Imperial College London

100 years of living science

Non-technical skills and team performance

Dr Stephanie Russ

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Learning Objectives

1. Identify individual, team and environmental factors which could influence performance

2. Compare and contrast the different modes of assessment utilised for technical and non-technical skills

Outline

1. Teamwork and non-technical skill in healthcare: A brief history

2. What are these skills?

3. Can we measure these skills?

4. Can we improve these skills?

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1. Teamwork and non-technical skill in healthcare: A brief history

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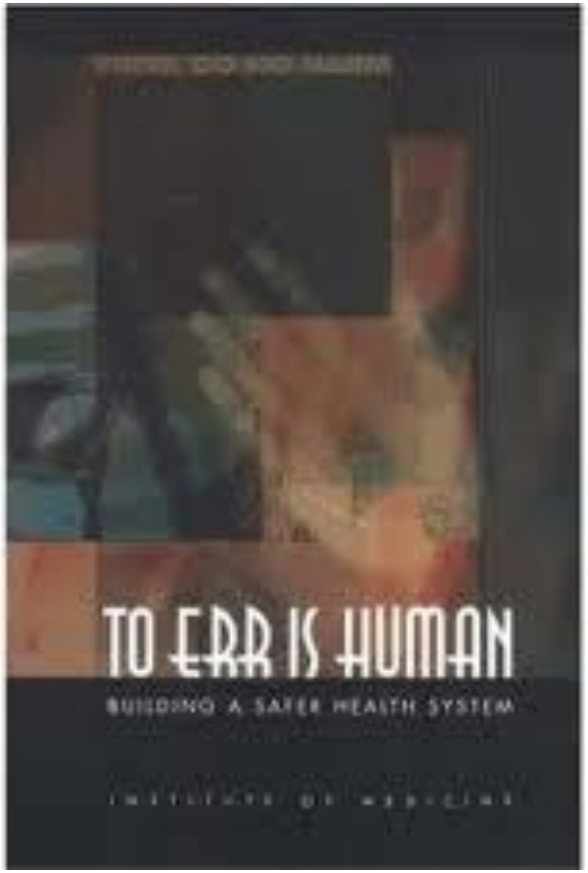
Teamwork and patient safety

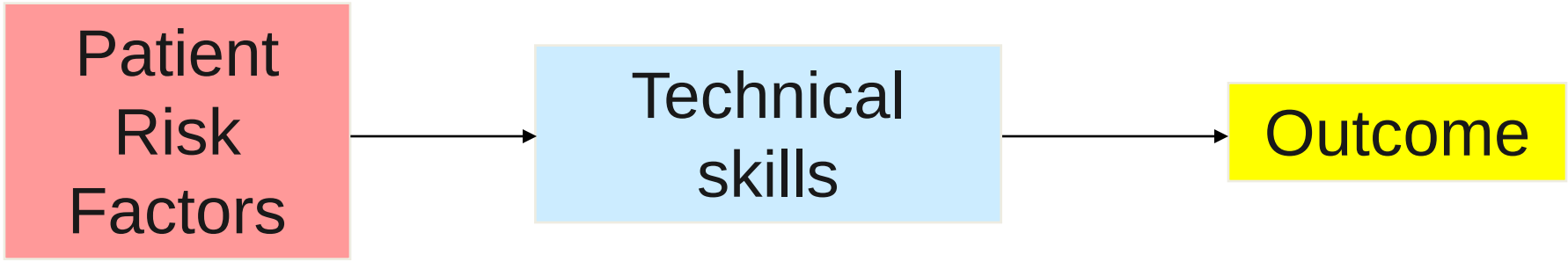
- **Institute of Medicine:** Increased awareness of **medical errors**

- Concluded that between **44,000 to 98,000 people die each year** as a result of preventable medical errors

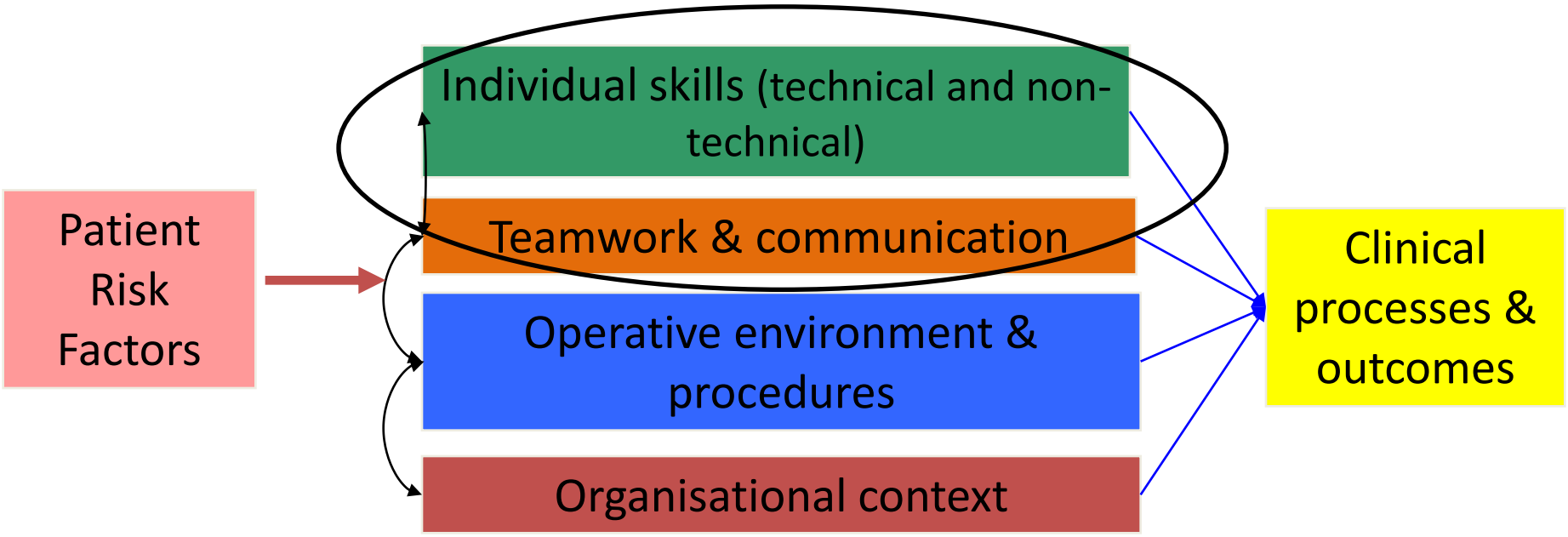
- **Key recommendation**: Teamwork as a mechanism for enhancing patient safety



