The Role of Simulation in Improving Clinical Practice in Australia and NZ

Alan Merry

THE UNIVERSITY OF AUCKLAND

HEALTH QUALITY & SAFETY COMMISSION NEW ZEALAND

AUCKLAND CITY HOSPITAL

Disclosure

Financial Interests

Safer Sleep LLC

Other interests

NZ Health Quality and Safety Commission, Lifebox, ANZCA, WFSA

Research support from

ANZCA, WHO, HRC, AMRF, NZ Lotteries,

AFT Pharmaceuticals,

Roche, Baxter,
and others

THE UNIVERSITY OF AUCKLAND

AUCKLAND CITY HOSPITAL

Today....

1. The economy and other adverse events
2. The Commission and the Triple Aim
3. Simulation in medical education
4. Simulation in evaluating performance
5. Simulation in patient safety research
6. Simulation and teamwork
7. Conclusions

AUCKLAND CITY HOSPITAL
GREEN LANE DEPARTMENT OF ANAESTHESIA

HEALTH QUALITY & SAFETY COMMISSION NEW ZEALAND

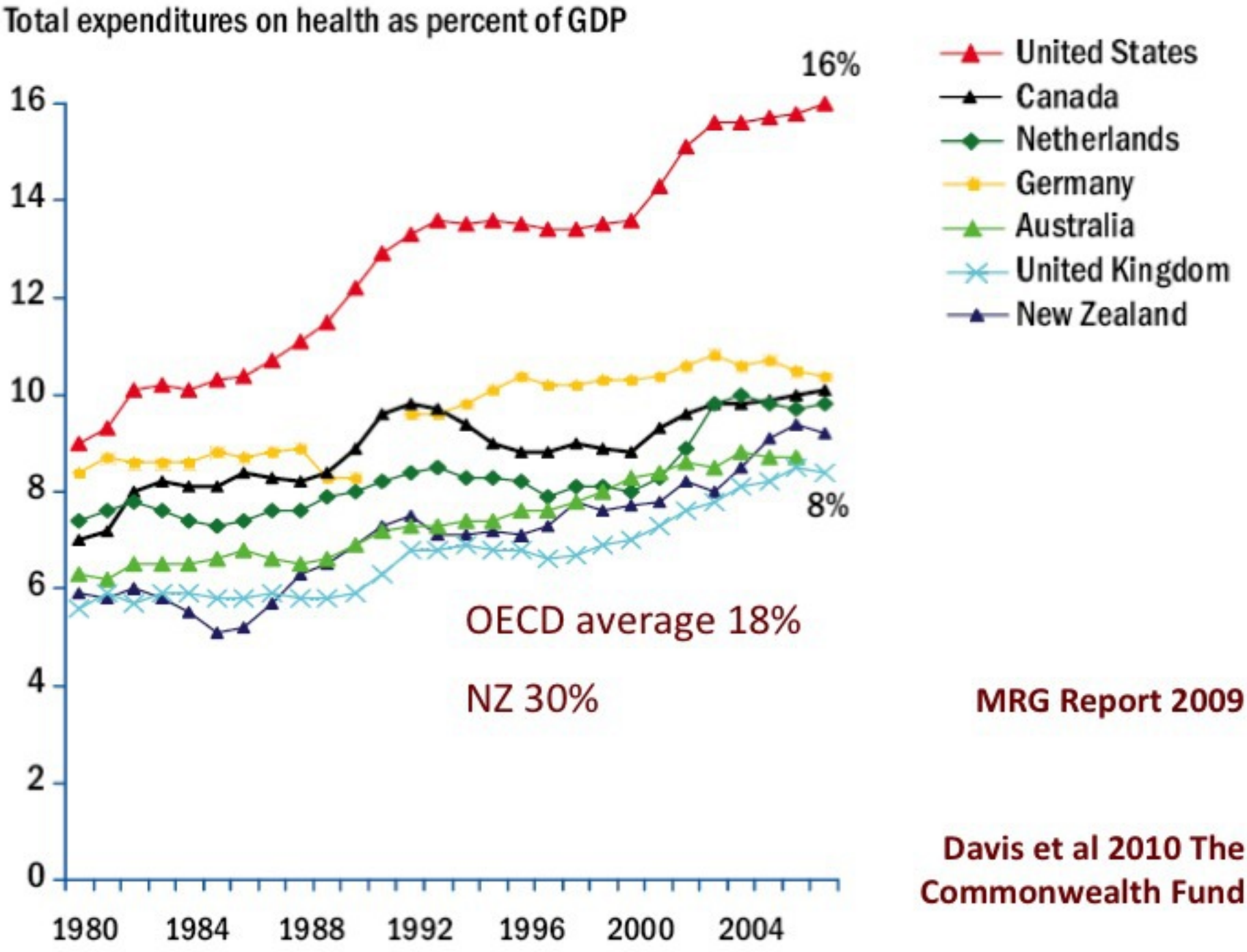
