info@eorna-congress.eu Search

EORNA
EUROPEAN OPERATING ROOM NURSES ASSOCIATION

9th EORNA Congress
16-19 May 2019
The Hague, The Netherlands

CONGRESS | SCIENTIFIC PROGRAMME & ABSTRACTS | REGISTRATION & ACCOMMODATION | PRACTICAL INFORMATION | SPONSORS & EXHIBITORS

The impact of technologies on team performance in surgery

Professor Brigid Gillespie

Griffith University & Gold Coast Health, Queensland, Australia

9th EORNA Congress, 'On the Move'
The Netherlands

Gold Coast Health
Queensland Government

Griffith UNIVERSITY

MENZIES HEALTH INSTITUTE QUEENSLAND

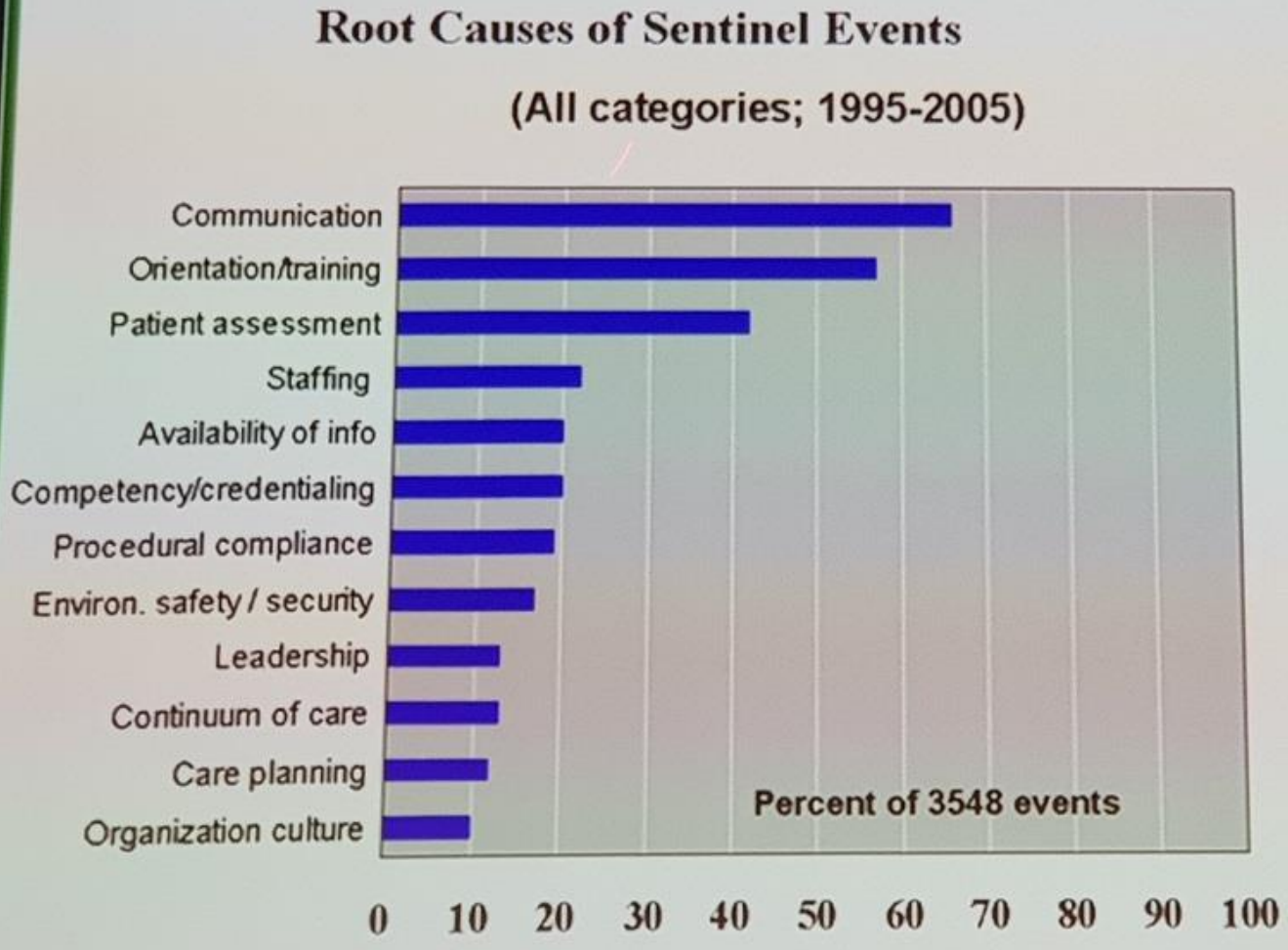
CRICOS No. 00233E

Background

- 250 million surgeries performed every year worldwide.
- Adverse events (AE) in surgery occur in up 14% of patients, mortality rates b/ 1-4%.
- In the OR, communication failures identified as the leading cause of patient injury and death (Arriaga et al 2014).
- Even where harm to patients is not caused, communication failures can result in inefficiency; one study found that 81% of failures in intraoperative communication led to superfluous discussions or work (Hu et al 2012)
- Extraneous factors, e.g., mobile phones, door opening, staff changeovers add to disruptions, increasing risk of errors.
- Introduction of various technologies can alter the dynamics of the surgical team and add another layer of complexity to team communications.

Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES HEALTH INSTITUTE QUEENSLAND

Communication Failures—the leading cause



- Communication breakdowns identified as main cause in 60 cases of malpractice
- 92% of these involved verbal miscommunication
- 64% involved one-to-one communication
- In 49% of these cases, the absence information, or that information was received inaccurately in 44% of cases

(Greenberg et al 2007)

Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES HEALTH INSTITUTE QUEENSLAND

Communication Failure

Types of failure that contribute to errors:

1. System failures – lack of communication channels or inappropriate use of existing channels.
2. Message failures – essential information is not communicated.
3. Reception failures – information is misinterpreted or delayed.

(Reason, 1997)

Gold Coast Health
Queensland Government

Griffith UNIVERSITY

MENZIES
HEALTH INSTITUTE QUEENSLAND

Human Factors

"Human factors are the interrelationships between people and their environment and each other that need to be considered to optimise performance and ensure safety." (Gillespie & Davies, 2016, pp. 32)

- Individual non-technical skills;
- Environmental conditions.

Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES HEALTH INSTITUTE QUEENSLAND

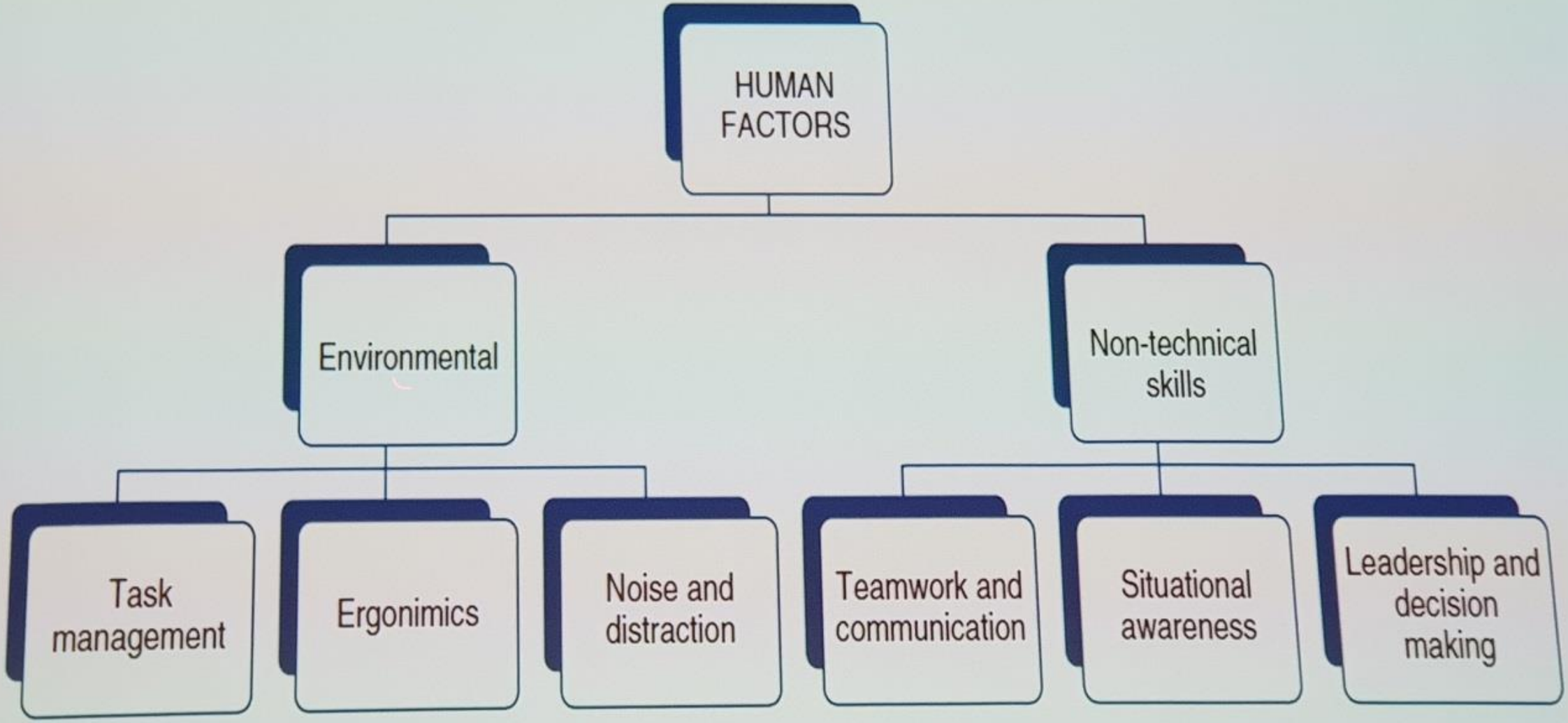


FIGURE 2-1: Components of human factors
Source: Adapted from Flin & Patey (2011).

(Gillespie & Davies, 2016, pp. 33)

Non-Technical Skills

3 Key ingredients to effective teamwork in surgery:

1. Communication and teamwork **+**
2. Coordination, cooperation and collaboration **+**
3. Situational awareness

= Shared Mental Model

Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES HEALTH INSTITUTE QUEENSLAND

1. Communication and Teamwork

Communication

"Clinical communication is the exchange of information about a person's care that occurs between treating clinicians, members of a multidisciplinary team, and between clinicians and patients, families and carers." (https//www.safetyandquality.gov.au/our-work/clinical-communications/)

Teamwork

"A set of interrelated thoughts, thoughts, actions, and feelings of each team member that are needed to function as a team and that combine to facilitate coordinated, adaptive performance and task objectives resulting in value-added outcomes" (Salas et al, 2005, pp. 562).

Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES HEALTH INSTITUTE QUEENSLAND

2. Coordination, Cooperation and Collaboration

- ***Cooperation*** occurs when people exchange relevant information and resources in support of each other's goals rather than a shared goal. When cooperation occurs, something new may be achieved, typically comes from the individual, not a collective team effort.
- ***Coordination*** occurs when resources and information are shared so each party can accomplish their part in support of a mutual objective. But, nothing new is created.
- ***Collaboration*** involves working together to create something new in support of a shared vision. The important phrase is "shared vision." The most important process is to get people to work on the same goals. Collaboration is not an individual effort. Something new is created---a "shared vision."

Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES HEALTH INSTITUTE QUEENSLAND

3. Shared Situational Awareness

- "Most simply put, shared situational awareness is knowing what's going on around you" (Endsley, 1995).
- SA refers to an individual's awareness and understanding of the dynamic information that is applicable to their current environment or task.
- A shared mental model supports shared SA.

Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES HEALTH INSTITUTE QUEENSLAND

= Shared Mental Model

- A shared mental model enables team members to predict what their team mates are going to do & what they are going to need to do it → to strategise.
- Informs how team members can adjust their strategies spontaneously during situations that change unexpectedly.

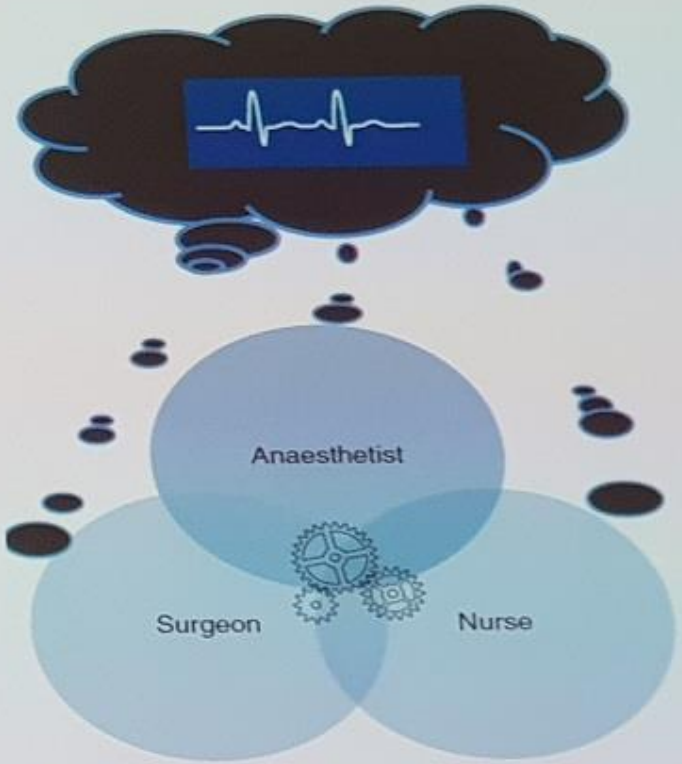


FIGURE 2-2: Depiction of a shared mental model between the anaesthetist, the nurse and the surgeon
Source: Adapted from Department of Defense (2006).

(Gillespie & Davies, 2016, pp. 33)

Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES HEALTH INSTITUTE QUEENSLAND

Digital Technologies

Every once in a while, a new technology, an old problem, and a big idea turn into an innovation.....