Traditional view of surgical performance

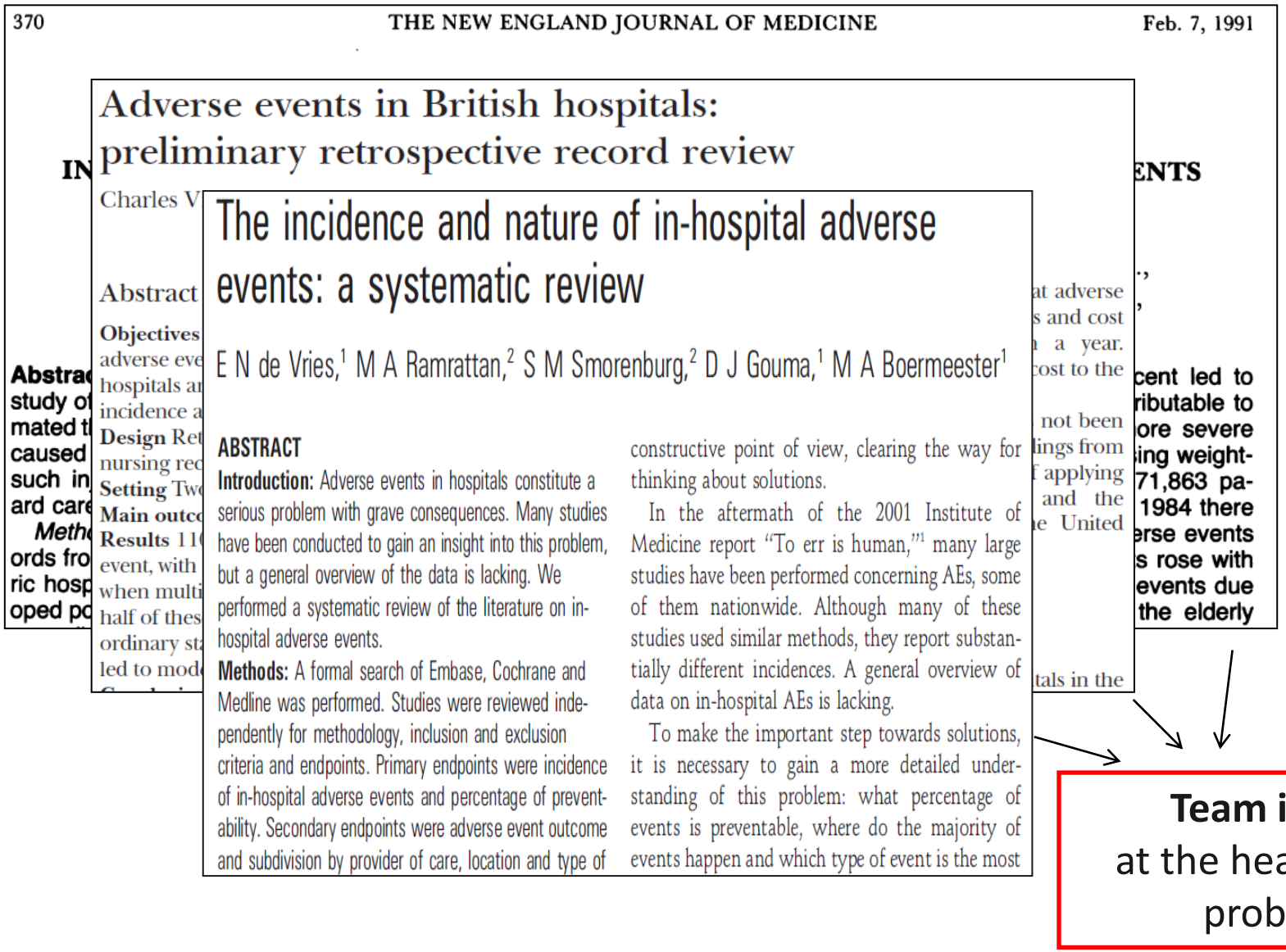


Systems approach to surgical performance



Vincent et al, 2004

Team skills and safety of care delivery



370 THE NEW ENGLAND JOURNAL OF MEDICINE Feb. 7, 1991

Adverse events in British hospitals: preliminary retrospective record review

Charles V

Abstract

Objectives

The incidence and nature of in-hospital adverse events: a systematic review

E N de Vries,[1] M A Ramrattan,[2] S M Smorenburg,[2] D J Gouma,[1] M A Boermeester[1]

ABSTRACT

Introduction: Adverse events in hospitals constitute a serious problem with grave consequences. Many studies have been conducted to gain an insight into this problem, but a general overview of the data is lacking. We performed a systematic review of the literature on in-hospital adverse events.

Methods: A formal search of Embase, Cochrane and Medline was performed. Studies were reviewed independently for methodology, inclusion and exclusion criteria and endpoints. Primary endpoints were incidence of in-hospital adverse events and percentage of preventability. Secondary endpoints were adverse event outcome and subdivision by provider of care, location and type of

constructive point of view, clearing the way for thinking about solutions.

In the aftermath of the 2001 Institute of Medicine report "To err is human,"[1] many large studies have been performed concerning AEs, some of them nationwide. Although many of these studies used similar methods, they report substantially different incidences. A general overview of data on in-hospital AEs is lacking.

To make the important step towards solutions, it is necessary to gain a more detailed understanding of this problem: what percentage of events is preventable, where do the majority of events happen and which type of event is the most

Team issues
at the heart of the problem

In the evidence base…

The American Journal of Surgery (2009) 197, 678–685

Clinical Surgery-American

Surgical team behaviors and patient ou

Karen Mazzocco, R.N., J.D.[a,*], Diana B. Petitti, M.D., M.
Kenneth T. Fong, M.S.[c], Doug Bonacum, M.B.A.[c], John B
Suzanne Graham, R.N., Ph.D.[e], Robert E. Lasky, Ph.D.[f],
Eric J. Thomas, M.D., M.P.H.[f]

ORIGINAL ARTICLES

Teamwork and Error in the Operating Room

Analysis of Skills and Roles

K. Catchpole, PhD, A. Mishra, MRCS, A. Handa, FRCS, and P. McCulloch, FRCS

Journal of Evaluation in Clinical Practice, **12**, 2, 182–189 doi:10.1111/j.1365-2753.2006.00614.x

Teamwork in the operating theatre: cohesion or confusion?

Shabnam Undre MBBS FRCSE,[1] Nick Sevdalis BSc MSc PhD,[2] Andrew N. Healey BSc(Hons) PhD CPsychol,[3] Sir Ara Darzi KBE Professor MD FRCS, FRCSI[4] and Charles A. Vincent BA MPhil PhD[5]

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Abstract

Rationale The aim of the research that we report here was to empirically assess the cohesiveness of the multidisciplinary operating theatre (OT) team. **Method** We used concepts from the team performance and team mental models literature to assess OT professionals' perceptions of their teamwork, the structure of their teams and their respective roles within them and their teams' performance. **Results** *Team structure*: OT professionals would welcome a change from the current structure of the team, although there was no agreement on what that structure is. Nurses per-

Doctors go on trial for manslaughter after removing wrong kidney

Clare Dyer, legal correspondent

Author information ▶ Copyright and License information ▶

A consultant urologist and a locum surgical registrar who went on trial for manslaughter last week were guilty of "gross negligence" in removing their patient's only functioning kidney, Cardiff crown court was told.

Prosecuting counsel Leighton Davies QC told the jury the actions of consultant John Roberts and surgeon Mahesh Goel "fell so far below the standard of care expected of a reasonably competent surgeon" that they "deserved to be condemned as gross negligence and therefore a crime."

Graham Reeves died aged 69, five weeks after the operation at Prince Philip Hospital in Llanelli, Carmarthenshire, in January 2000, when his healthy left kidney was removed instead of his diseased right kidney.

The surgery was carried out by Dr Goel, aged 40, under the supervision of Mr Roberts, aged 60. The court was told that the wrong kidney was identified on the hospital admittance slip, and the error was transferred to the operating theatre list. The case notes and consent form carried the correct information, but neither surgeon had looked properly at the case notes.

Mr Roberts later said that he thought he might have looked at the *x* ray film back to front.

Mr Roberts, of Tycoch, Swansea, and Dr Goel, who now works at Burnley General Hospital in Lancashire, both deny manslaughter.

Family devastated after healthy daughter dies following routine operation

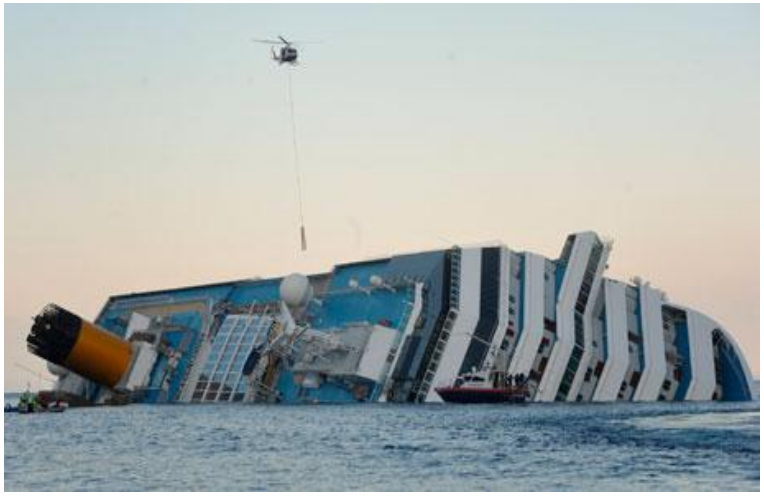
A grief-stricken family have been left asking how a "fit and healthy" woman could go into hospital for a routine operation, only for her to die four days later.