THE UNIVERSITY OF AUCKLAND
FACULTY OF MEDICAL AND HEALTH SCIENCES

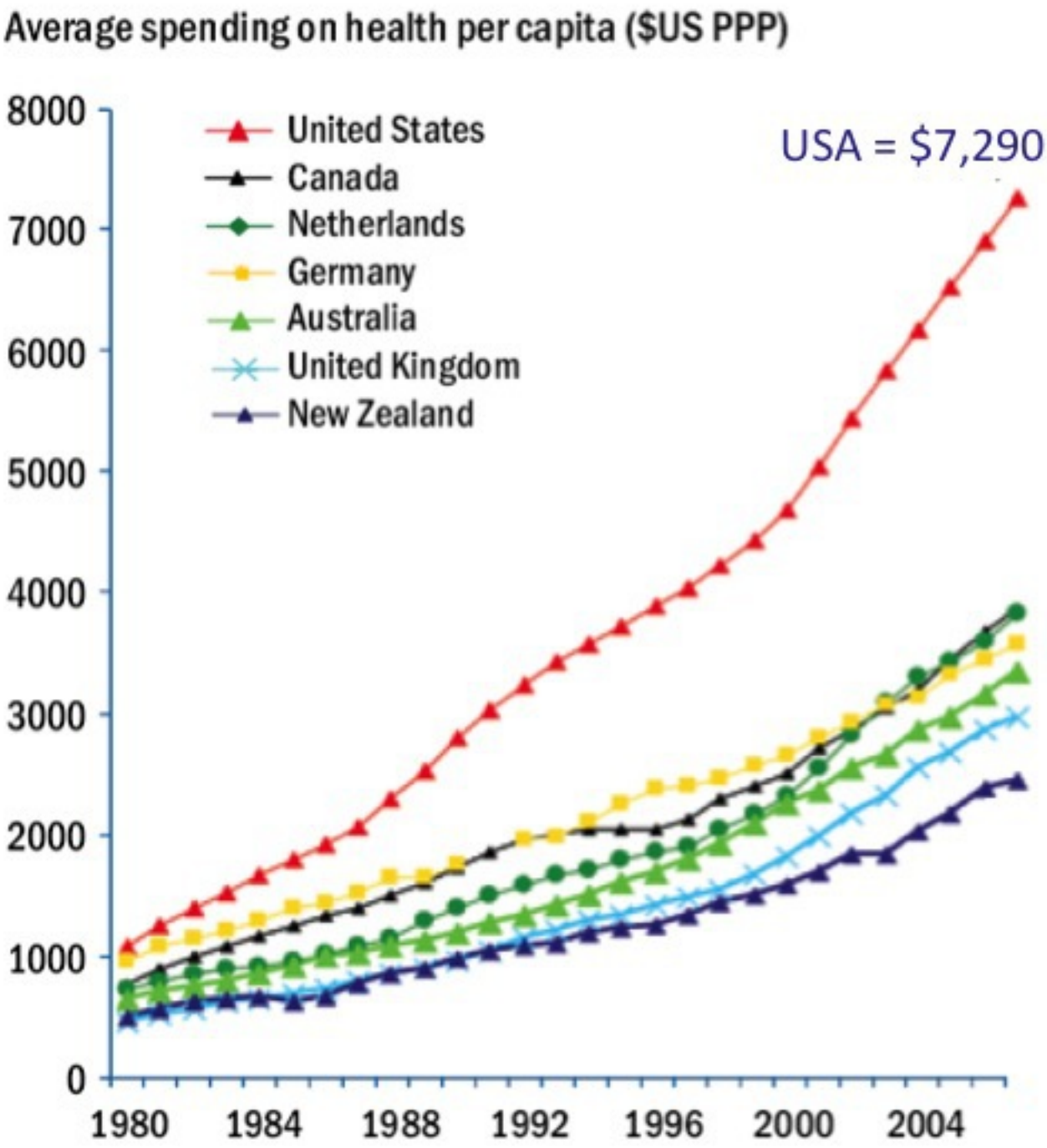
1. **The economy and other adverse events**
2. The Commission and the Triple Aim
3. Simulation in medical education
4. Simulation in evaluating performance
5. Simulation in patient safety research
6. Simulation and teamwork
7. Conclusions

AUCKLAND CITY HOSPITAL
GREEN LANE DEPARTMENT OF ANAESTHESIA

HEALTH QUALITY & SAFETY COMMISSION NEW ZEALAND

THE UNIVERSITY OF AUCKLAND
FACULTY OF MEDICAL AND HEALTH SCIENCES


Total expenditures on health as percent of GDP
16%
8%
16
14
12
10
8
6
4
2
0
1980
1984
1988
1992
1996
2000
2004
United States
Canada
Netherlands
Germany
Australia
United Kingdom
New Zealand
OECD average 18%
NZ 30%
MRG Report 2009
Davis et al 2010 The Commonwealth Fund



Expenditures in $US PPP (purchasing power parity)