Dean Carmen

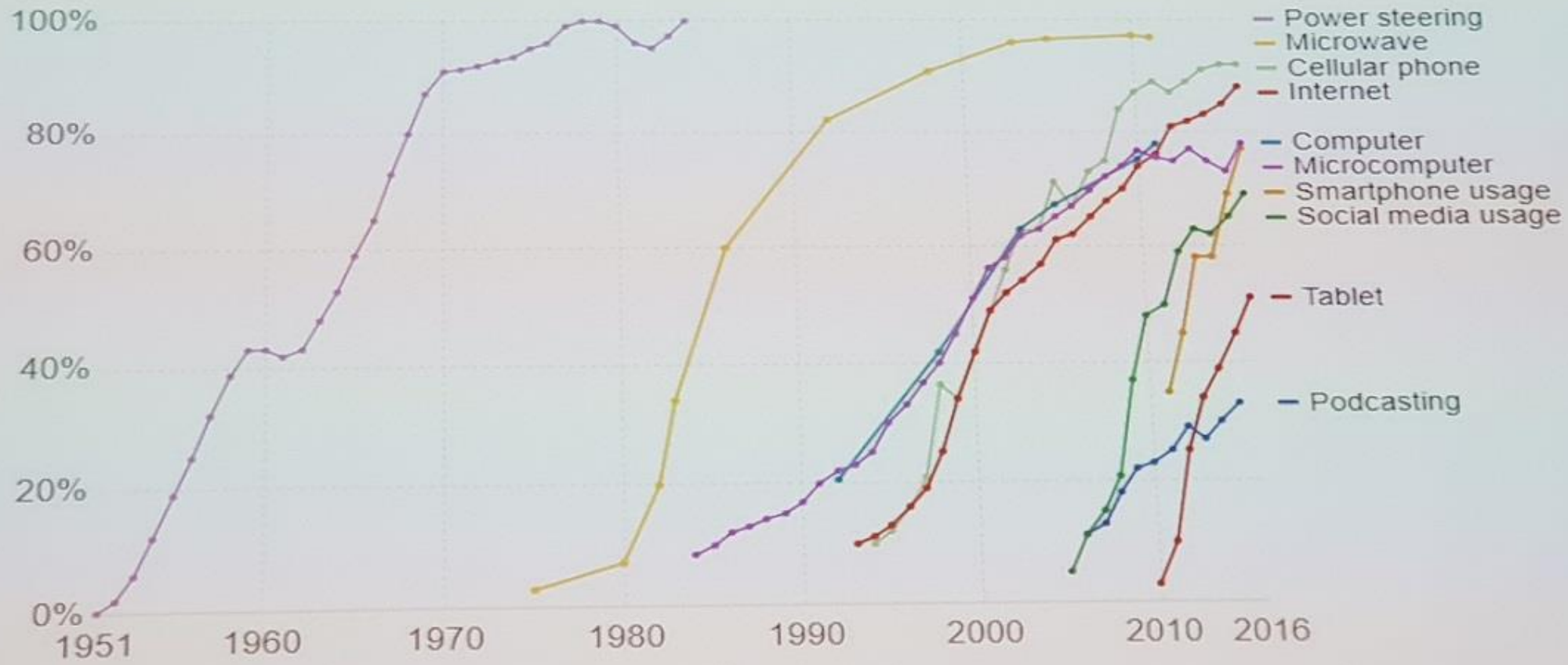
Griffith UNIVERSITY

MENZIES HEALTH INSTITUTE QUEENSLAND

Gold Coast Health

Queensland Government

Technology adoption



Technological adoption with older technologies removed

Image: Our World in Data via Visual Capitalist

https://www.weforum.org/agenda/2018/02/the-rising-speed-of-technological-adoption

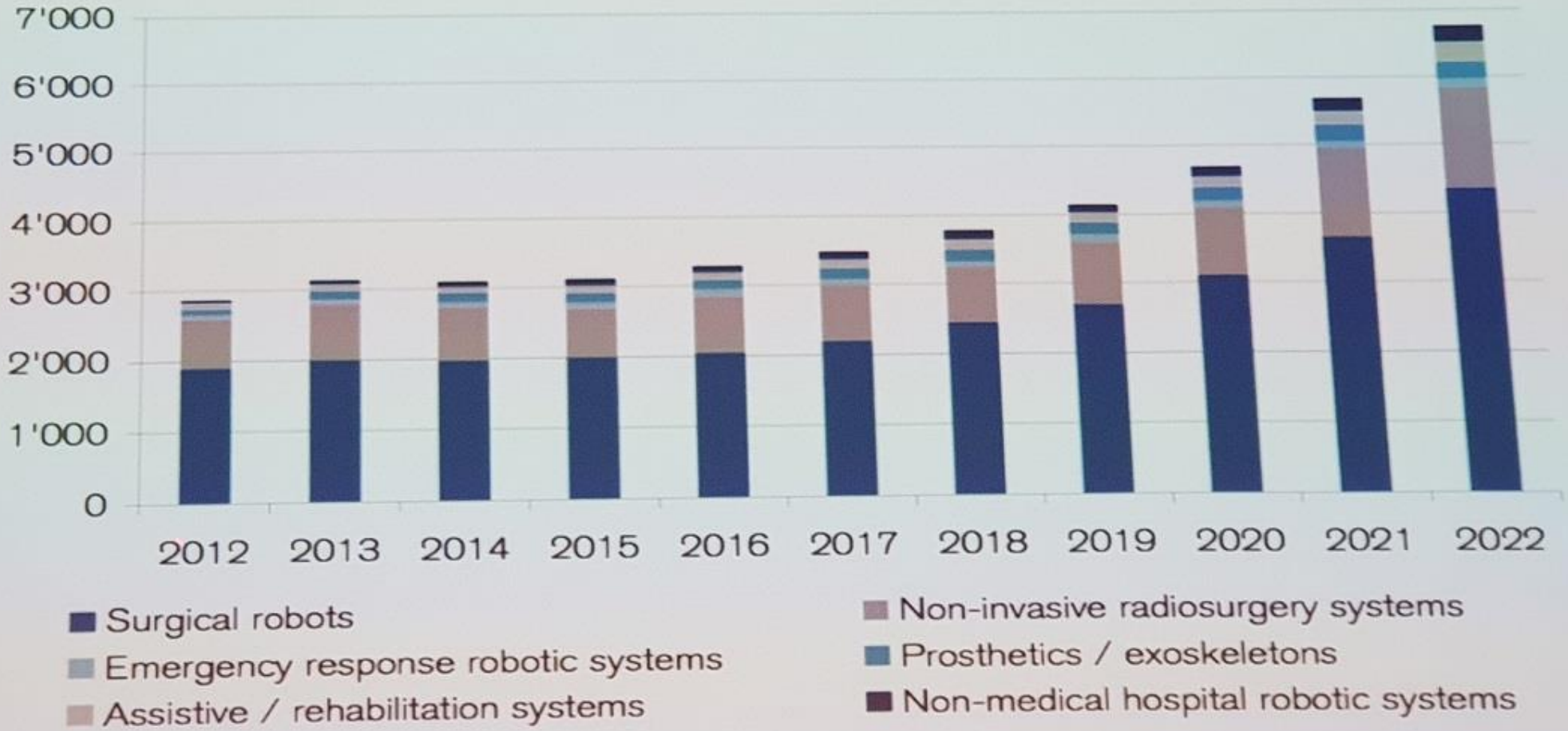
The Digital OR

- 'Artificial intelligence'
- Connecting devices and technologies with their own interfaces or monitors to display their data
- Data on demand, virtual presence
- Everyone in the room has access to case-related information
- *Does this take attention away from the patient?*

https://idataresearch.com/stryker-karl-storz-lead-us-integrated-operating-room-market-demand-increases-date-technology/

Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES HEALTH INSTITUTE QUEENSLAND

Projected robotics use in healthcare, 2014-22



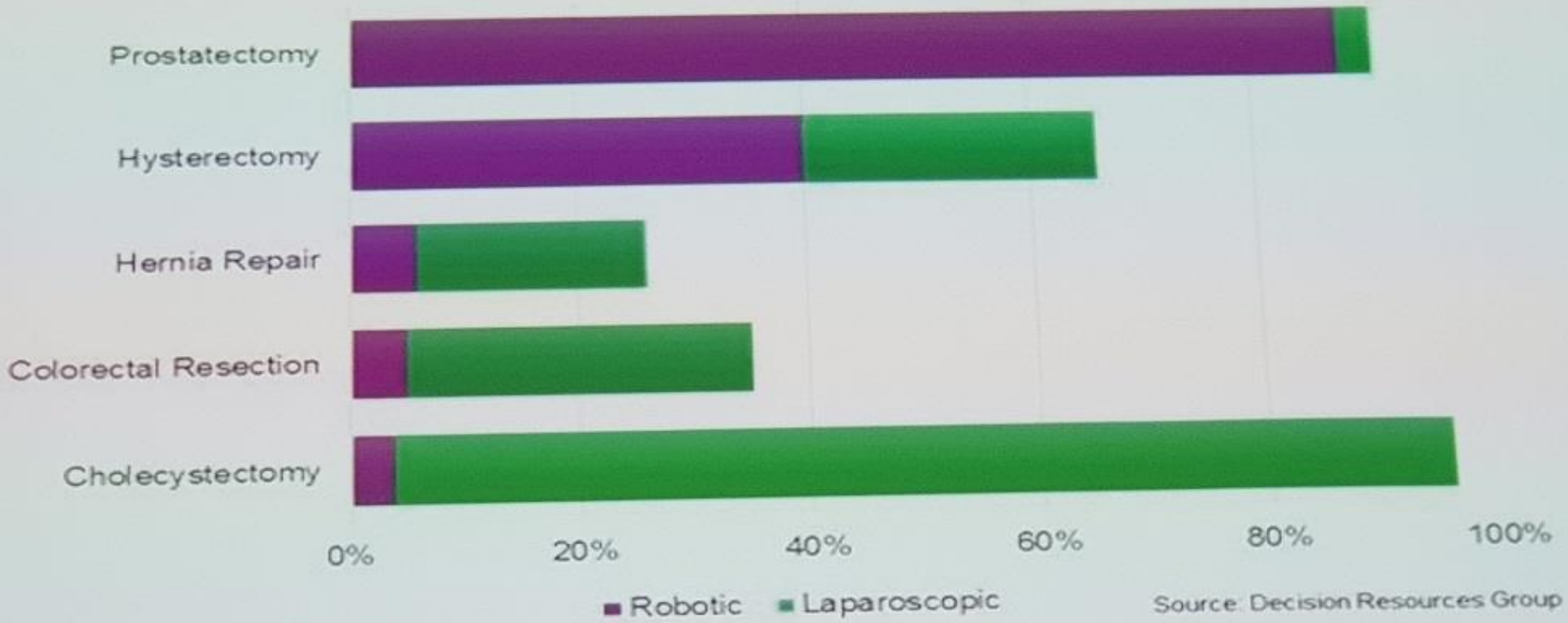
https://twitter.com/mikequindazzi/status/851766966851436545

Robotic-Assisted Surgery (RAS)

- Robotic-assisted surgery (RAS) includes technological developments that use robotic systems to aid in surgical procedures.
- RAS was developed to overcome the limitations of minimally-invasive surgical (MIS) procedures and to enhance the capabilities of surgeons performing open surgery.
- RAS requires manipulation of more complex equipment than open procedures, likely requiring a different set of NTS.

Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES HEALTH INSTITUTE QUEENSLAND