As a result "it was necessary to undertake a repair which meant clamping the blood supply to the liver. During this clamping the right lobe of the liver suffered a period of ischemia and was subsequently infected", the inquest heard.

Dr Radcliffe found that following the operation "there was a lack of communication" between the surgeon and other staff about the risk of liver ischemia – a restriction in the blood supply.

A blood sample which would have given an indication of the potential for liver ischemia "was not acted upon".


AA



Outline

1. Teamwork and non-technical skill in healthcare: A brief history
2. What are these skills?
3. Can we measure these skills?
4. Can we improve these skills?

What are these skills?

A set of skills related to how clinicians behave, interact, and think in their clinical area

- Non-technical skills vs teamwork???

Yule et al (2006)

What are these skills?

Table VI. Proposed draft non-technical skills taxonomy

Interpersonal skills	*Cognitive skills*
Communication	Situation awareness
Leadership	Mental readiness
Teamwork	Assessing risks
Briefing/planning/ preparation	Anticipating problems
Resource management	Decision making
Seeking advice and feedback	Adaptive strategies/flexibility
Coping with pressure/ stress/fatigue	Workload distribution

Yule et al (2006)

Key team skills for surgery

Communication: Quality and quantity of information exchanged among team members

Leadership: Provision of directions, assertiveness, and support among members of the team

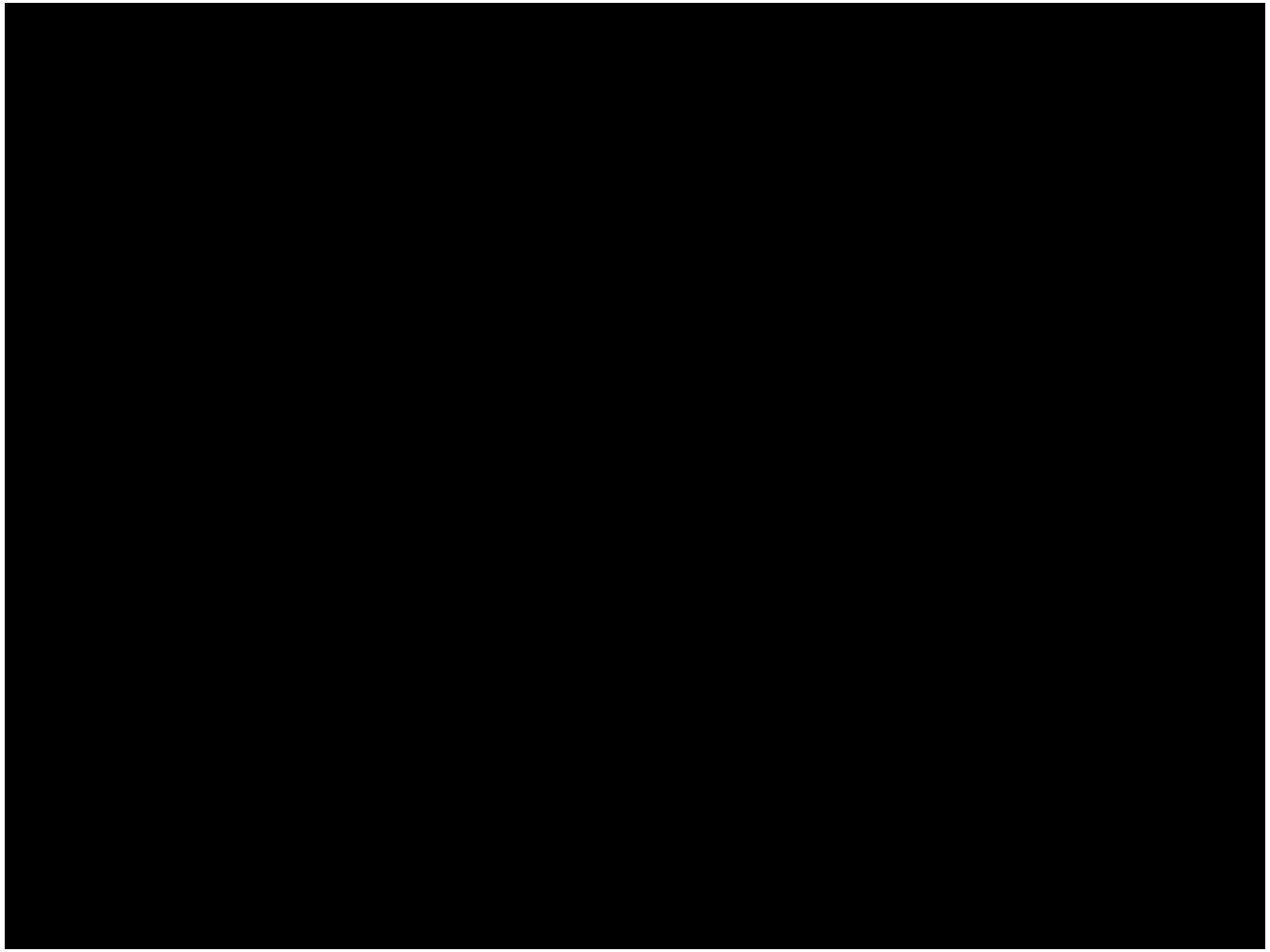
Cooperation: Assistance provided among members of the team, supporting others, and correcting errors

Situational awareness: Team observation and awareness of ongoing processes

Team coordination: Management and timing of activities and tasks

Decision making: defining a problem, considering one's options, implementing an option and reviewing the outcome

