
- How will we know that a change is an improvement?
  - select quality indicator that matter to patients and stakeholders
  - create data collection plan.
- What changes can we make that will result in improvement?

Step 1: Plan (4/4)



Match the solution to the problem

- Close the knowledge gap:
  - adequate supervision
  - educational interventions, trainings, re-trainings.

- Encourage behaviour change:
  - audit and feedback
  - sticky messages
  - quality rounds
  - interdisciplinary rounds.

- Facilitate best practices:
  - treatment protocols, standardized order sets
  - checklists, bundles
  - improve work flow.

Education is important but not sufficient on its own

Step 2: Do



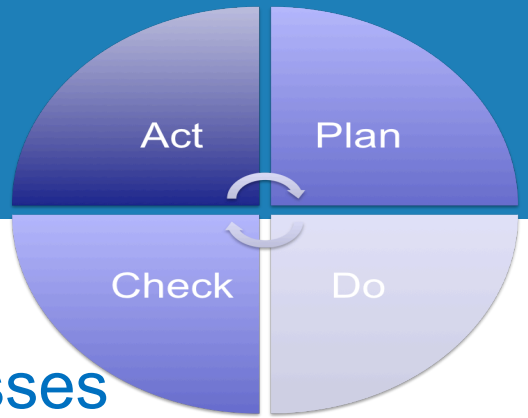
- Conduct one intervention at a time.
- Keep the intervention simple, practical, focused.
- Start with pilot test on just a few patients (2–5) over a limited time (hours/days).
- Get feedback from bedside staff.
- Refine the intervention based on pilot test.
- Then conduct larger scale implementation.

Step 3: Study



- Re-measure the quality indicator.
- Compare with baseline (before intervention).
- Was the intervention effective?

Step 4: Act



- Act on what is learned:
  - learn from your mistakes and your successes
  - all changes are not improvements.
- Use the information to modify the intervention, as needed:
  - if successful, refine, retest, then implement and standardize into practices
  - if not successful, identify issues, modify, re-test.
- Communicate your results:
  - celebrate your successes.

QI project: Summary of planning phase

- **Aim:** over the next 6 months improve compliance of timely antimicrobial therapy (within 1 hour) to 80%.
- **Quality indicator:** time from triage to antimicrobial administration. Data to be collected by chart audits.
- **Intervention:** create an order set that the doctor can activate as soon as patient is evaluated and this immediately gives notice to pharmacy.

QI project: Summary of do phase

- Created sample order set, worked with doctors (including ID), nurses and pharmacists.
- Piloted order set over one shift in the emergency department with 5 patients.
- Worked on revision of order set based on feedback from staff.
- Conducted 1 month test of order set.

QI project: Summary of study phase

Sample analysis

- Proportion (%) of eligible patients with severe pneumonia and sepsis receive appropriate antimicrobial therapy within 1 hour of triage over **one month** period.

Numerator

- Sum of the # eligible patients who had appropriate antimicrobials within the right time over **one month** period.

Denominator

- Sum # eligible sepsis patients on each day over **one month** (eligible patient-days per week).

QI project: Summary of study phase

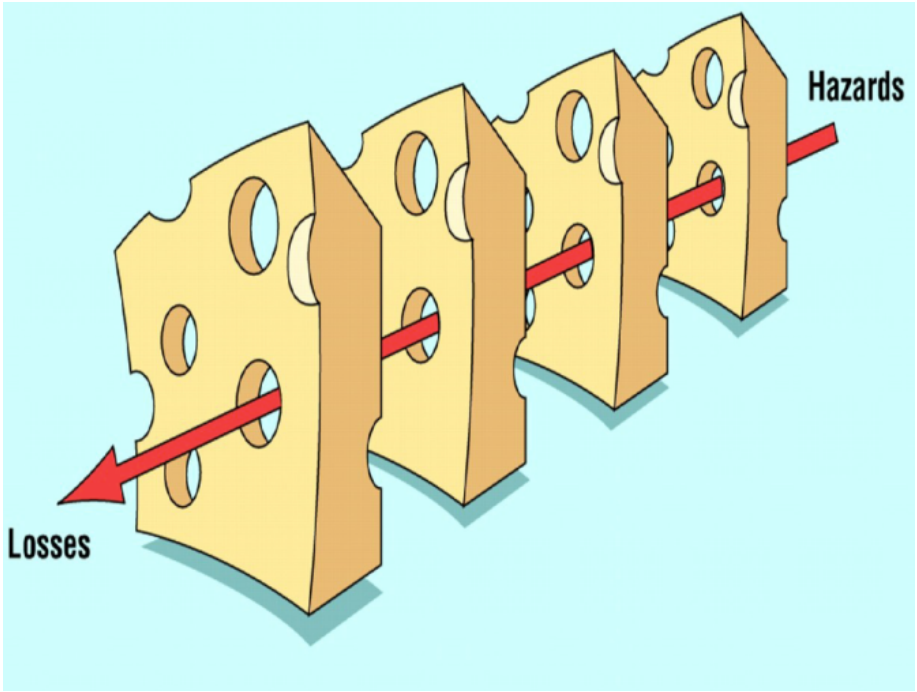
- Baseline, only 20% eligible patients with severe pneumonia/sepsis received appropriate antimicrobials within 1 hour.
- During pilot phase, 50% eligible patients with severe pneumonia/sepsis received appropriate antimicrobials within 1 hour.
- Yes, intervention effective **but** needs to be refined to improve compliance.