RAS procedures, US, 2016



Robotic Procedure Penetration, U.S., 2016

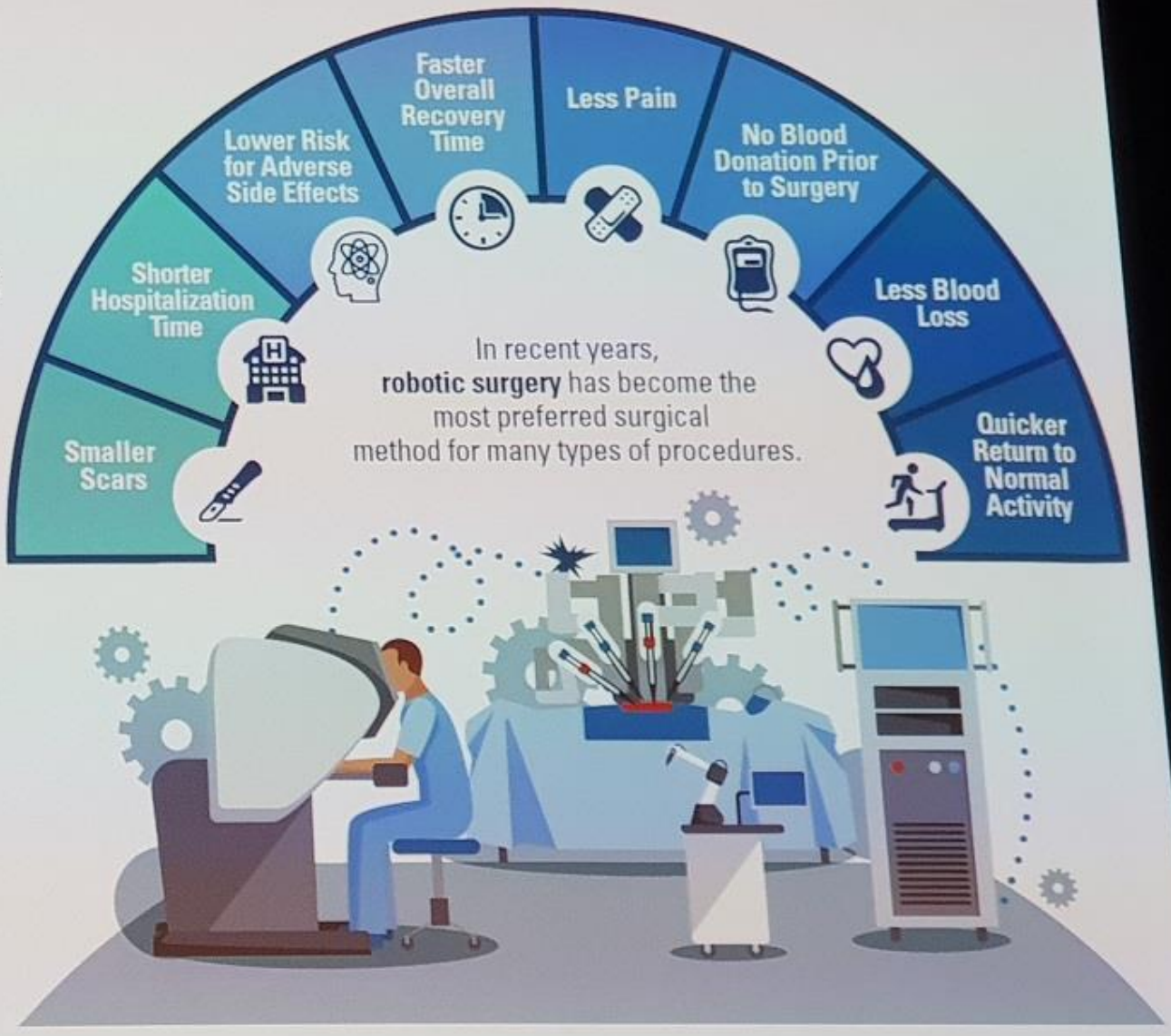
https://www.meddeviceonline.com/doc/considerations-for-conquering-the-u-s-robotic-surgery-market-0001

Benefits of RAS

- MIS single greatest technological innovat in past 30 years.
- High definition cameras & micro-instruments.

Advantages of RAS:

- ↓ complications, e.g.., blood loss
- ↓ pain & hernias
- ↓ SSI
- ↓ HLOS
- Early return to work



https://www.google.com/search?rlz=1C1GGRV_enAU751AU751&biw=1344&bih=722&tbm=isch&sa=1&ei=b

Robotics and team performance

- Surgeon
- Anaesthetist
- Nurse
- Technician
- Orderly

https://www.google.com.au/search?q=robotic+surgery+images&rlz

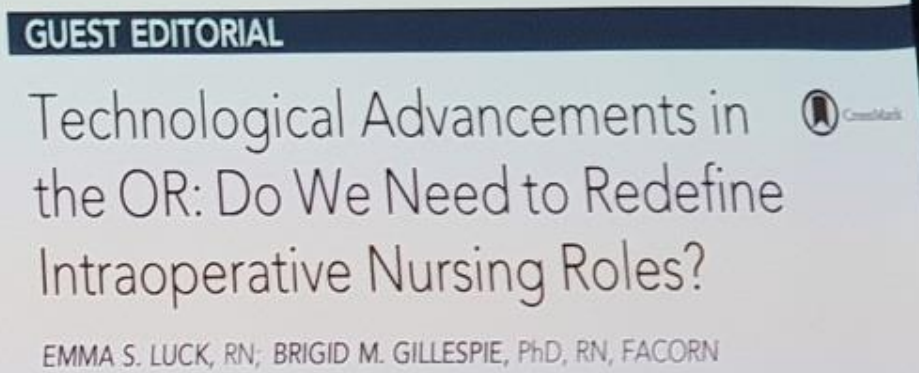
Gold Coast Health
Queensland Government

Griffith UNIVERSITY

MENZIES
HEALTH INSTITUTE QUEENSLAND

New ways of working?

- Impact on work roles.
- RAS technologies affect work practices and workflow.
- Greater potential for miscommunication and inefficiency.
- Critical to address issues of long learning time and high error rates while adapting to new technology in the OR.
- Adjustments to team NTS needed to accommodate novel technologies or altered work roles.


GUEST EDITORIAL

Technological Advancements in the OR: Do We Need to Redefine Intraoperative Nursing Roles?