Communication



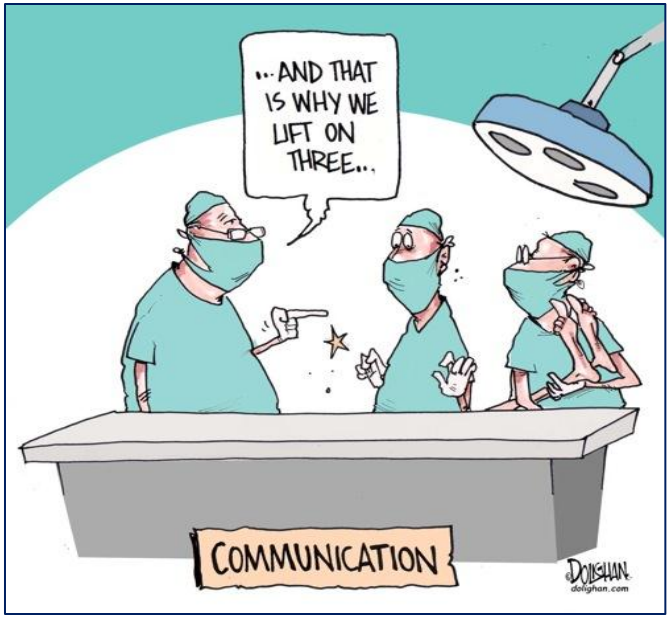
Communication

Quality and quantity of information exchanged among team members

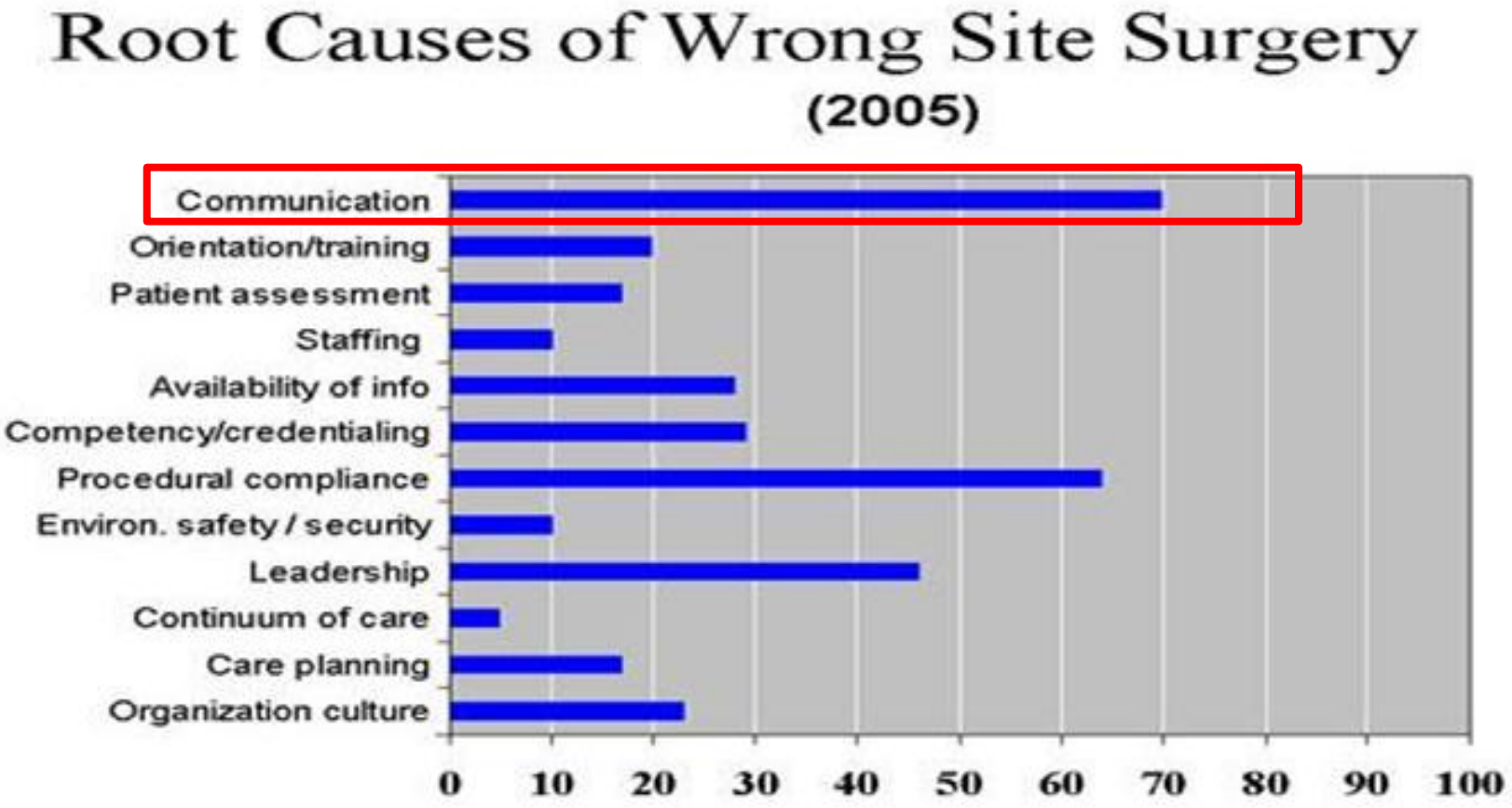
It may be not what is said that is important but how it is said (Flin R, Safety at the Sharp End)

Two-way process
-Sender and Receiver(s)

Forms
-Verbal (spoken)
-Non-Verbal (gestures, posture, tone of voice)