QI project: Summary of act phase

- Announced improvement to all stakeholders via email, posters.
- Re-worked process flow diagram to find new areas for improvement.
- Test again!

What to avoid in your QI work

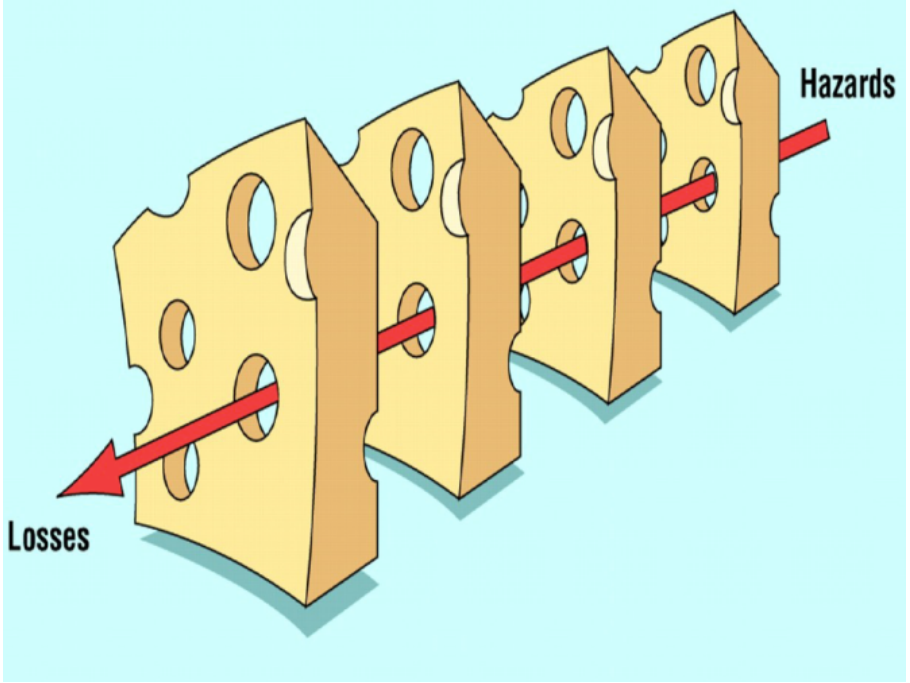
- Traditional approach to quality problems unhelpful:
  - problem = deficits in knowledge or skill in one or two persons
  - solution = discipline and remedial training
  - little attention given to system design or expected human errors.



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QI work focuses on the system

- How do quality problems **really** occur?
  - latent structural issues related to organization of care
  - work conditions: workload (too much), supervision (too little), communication (poor), equipment, knowledge, skills
  - point of care issues: cognitive and non-cognitive errors
  - it is **rarely** the case that all systems work perfectly but for one bad worker…



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Tips for successful QI programme

Don’t expect “magic bullets” from QI.

QI interventions generally produce small to modest gains – just like most drugs and procedures, these gains are nonetheless important!

We may think we’re doing a great job, but impossible to know without measuring.

The clinician's potential roles

- Be a QI team member.
- Advocate for change with hospital leadership and staff.
- Determine standards of care.
- Create guidelines, protocols, order sets, checklists.
- Train staff on new guidelines, standards.
- Implement QI projects.
- Audit and feedback (e.g. audit of adherence to CVC sterile insertion bundle with constructive, real-time feedback).
- Supervise health care workers.

Useful websites

- WHO A methodological guide for data-poor hospitals

  http://www.who.int/patientsafety/en/

- Agency for Health Care Research and Quality

  http://www.ahrq.gov/professionals/quality-patient-safety/quality-resources/

- Institute for Health Care Improvement

  https://www.ihi.org/_layouts/ihi/login/login.aspx?hidemsg=true&ReturnURL=%2fPages%2fdefault.aspx

Summary

- Systematic and continuous quality improvement work is essential because health care delivery is complex and imperfect, even with best efforts.
- Quality is the provision of safe, timely, effective, efficient, equitable, and patient-centred care.
- Quality measures are related to ICU resources/structure, processes of care, and patient outcomes. Focus on processes of care, instead of hard-to-measure outcomes.
- Use the iterative, real-time, **plan-do-study-act** cycle to test changes of improvement.
- Create an inclusive team and culture of change for a successful and sustainable QI programme.

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Contributors

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