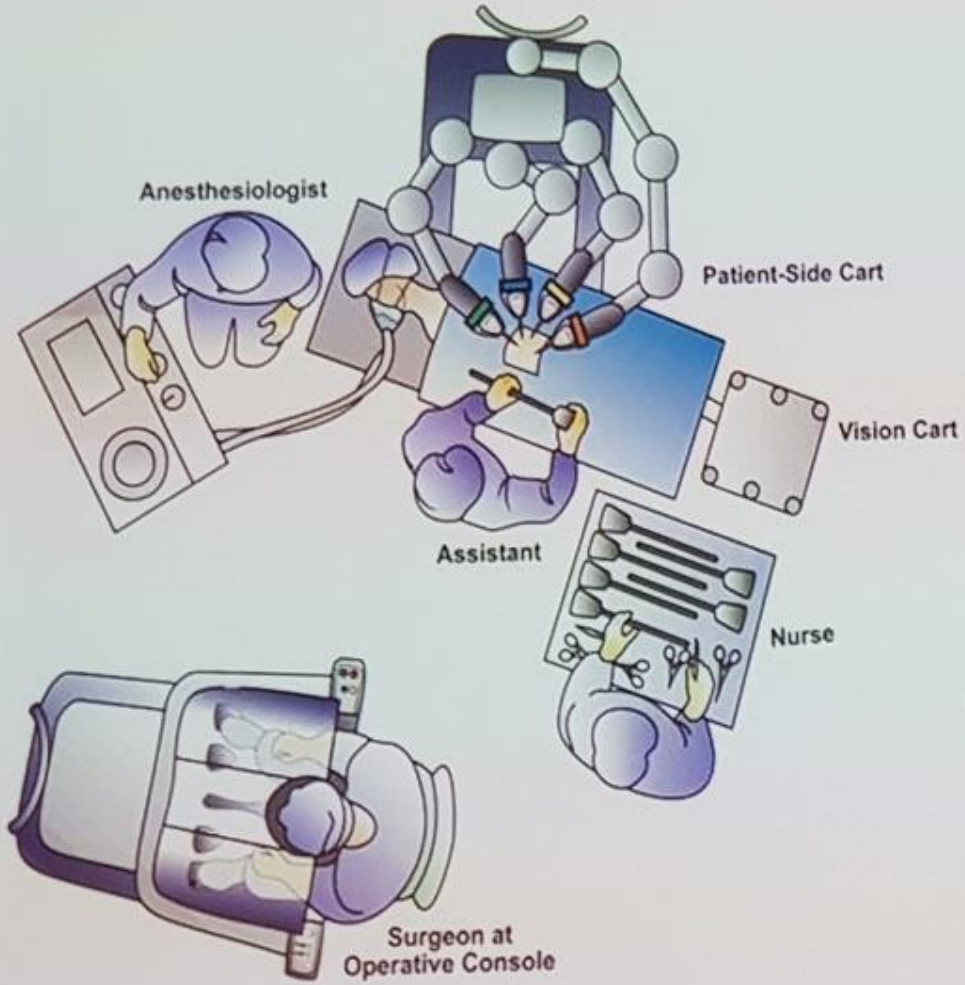
EMMA S. LUCK, RN; BRIGID M. GILLESPIE, PhD, RN, FACORN

Gold Coast Health

Queensland Government

Griffith UNIVERSITY

MENZIES HEALTH INSTITUTE QUEENSLAND



Physical environment

- Ergonomics, information gathering
- Spatial configuration of the team and technology
- Unanticipated consequences re team communication, teamwork and decision making

https://urology.ufl.edu/patient-care/robotic-laparoscopic-urologic-surgery/procedures/laparoscopic-and-robotic-partial-nephrectomy/

Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES HEALTH INSTITUTE QUEENSLAND

Types of Shared Mental Models

Model Type	Knowledge Content	Comment
Technology & Equipment	Equipment functioning Operating procedures Systems limitations Likely failures	Most stable, may require less to be shared across the team
Job / task	Task procedures Likely contingencies & scenarios Task strategies Environmental constraints Task component relationships	In highly proceduralised tasks, members need shared mental models When tasks are more predictable, the value of knowledge becomes more crucial
Team interactions	Roles/responsibilities Information sources Interactive patterns Communication channels Role dependencies Information flow	Shared knowledge drives how team members behave by creating expectations Adaptable teams understand well and predict the nature of team interactions
Team	Team mates' knowledge, skills, attitudes, preferences & tendencies	Team-specific knowledge of team mates helps members tailor behaviour to what they expect from team mates

Mathieu et al, 2000

Emerging evidence: Systematic Mixed Methods Literature Review

Gillespie, Gillespie, Steel & Erichsen-Andersson (in draft)

Aim: Describe the impact of RAS on team communications in surgery.

Methods:

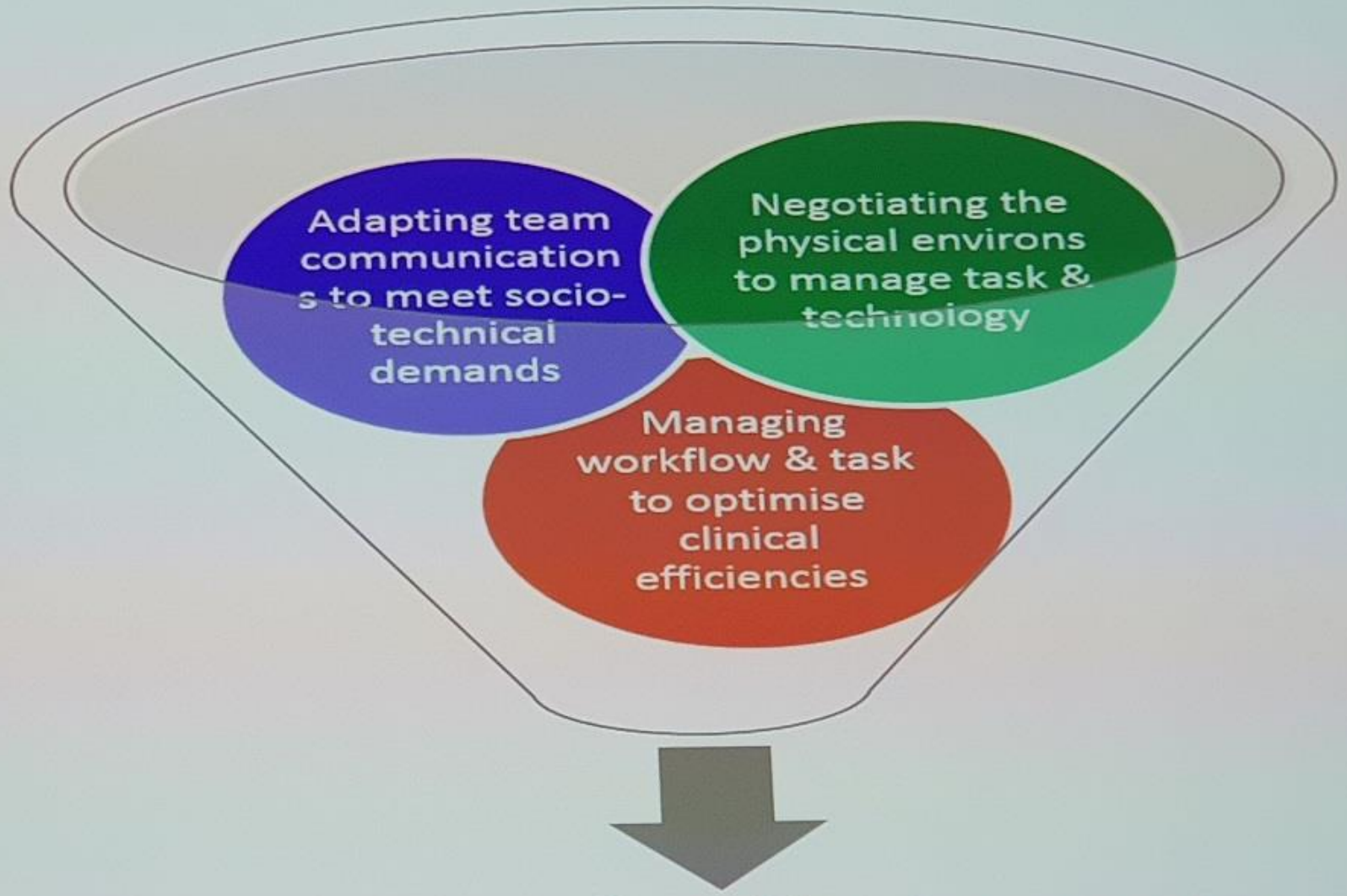
- Systematic mixed studies review
- Inclusion/exclusion criteria
- Quality assessment scores using MMAT criteria
- Thematic analysis

Results:

- 1,122 hits, 13 papers reviewed
- 11 quantitative papers, 2 qualitative papers

Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES HEALTH INSTITUTE QUEENSLAND

Thematic findings



New ways of working to manage procedural complexity in surgery

Implications of review findings

- Coordination – when the surgeon is separated from the team, the team is less aware of the surgeon's actions
- Steep learning curve associated with new surgical technologies, e.g., RAS
- Flow disruptions reduce as surgeon gains more experience
- Training – surgeons and trainees have different views of the surgical site, so it is harder for the surgeon to explain what is happening and monitor the trainee's understanding
- Reliance on complex equipment increases opportunities for technology failures
- Situational awareness – when the team is more experienced in RAS, they realise that surgeon's SA is dependent on them orally communicating information, and they respond by using more verbal communication about the patient's status, consequently, improving the surgeon's SA

Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES HEALTH INSTITUTE QUEENSLAND

Recommendations for clinical practice

1. Whole-team training, training as a team, focussing on skills that move beyond technical to teamwork and role distribution
2. A hand-picked dedicated team, trained in robotic surgery
3. Closed loop communication that is loud and clear
4. Positioning of scrub nurse so they are able to move easily b/ screen and robotic arm
5. Diligent use of the WHO Surgical Safety Checklist
6. Implementation plan supported by the healthcare organisation

Recommendations for research

- Development and evaluation of methods for whole-team training
- Experimental evaluations of the impact of different physical configurations of robotic console and team members on communication and teamwork in the OR
- Assess the feasibility of using routinely collected data (e.g., hospital reporting systems, national registries) to understand the impact of technologies on rare end-points associated with patient safety
- Better understanding of how RAS shapes team culture – radical culture shift with technologies

Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES HEALTH INSTITUTE QUEENSLAND

Key messages

- Technology in the OR is omnipresent, it is here with us to stay!
- While technologies have innovated and revolutionised surgery, they also impose challenges in the ways surgical teams work
- 'Unintended consequences' and socio-technical systems effects of technologies need to be identified and understood from a patient safety perspective
- New ways of working are needed, and team members need to train together in training programs that respond to the added layer of complexity associated with such technologies
- Teams' need to cultivate NTS

Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES HEALTH INSTITUTE QUEENSLAND


THANK YOU
Professor Brigid Gillespie
b.gillespie@griffith.edu.au
Gold Coast Health
Queensland Government
Griffith UNIVERSITY
MENZIES
HEALTH INSTITUTE QUEENSLAND