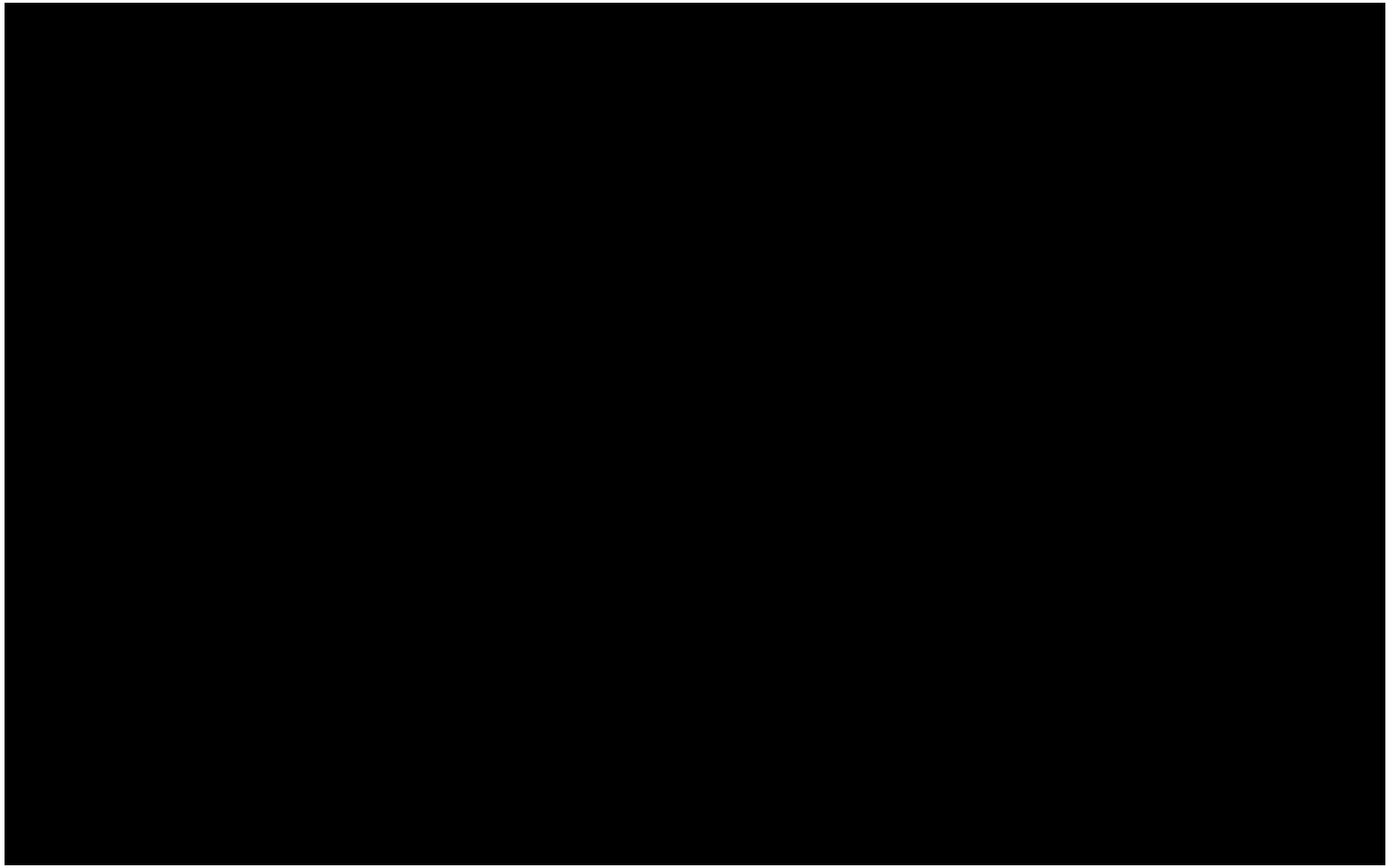


Example: wrong side/site surgery



Kwaan et al. Arch Surg. 2006;141: 353-8

Situational awareness



Situational Awareness

Team observation and awareness of ongoing processes

Cognitive Skill

1. Gathering information
2. Interpreting the gathered information
3. Anticipating future states

Factors affecting Situational Awareness

- Stress
- Fatigue
- Expertise
- Workload
- Distractions

Elaine Bromiley Case

Coordination

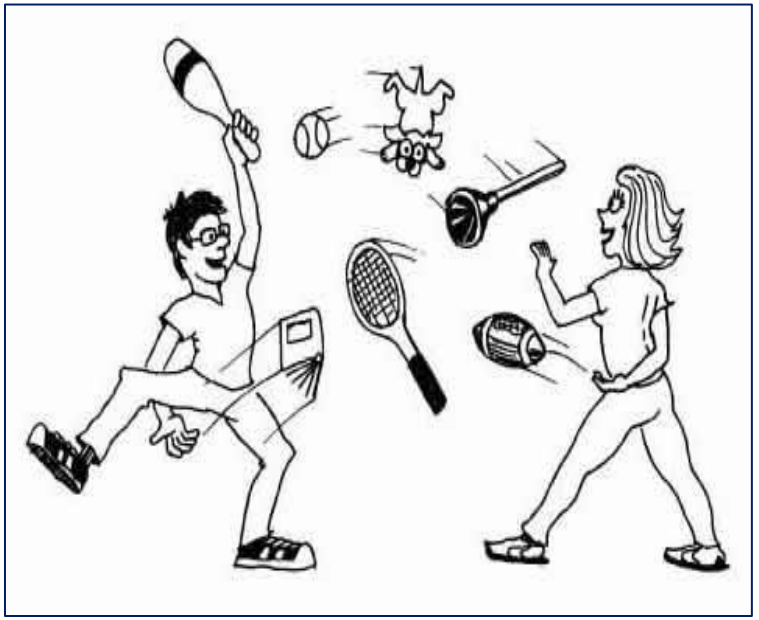
Coordination

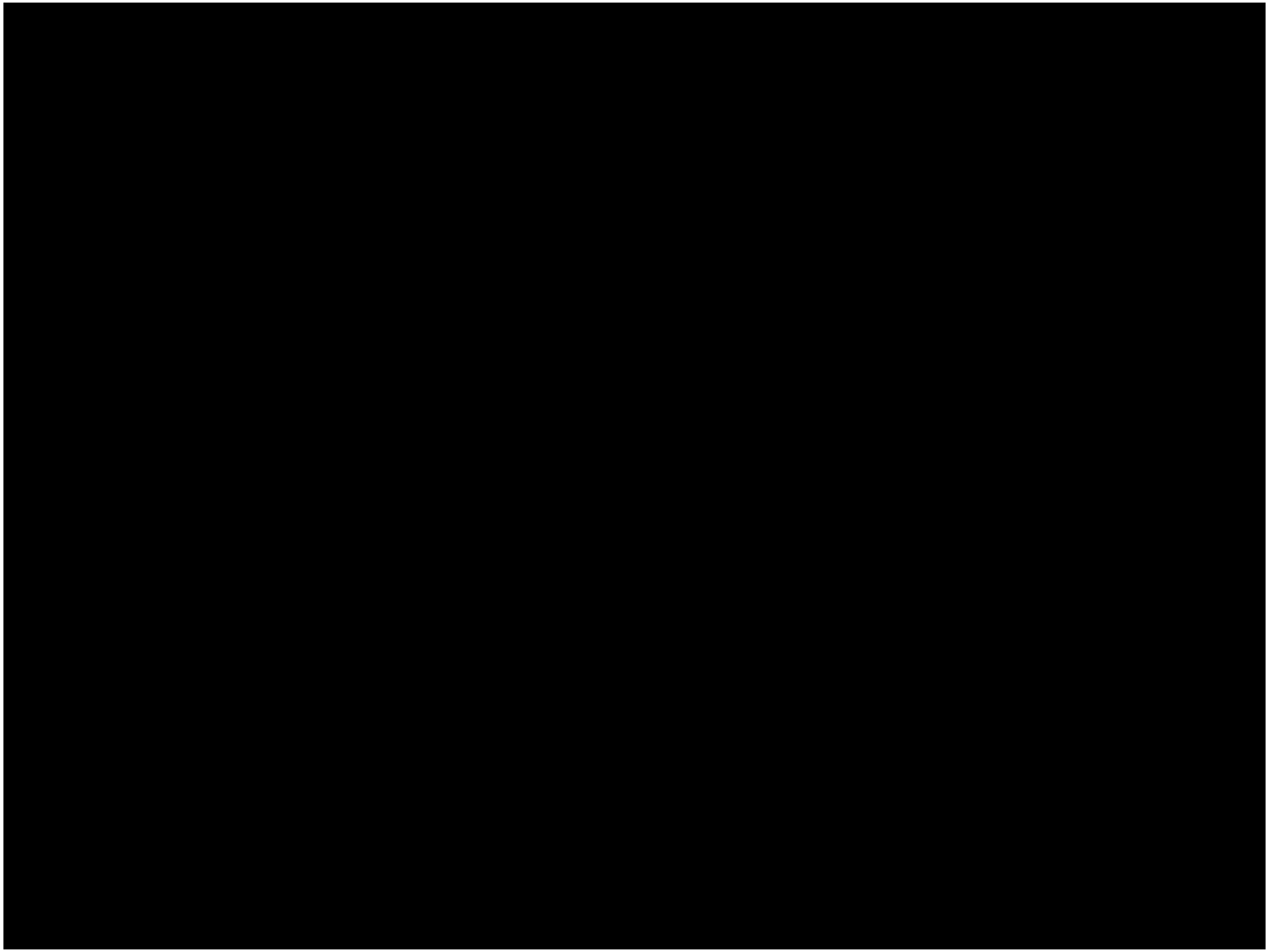
Management and timing of activities and tasks

•Within and between sub-teams

Implicit vs. Explicit

•Team Stability
•Expertise
•Knowledge
•Expectation
•Situational Awareness





Outline

1. Teamwork and non-technical skill in healthcare: A brief history

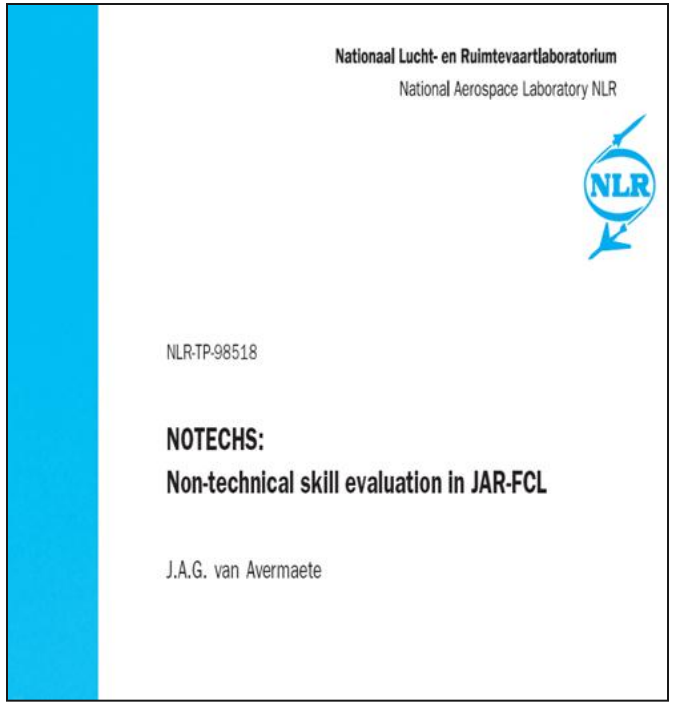
2. What are these skills?

3. Can we measure these skills?

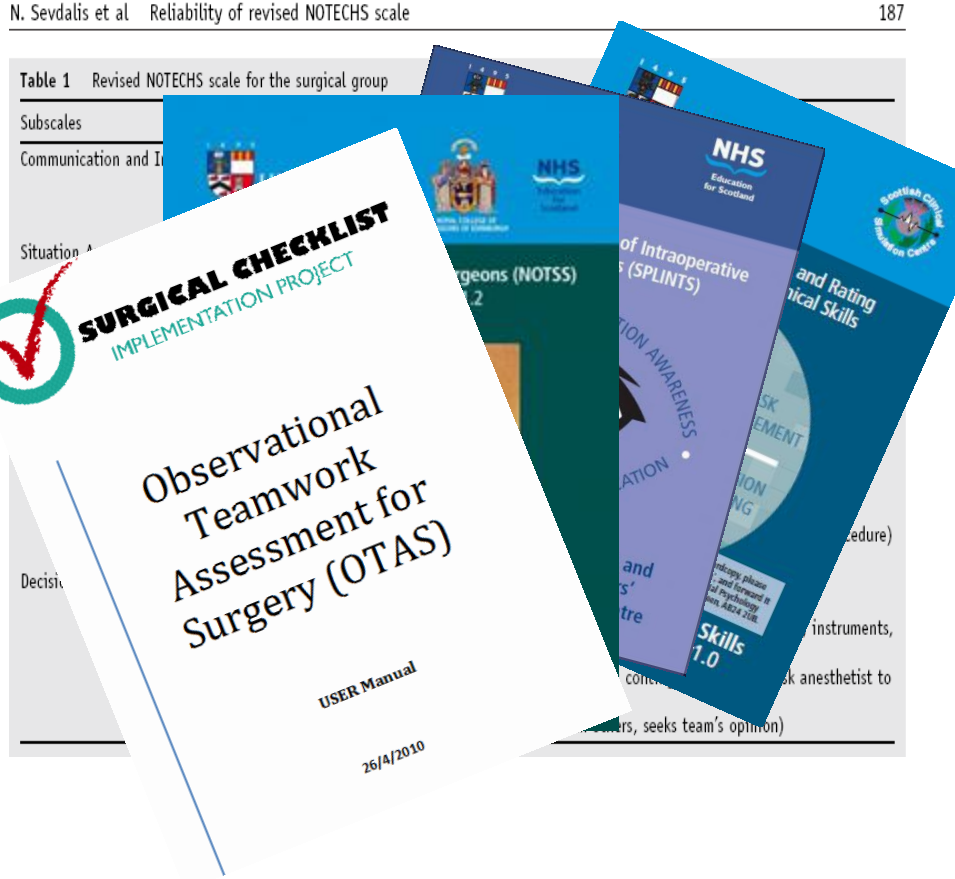
4. Can we improve these skills?