Netherlands is estimated

OECD Health Data, 2009

Davis et al 2010 The Commonwealth Fund

HOUSING NZ, SAFEKIDS DRIVEWAY CAMPAIGN TARGETS 12,759 HOMES

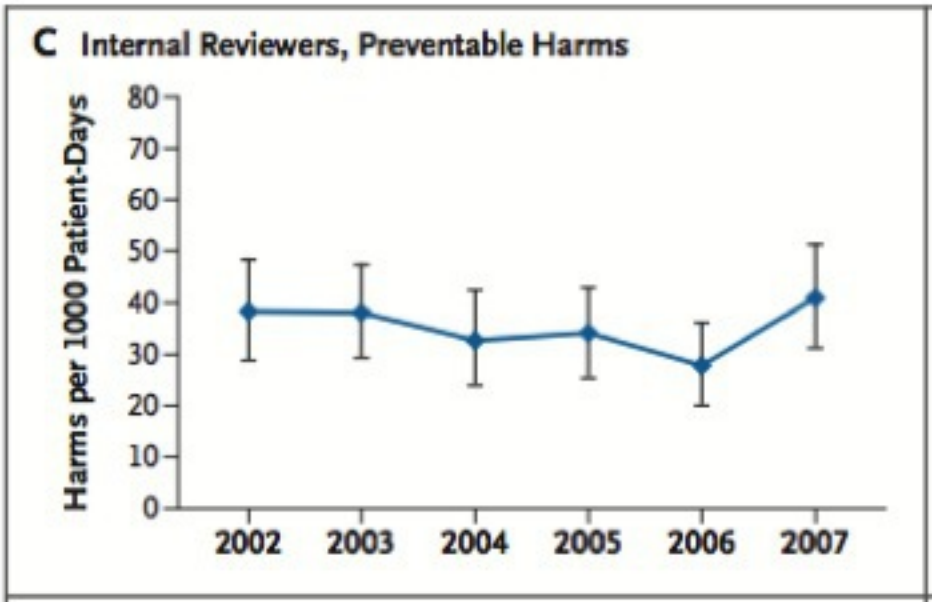
The sound of hammers rings out on Bairds Rd. Mele and Teremoana Rima of Otara watch with transparent delight as a strapping team of Housing NZ contractors build a fence separating their driveway from their home and yard.

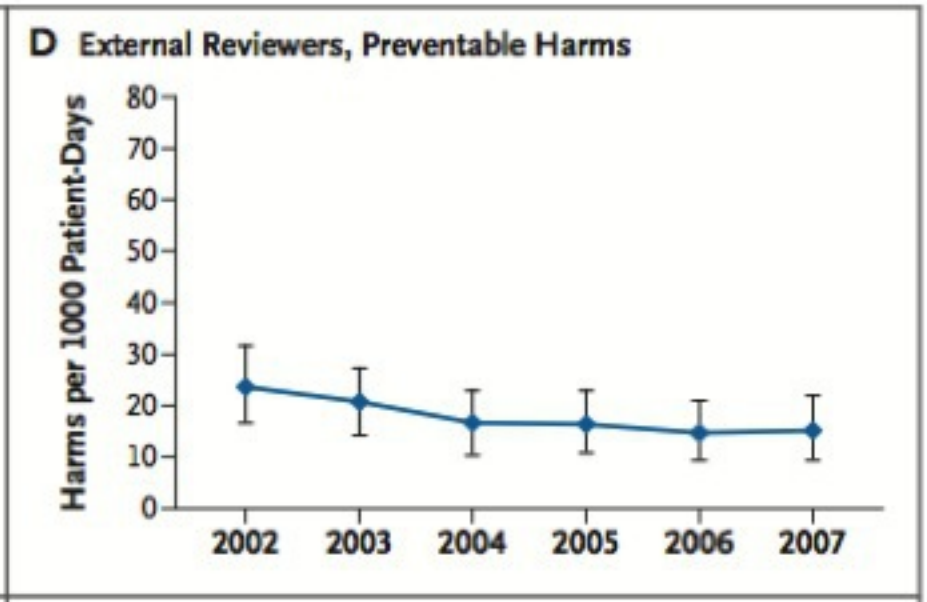
Home safe as. Mele and Teremoana Rima with grandson Malachi are delighted to see a fence going up to separate their driveway from their home and yard.

SPECIAL ARTICLE *NEJM* Nov 2010

Temporal Trends in Rates of Patient Harm Resulting from Medical Care

Christopher P. Landrigan, M.D., M.P.H., Gareth J. Parry, Ph.D.,
Catherine B. Bones, M.S.W., Andrew D. Hackbarth, M.Phil.,
Donald A. Goldmann, M.D., and Paul J. Sharek, M.D., M.P.H.





NZ Serious and Sentinel Events 2009 – 2010

- 374 people in serious or sentinel events
- 127 died during admission or shortly afterwards
- *Nearly 1 million people treated and discharged*
- *1.7 million outpatient discharges*

Minor Events Matter

243 arterial switch operations in 16 UK institutions by 21 surgeons ➔ 25% death (6.6%) or near miss

- Major events
  - Significantly related to death and near misses
  - Risk reduced by appropriate compensation
- Minor events
  - Little consequence individually
  - Often overlooked
  - Total number closely related to death and near misses

de Leval et al 2000 *J Thorac Cardiovasc Surg* 119:661-72

Solis-Trapala et al 2007 *Stat Med* 26:5189-202

Iatrogenic Harm - What Does the Injured Patient Want?