Can we measure these skills?

Originally developed for commercial aviation



Modified for use in surgery



OTAS Rating Scale

- **7-Point Scale**
- **5 behaviours**
- **Separate ratings for surgical sub-teams and surgical phases**

0	1	2	3	4	5	6
Team function severely hindered	Team function compromised	Slight detriment to team function	Team function neither hindered nor enhanced	Team function moderately enhanced	Team function highly enhanced	Exemplary; team function very highly enhanced

COMPROMISED ← – – – – – **PATIENT SAFETY** – – – – – – – → **ENHANCED**

Sevdalis et al, Ann Surg 2009;249:1047-51, Hull et al, J Am Coll Surg 2011;212:234-43

Outline

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4. Can we improve these skills?

Interventions: The challenge

- Multidisciplinary teams
- Teams haphazardly put together
- Assumption that they can “manage”
- Assumption that it is all down to one’s personality

Checklists

WHO Surgical Safety Checklist

(adapted for England and Wales)

National Patient Safety Agency

National Reporting and Learning Service

SIGN IN (To be read out loud)

Before induction of anaesthesia

Has the patient confirmed his/her identity, site, procedure and consent?
- ☐ Yes

Is the surgical site marked?
- ☐ Yes/not applicable

Is the anaesthesia machine and medication check complete?
- ☐ Yes

Does the patient have a:

Known allergy?
- ☐ No
- ☐ Yes

Difficult airway/aspiration risk?
- ☐ No
- ☐ Yes, and equipment/assistance available

Risk of >500ml blood loss (7ml/kg in children)?
- ☐ No
- ☐ Yes, and adequate IV access/fluids planned

TIME OUT (To be read out loud)

Before start of surgical intervention
for example, skin incision

Have all team members introduced themselves by name and role?
- ☐ Yes

Surgeon, Anaesthetist and Registered Practitioner verbally confirm:
- ☐ What is the patient's name?
- ☐ What procedure, site and position are planned?

Anticipated critical events

Surgeon:
- ☐ How much blood loss is anticipated?
- ☐ Are there any specific equipment requirements or special investigations?
- ☐ Are there any critical or unexpected steps you want the team to know about?

Anaesthetist:
- ☐ Are there any patient specific concerns?
- ☐ What is the patient's ASA grade?
- ☐ What monitoring equipment and other specific levels of support are required, for example blood?

Nurse/ODP:
- ☐ Has the sterility of the instrumentation been confirmed (including indicator results)?
- ☐ Are there any equipment issues or concerns?

Has the surgical site infection (SSI) bundle been undertaken?
- ☐ Yes/not applicable
  - Antibiotic prophylaxis within the last 60 minutes
  - Patient warming
  - Hair removal
  - Glycaemic control

Has VTE prophylaxis been undertaken?
- ☐ Yes/not applicable

Is essential imaging displayed?
- ☐ Yes/not applicable

SIGN OUT (To be read out loud)

Before any member of the team leaves the operating room

Registered Practitioner verbally confirms with the team:
- ☐ Has the name of the procedure been recorded?
- ☐ Has it been confirmed that instruments, swabs and sharps counts are complete (or not applicable)?
- ☐ Have the specimens been labelled (including patient name)?
- ☐ Have any equipment problems been identified that need to be addressed?

Surgeon, Anaesthetist and Registered Practitioner:
- ☐ What are the key concerns for recovery and management of this patient?

This checklist contains the core content for England and Wales

www.npsa.nhs.uk/nrls

PATIENT DETAILS

Last name:

First name:

Date of birth:

NHS Number:*

Procedure:

*If the NHS Number is not immediately available, a temporary number should be used until it is.

Definition and aims

- A list of action items arranged in a systematic manner, allowing the user to record the presence/absence of individual items to ensure that all are considered or completed

- Aims :
  - Reminder
  - Standardisation
  - Redundancy to the system
  - Improved teamwork/communication
  - Remove hierarchy

Impact on clinical outcomes

WHO Safe Surgery Saves Lives Campaign

The NEW ENGLAND JOURNAL of MEDICINE

SPECIAL ARTICLE

A Surgical Safety Checklist to Reduce Morbidity and Mortality in a Global Population

Alex B. Haynes, M.D., M.P.H., Thomas G. Weiser, M.D., M.P.H., William R. Berry, M.D., M.P.H., Stuart R. Lipsitz, Sc.D., Abdel-Hadi S. Breizat, M.D., Ph.D., E. Patchen Dellinger, M.D., Teodoro Herbosa, M.D., Sudhir Joseph, M.S., Pascience L. Kibatala, M.D., Marie Carmela M. Lapitan, M.D., Alan F. Merry, M.B., Ch.B., F.A.N.Z.C.A., F.R.C.A., Krishna Moorthy, M.D., F.R.C.S., Richard K. Reznick, M.D., M.Ed., Bryce Taylor, M.D., and Atul A. Gawande, M.D., M.P.H., for the Safe Surgery Saves Lives Study Group*

- Major complication rate decreased 36%
- Mortality decreased 47%
- Post-op infection decreased 48%

Peter Pronovost: ICU Checklist for Central Line Insertions

The NEW ENGLAND JOURNAL of MEDICINE

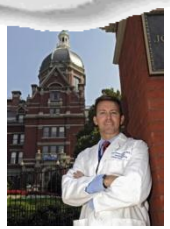
ESTABLISHED IN 1812 DECEMBER 28, 2006 VOL. 355 NO. 26

An Intervention to Decrease Catheter-Related Bloodstream Infections in the ICU

Peter Pronovost, M.D., Ph.D., Dale Needham, M.D., Ph.D., Sean Berenholtz, M.D., David Sinopoli, M.P.H., M.B.A., Haitao Chu, M.D., Ph.D., Sara Cosgrove, M.D., Bryan Sexton, Ph.D., Robert Hyzy, M.D., Robert Welsh, M.D., Gary Roth, M.D., Joseph Bander, M.D., John Kepros, M.D., and Christine Goeschel, R.N., M.P.A.

- Central line infection rates decreased 66%
- Quarterly infection rate in most ICU's <1%
- Estimated saving of $175 million
- Potentially more than 1500 lives saved

MHA Keystone Center for Patient Safety & Quality



Impact on Communication?

Table 2. Number of Communication Failures With and Without at Least 1 Visible Consequence in the Preintervention and Postintervention Phases

	Preintervention	Postintervention	Total
Failures with no visible consequence	133	38	**171**
Failures with at least 1 visible consequence	207	75	**282**
Total	**340**	**113**	**453**

Visible consequences: inefficiency, team tension, resource waste, workaround, delay, patient inconvenience, and procedural error

Lingard, L. et al. Arch Surg 2008;143:12-17.

Impact on Teamwork?