- Acknowledgement
- Apology
- Assurance others will not be injured in the same way
- Compensation

1. The economy and other adverse events
2. **The Commission and the Triple Aim**
3. Simulation in medical education
4. Simulation in evaluating performance
5. Simulation in patient safety research
6. Simulation and teamwork
7. Conclusions

AUCKLAND CITY HOSPITAL
GREEN LANE DEPARTMENT OF ANAESTHESIA

HEALTH QUALITY & SAFETY COMMISSION NEW ZEALAND

THE UNIVERSITY OF AUCKLAND
FACULTY OF MEDICAL AND HEALTH SCIENCES

HEALTH QUALITY & SAFETY COMMISSION NEW ZEALAND

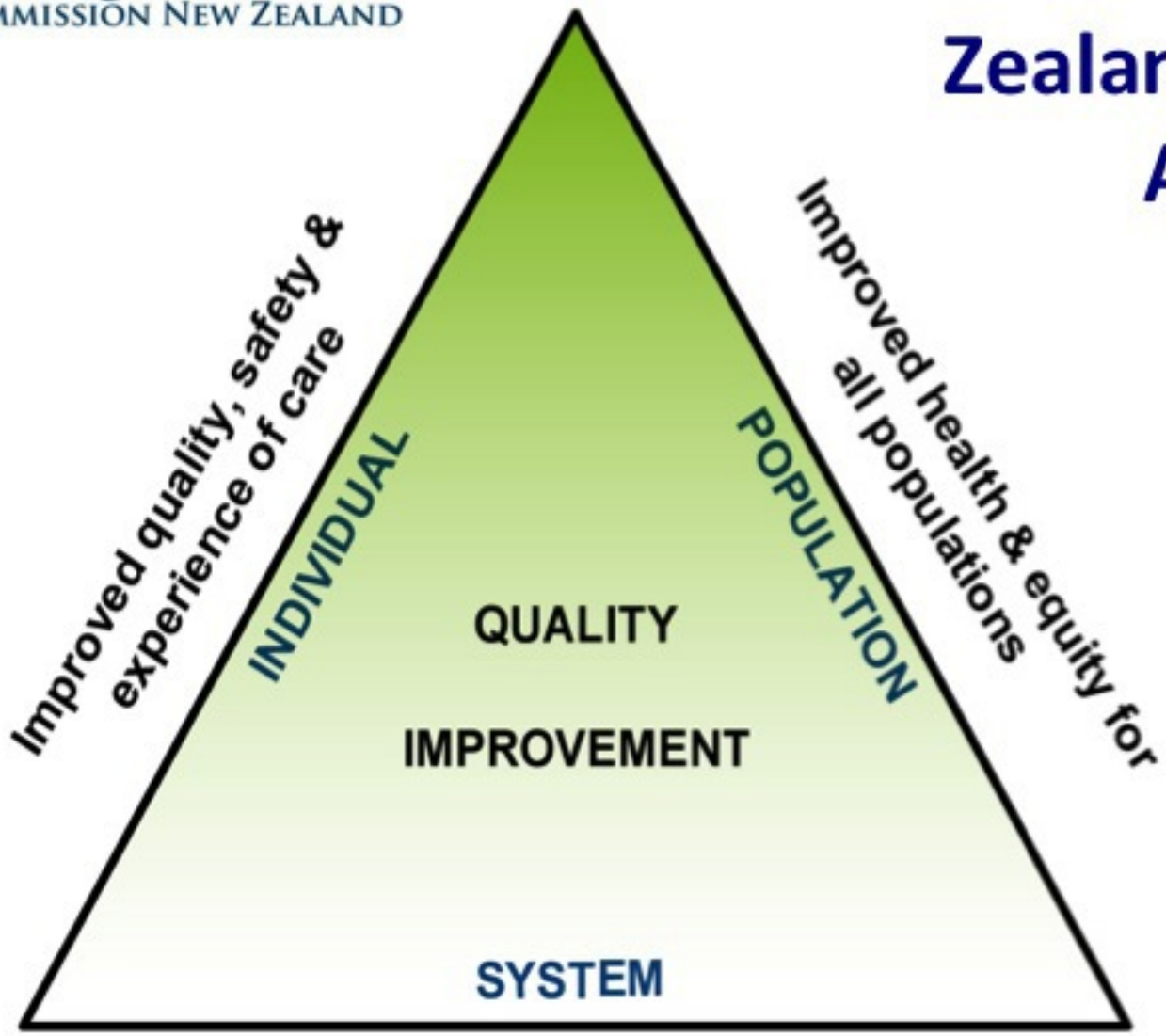
Health Quality & Safety Commission New Zealand

Establishment

- December 2009 - agreed by Cabinet as a stand-alone Crown Entity
- 1 July 2010 - interim Board appointed
- 9 November 2010 – section 17 of the *New Zealand Public Health and Disability Amendment Act 2010*

HEALTH QUALITY & SAFETY COMMISSION NEW ZEALAND

The New Zealand Triple Aim



Best value for public health system resources

1. The economy and other adverse events
2. The Commission and the Triple Aim
3. **Simulation in medical education**
4. Simulation in evaluating performance
5. Simulation in patient safety research
6. Simulation and teamwork
7. Conclusions

AUCKLAND CITY HOSPITAL
GREEN LANE DEPARTMENT OF ANAESTHESIA

HEALTH QUALITY & SAFETY COMMISSION NEW ZEALAND

THE UNIVERSITY OF AUCKLAND
FACULTY OF MEDICAL AND HEALTH SCIENCES

Deaths from Difficulty Airways
Coroners' Reports 2002 – 2007

Source:
Prof Harry Owen

British Journal of Anaesthesia 106 (5): 617–31 (2011)
Advance Access publication 29 March 2011 · doi:10.1093/bja/aer058

BIA

Can't Intubate Can't Oxygenate – Major Complications of Airway Managent

of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 1: Anaesthesia†

T. M. Cook[1]*, N. Woodall[2] and C. Frerk[3], on behalf of the Fourth National Audit Project

British Journal of Anaesthesia 106 (5): 632–42 (2011)
Advance Access publication 29 March 2011 · doi:10.1093/bja/aer059

BJA

CME

Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 2: intensive care and emergency departments†

T. M. Cook[1]*, N. Woodall[2], J. Harper[3] and J. Benger[4], on behalf of the Fourth National Audit Project

[1] Department of Anaesthesia and Intensive Care, Royal United Hospital, Combe Park, Bath, UK
[2] Department of Anaesthesia, Norfolk & Norwich University NHS Foundation Trust, Norwich, UK
[3] Department of Anaesthesia and Intensive Care, Royal Liverpool University Hospital, Liverpool, UK
[4] University of the West of England, Bristol, UK

* Corresponding author. E-mail: timcook007@googlemail.com

Background. The Fourth National Audit Project of the Royal College of Anaesthetists and Difficult Airway Society (NAP4) was designed to identify and study serious airway complications occurring during anaesthesia, in intensive care unit (ICU) and

Anaesth Intensive Care 1999; 27: 659-661

Airway Management in Ludwig's Angina

S. P. W. NEFF*, A. F. MERRY†, B. ANDERSON‡
Department of Anaesthesia, Green Lane Hospital, Auckland, New Zealand

Anaesth Intensive Care 2009; 37: 171-174

Scout's motto

Failure to manage a pati
the most terrifying situatio
anaesthetists. Crises relate
involve otherwise healthy
relatively low risk surgery, so
be particularly tragic. The mo

Anaesth Intensive Care 2011; 39: 578-584

Point of View

Emergency surgical airway in life-threate emergencies – why are we so reluctant to

K. B. GREENLAND*, C. ACOTT†, R. SEGAL‡, G. GOULDING§, R.

Anaesth Intensive Care 2011; 39: 16-34

Special Article

Equipment to manage a difficult airway during anaesthesia

P. A. BAKER*, B. T. FLANAGAN†, K. B. GREENLAND‡, R. MORRIS§, H. OWEN**, R. H. RILEY††,

Simulation in Medical Education

Desirable attributes of medical education

- Actively engaging the learner
- Solving real life problems
- Providing opportunities for practice
- Giving feedback (formative assessment)
- Facilitating reflection
- Providing relevant experience

Kaufman 2003 *BMJ* 326: 213-6

Simulation in Medical Education

- Undergraduate
- Postgraduate
- CPD
- Many disciplines

- Anatomy
- Physiology
- Pharmacology
- Skills
  - psychomotor
  - cognitive
- Teamwork
- Crisis management

Simulation in Medical Education

Does simulation enhance education?

- Many studies
  - ? outcome measures
  - ? control groups

Weller J 2006 *MD Thesis*

Simulation in Medical Education

Does simulation enhance education?

- Enthusiasm of participants is high
- Face validity is high
- Cost may be high
- Evidence for superiority over other methods is limited

Weller J 2006 *MD Thesis*

Simulation in Medical Education

What the airlines do

- New airport
- New plane
  - 2 weeks classroom
  - 1 week Integrated Procedure Trainer (IPT)
  - 2 weeks A320 Simulator

  → qualified to fly the A 320

Simulation in Medical Education

What the airlines do

- A320 $18 000 per hour
- A320 Simulator $ 700 per hour

- (Purchase cost $10 million)

1. The economy and other adverse events
2. The Commission and the Triple Aim
3. Simulation in medical education
4. **Simulation in evaluating performance**
5. Simulation in patient safety research
6. Simulation and teamwork
7. Conclusions