SURGICAL CHECKLIST
IMPLEMENTATION PROJECT

<u>Overarching aim</u>

To evaluate the ongoing implementation of the Surgical Safety Checklist in the NHS

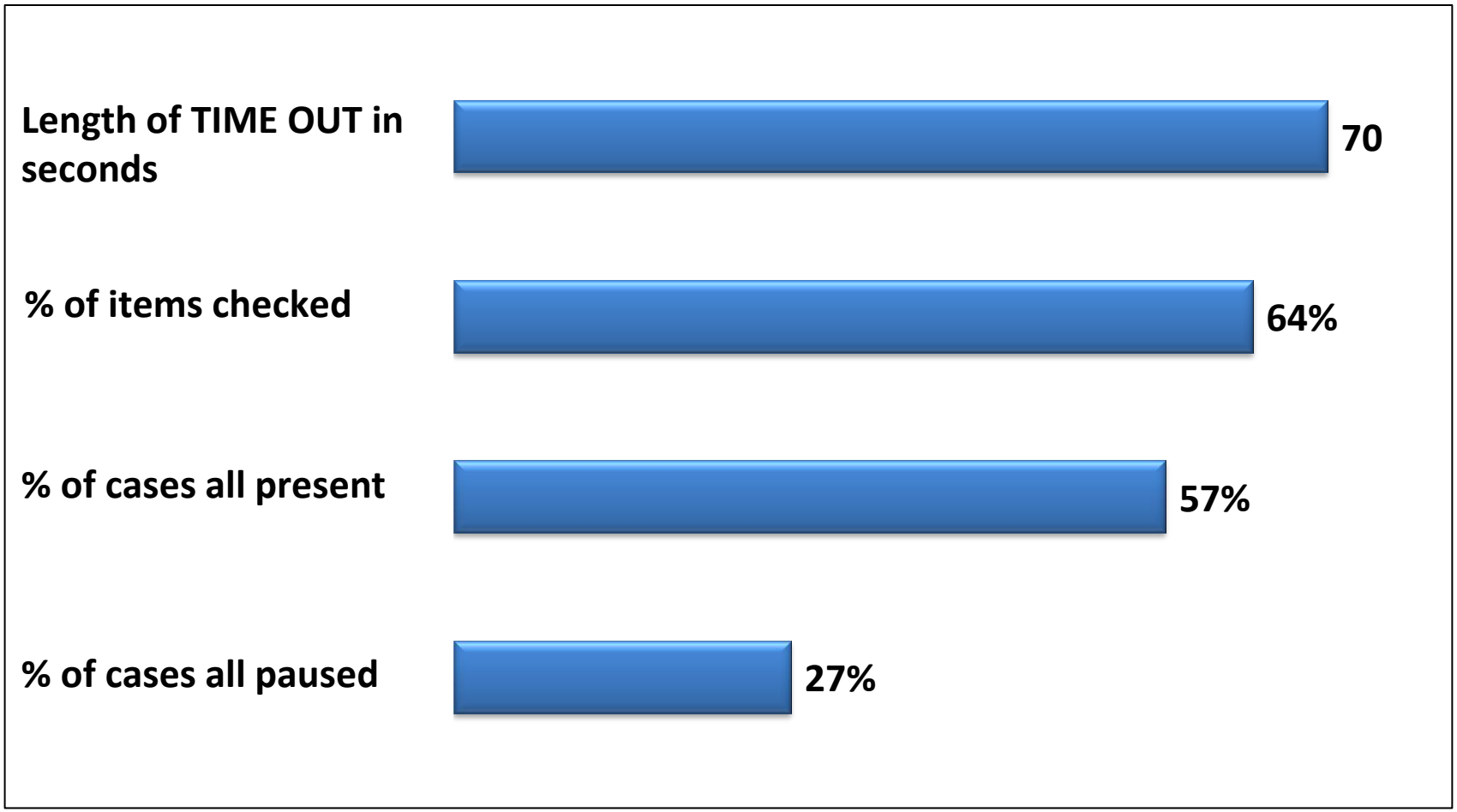
NHS
National Institute for Health Research

'TIME-OUT': Checklist compliance

1. Which version of the Checklist was used? (circle)	Paper / Online / Vocal
2. When was the time-out conducted? (circle)	Before prepping/ draping the patient Before skin incision After skin incision
3. Which items were checked (circle)	Patient ID Procedure and site **Anticipated surgical difficulties** Expected blood loss Special equipment/investigations required Any potential unexpected steps? **Anticipated anaesthetic difficulties** Patient-specific concerns ASA grade Other equipment/support required? **Nursing issues** Equipment problems? Confirmation of sterility? **Other** Antibiotic prophylaxis Hair removal Patient warming DVT prophylaxis Essential/relevant imaging displayed
6. Time taken to complete Time out (in mins/secs):	
7. Who led the Time out (circle)	Scrub Nurse — Circulating Nurse Anaesthetist — Anaesthesia trainee Surgeon — Surgical assistant ODP — Other

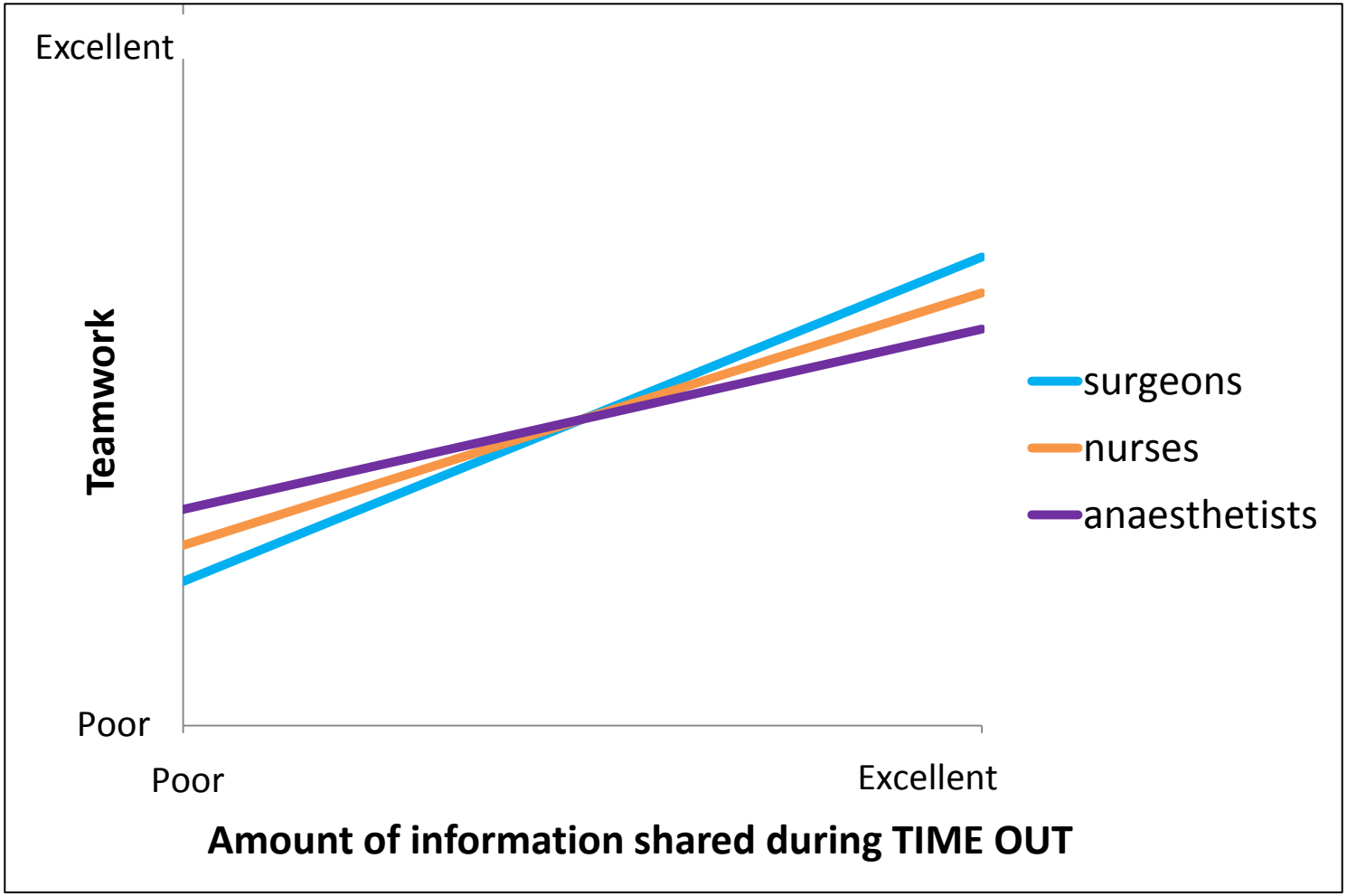
8. Were all team members present for Time out? (circle those present)	**Yes / No** Scrub Nurse — Circulating Nurse Anaesthetist — Anaesthesia trainee Surgeon — Surgical assistant ODP — Radiologist (expected?)
9. Who was missing?	
10. Did all present team members pause to do Time out?	**Yes/ No**
10. Team introduction (circle)	1. Not completed 2. Completed but not all team members introduced 3. Completed with team resistance or ridicule 4. Completed appropriately
11. Surgical information (circle)	Was there any resistance? **Yes / No** Did all surgical team members pause? **Yes / No** **Which applies?** 1. No exchange of information 2. Minimal exchange of information 3. Moderate exchange of information 4. All relevant information exchanged
12. Anaesthetic information (circle)	Was there any resistance? **Yes / No** Did all anaesthetic team members pause? **Yes / No** **Which applies?** 1. No exchange of information 2. Minimal exchange of information 3. Moderate exchange of information 3. All relevant information exchanged
13. Nursing information (circle)	Was there any resistance? **Yes / No** Did all nursing team members pause? **Yes / No** **Which applies?** 1. No exchange of information 2. Minimal exchange of information 3. Moderate exchange of information 4. All relevant information exchanged