AUCKLAND CITY HOSPITAL
GREEN LANE DEPARTMENT OF ANAESTHESIA

HEALTH QUALITY & SAFETY COMMISSION NEW ZEALAND

THE UNIVERSITY OF AUCKLAND
FACULTY OF MEDICAL AND HEALTH SCIENCES

Simulation in the Assessment of Anaesthetists

- Formative vs Summative
- Basic vs "High Stakes"

Simulation in the Assessment of Anaesthetists

What the airlines do

- 4 times a year in pairs
  - 6 hour blocks
  - 2 × 2 hours with half-an-hour debrief at the end
  - skills knowledge and human factors
- Fail → off flying

1. The economy and other adverse events
2. The Commission and the Triple Aim
3. Simulation in medical education
4. Simulation in evaluating performance
5. **Simulation in patient safety research**
6. Simulation and teamwork
7. Conclusions

AUCKLAND CITY HOSPITAL
GREEN LANE DEPARTMENT OF ANAESTHESIA

HEALTH QUALITY & SAFETY COMMISSION NEW ZEALAND

THE UNIVERSITY OF AUCKLAND
FACULTY OF MEDICAL AND HEALTH SCIENCES

Which Reality Matters?

- Physical
- Conceptual
- Emotional

Rudolph et al 2007 *Simulation in Healthcare* 2: 161-3

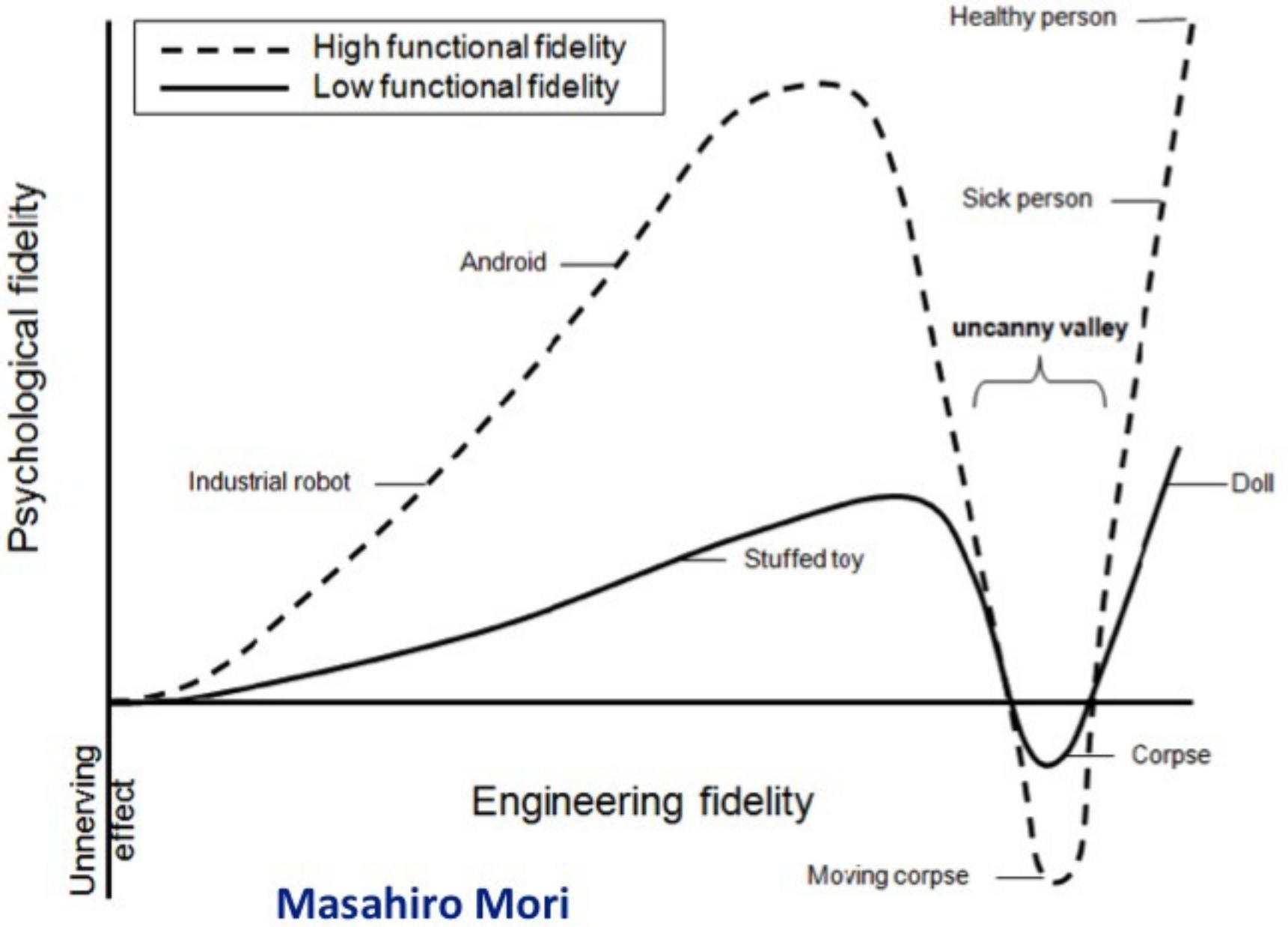


Figure 4-2: The 'uncanny valley' phenomenon seen in android design. Adapted from MacDorman

MacDorman 2005 *Proc Cog Sci Soc 76: 1071-96*

Anaesthesia
Journal of the Association of Anaesthetists of Great Britain and Ireland

Anaesthesia, 2008, **63**, pages 1349–1357 doi:10.1111/j.136

APPARATUS

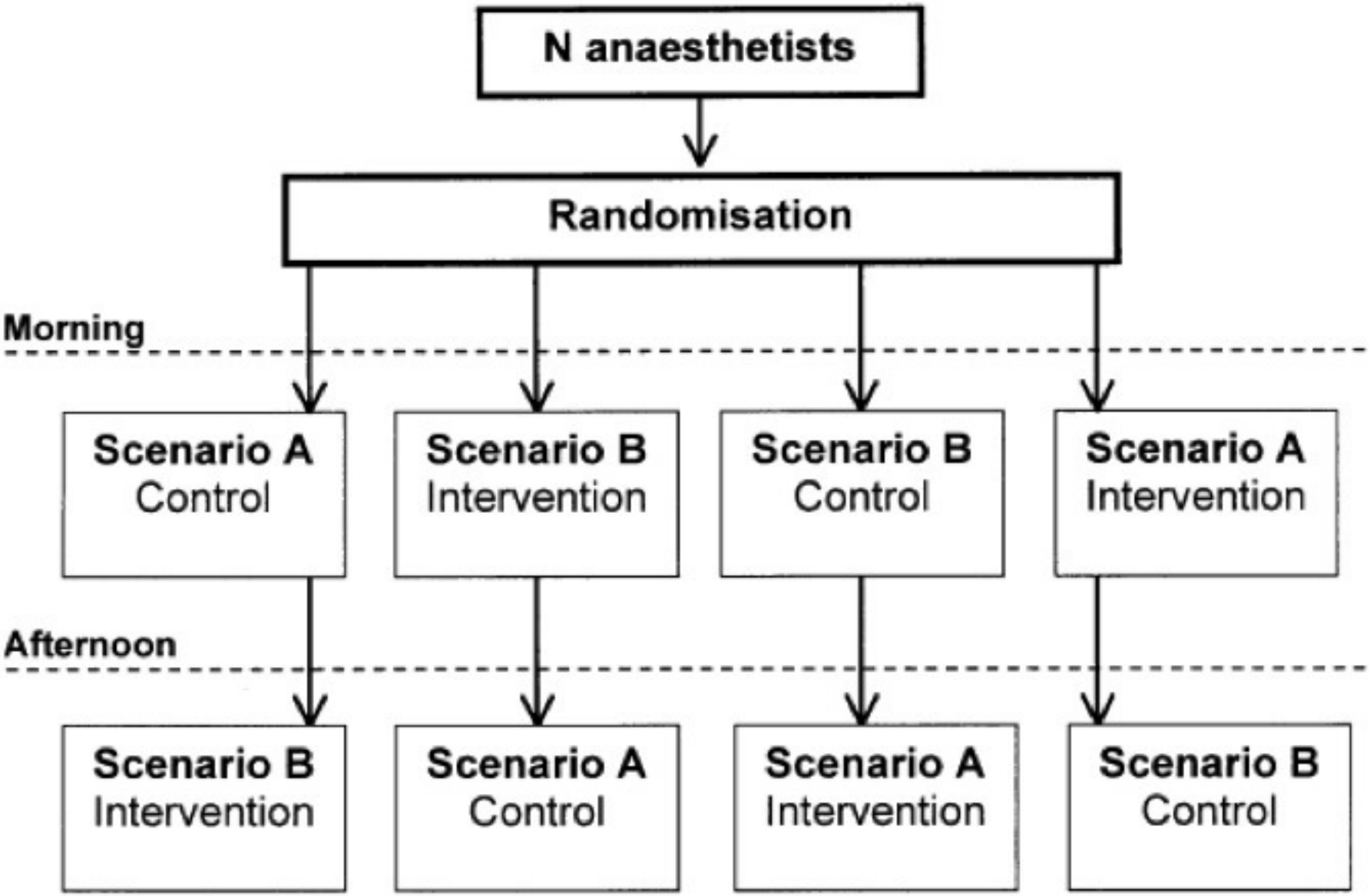
A simulation design for research evaluating safety innovations in anaesthesia*

A. F. Merry,[1] J. M. Weller,[2] B. J. Robinson,[3] G. R. Warman,[4] E. Davies,[5] J. Shaw,[6] J. F. Cheeseman[7] and L. F. Wilson[8]

National Patient Simulation Training Centre
Wellington

Supported by a grant from The Australian and New Zealand College of Anaesthetists

Merry et al 2008 *Anaesthesia* 63: 1349-57



Merry et al 2008 *Anaesthesia* 63: 1349-57

Results

- Scenarios 20
- Total errors 193
- **Drug administration errors 49**
- Mean (SD) errors/scenario 9.7 (3.5)
- Mean (SD) difference 0.3 (5.3)