‘TIME OUT’ completion



N=563, prelim analysis

Good information sharing at TIME OUT is related to good teamwork during the procedure



Does it make a difference if all team members are present?

YES

If all team members are present, the whole team displays better communication, coordination, cooperation, leadership and situational awareness during the procedure

Does it make a difference if all team members pause?

YES

If all team members pause, the whole team displays better communication, coordination, cooperation, leadership and situational awareness during the procedure

Does it make a difference who leads the TIME OUT?

YES

If the surgeon leads the TIME OUT, the whole team display better communication, coordination, cooperation, leadership and situational awareness during the procedure. We believe this shows that when surgeons buy in to the whole agenda and are supportive, the whole team is generally better functioning

Warning

When not used in the intended fashion such tools could have an adverse effect on team function

Whyte et al, 2008, Cognition, Technology and work

Team training

Background and aims

- Established in other industries
  - Aviation, military
  - Crew Resource Management

- Heavily based on simulation
  - Safe environment for repeated, directed practice

- Aim: to instil a set of skills, <u>regardless of an operator's personality</u>, that contribute to safe and effective operations

Article

Approaching the Evidence Basis for Aviation-Derived Teamwork Training in Medicine

Marina V. Zeltser, BA

American Journal of Medical Quality
25(1) 13–23

DOI: 10.1177/1062860609345664
http://ajmq.sagepub.com

Article

Crew Resource Management Improved Perception of Patient Safety in the Operating Room

American Journal of Medical Quality
25(1) 60–63

DOI: 10.1177/1062860609351236
http://ajmq.sagepub.com

Attitudinal Changes Resulting from Repetitive Training of Operating Room Personnel Using High-F

JOHN T. PAIGE, M
CHARLES W. HIL

From Louisiana

Effects of Teamwork Training on Adverse Outcomes and Process of Care in Labor and Delivery

A Randomized Controlled Trial

Peter E. Nielsen, MD, Marlene B. Goldman, ScD, Susan Mann, MD, David E. Shapiro, PhD, Ronald G. Marcus, MB, BCh, Stephen D. Pratt, MD, Penny Greenberg, RN, Patricia McNamee, RN, MS, Mary Salisbury, RN, MSN, David J. Birnbach, MD, Paul A. Gluck, MD, Mark D. Pearlman, MD, Heidi King, MS, David N. Tornberg, MD, MPH, and Benjamin P. Sachs, MB, BS

OBJECTIVE: To evaluate the effect of teamwork training on the occurrence of adverse outcomes and process of care in labor and delivery.

METHODS: A cluster-randomized controlled trial was conducted at seven intervention and eight control hospitals. The intervention was a standardized teamwork

Does team training work?

Team training efficacy

- 4 levels of efficacy (Kirkpatrick, 1976)

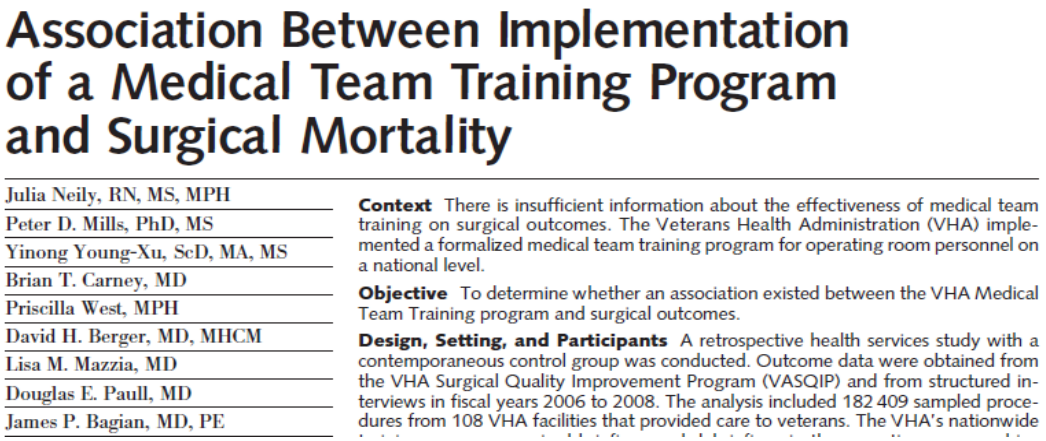
1. **Reactions**: do participants like taking part?
2. **Learning/attitudes**: do participants' attitudes improve?
3. **Behaviours**: do participants learn new skills?
4. **Organisational impact**: do patient outcomes improve?

Team training efficacy

- 4 levels of efficacy (Kirkpatrick, 1976)

1. **Reactions**: do participants like taking part? **YES, Positive**
2. **Learning/attitudes**: do participants' attitudes improve? **YES, Substantially**
3. **Behaviours**: do participants learn new skills? **YES, Substantially**
4. **Organisational impact**: do patient outcomes improve? **??????**

Team training efficacy



Association Between Implementation of a Medical Team Training Program and Surgical Mortality

Julia Neily, RN, MS, MPH
Peter D. Mills, PhD, MS
Yinong Young-Xu, ScD, MA, MS
Brian T. Carney, MD
Priscilla West, MPH
David H. Berger, MD, MHCM
Lisa M. Mazzia, MD
Douglas E. Paull, MD
James P. Bagian, MD, PE

Context There is insufficient information about the effectiveness of medical team training on surgical outcomes. The Veterans Health Administration (VHA) implemented a formalized medical team training program for operating room personnel on a national level.

Objective To determine whether an association existed between the VHA Medical Team Training program and surgical outcomes.

Design, Setting, and Participants A retrospective health services study with a contemporaneous control group was conducted. Outcome data were obtained from the VHA Surgical Quality Improvement Program (VASQIP) and from structured interviews in fiscal years 2006 to 2008. The analysis included 182 409 sampled procedures from 108 VHA facilities that provided care to veterans. The VHA's nationwide

- 18% decrease in observed mortality (74 vs 34 VA hospitals)
- Substantial training programme
  1. 2 months preparation
  2. 1 day on-site team training session (theatres closed)
  3. quarterly follow up telephone interviews with theatre staff for 1 year

JAMA 2010;304:1693-1700

Barriers and facilitators to interventions

Resistant individuals

Culture

Perceived lack of ownership

Repetitious of existing practices

Perceived lack of evidence base

Perceived inefficiencies in design

Not applicable to all specialities

Training/education

Feedback on local data

Senior buy-in

Modify to local context

Incorporate with existing processes

Consequences for resistant individuals

Involvement of whole team

Summary

- Things go wrong in healthcare and team failures lie at the heart of this
- This has led to a change in the way we look at patient safety
- We can identify a number of key non-technical skills – which are observable and can be measured/scored
- Certain interventions seem to work
- The key to successful implementation relies on designing around the barriers

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