24 subjects would be needed for 80% power to show a reduction in error rate of 30% from baseline with P ≤0.05

1. The economy and other adverse events
2. The Commission and the Triple Aim
3. Simulation in medical education
4. Simulation in evaluating performance
5. Simulation in patient safety research
6. **Simulation and teamwork**
7. Conclusions

AUCKLAND CITY HOSPITAL
GREEN LANE DEPARTMENT OF ANAESTHESIA

HEALTH QUALITY & SAFETY COMMISSION NEW ZEALAND

THE UNIVERSITY OF AUCKLAND
FACULTY OF MEDICAL AND HEALTH SCIENCES

Teamwork and Communication Influence Outcome and Efficiency

SalaKunzle et al 2010 *Safety Science* 48:1-17

Mazzocco et al 2009 *Am J Surg* 197:678-85

Symons et al 2012 *Int J Surg* 10:355-9

Lingard et al 2004 *Quality & Safety in Health Care* 13:330-4

Curry et al 2011 *Ann Intern Med* 154:384-90

Shared Mental Models

Loss of $125 million Mars Climate Orbiter in 1999

- Lockheed Martin specified engine's thrust in English units - pounds
- Navigators assumed metric units - newtons

Communication

- Clear, concise, explicit
- Directed
- Closed-loop

Salas et al 2005 *Small Group Research* 36: 555-99

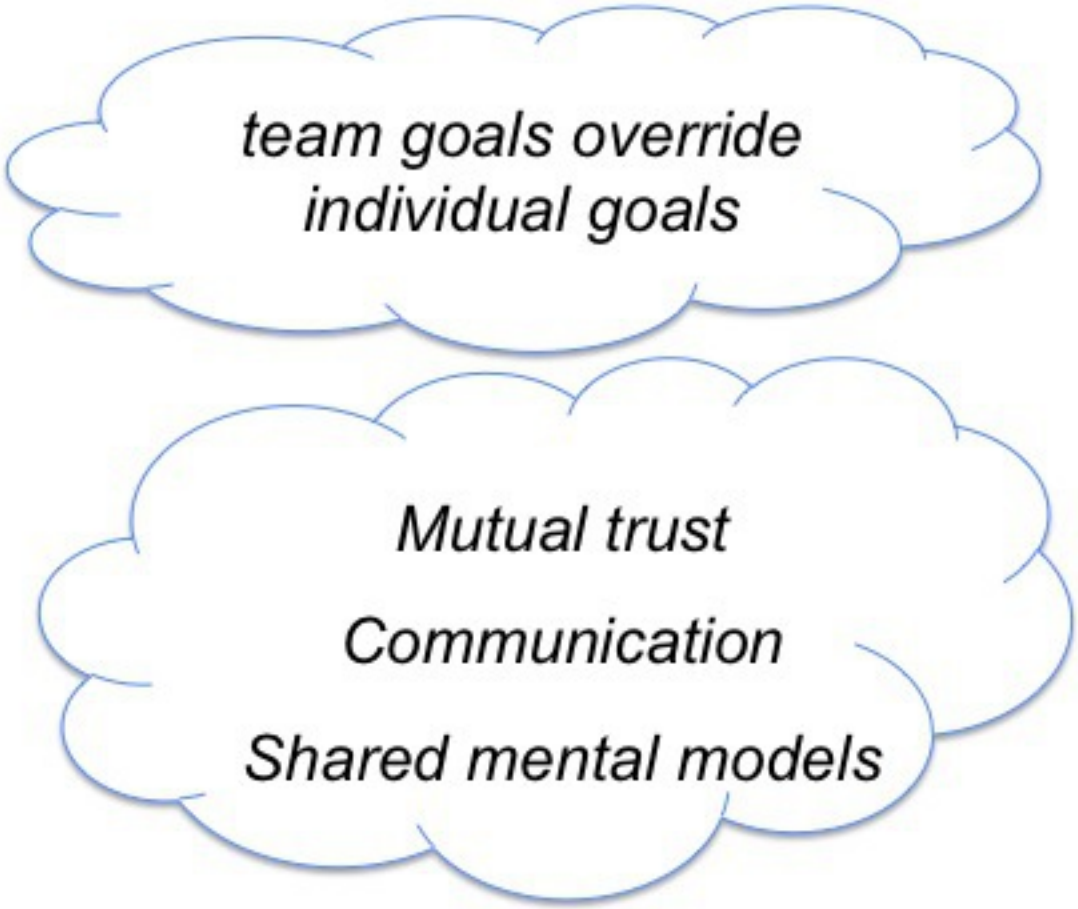
Challenges to Teamwork in Healthcare

- Traditional training and the "hero" model
- Power gradients
- Fear
- Tribalism
- Unstable teams
- Shifting leadership

Teamwork

Five dimensions

- Team orientation
- Team leadership
- Mutual performance monitoring
- Backup behaviour
- Adaptability



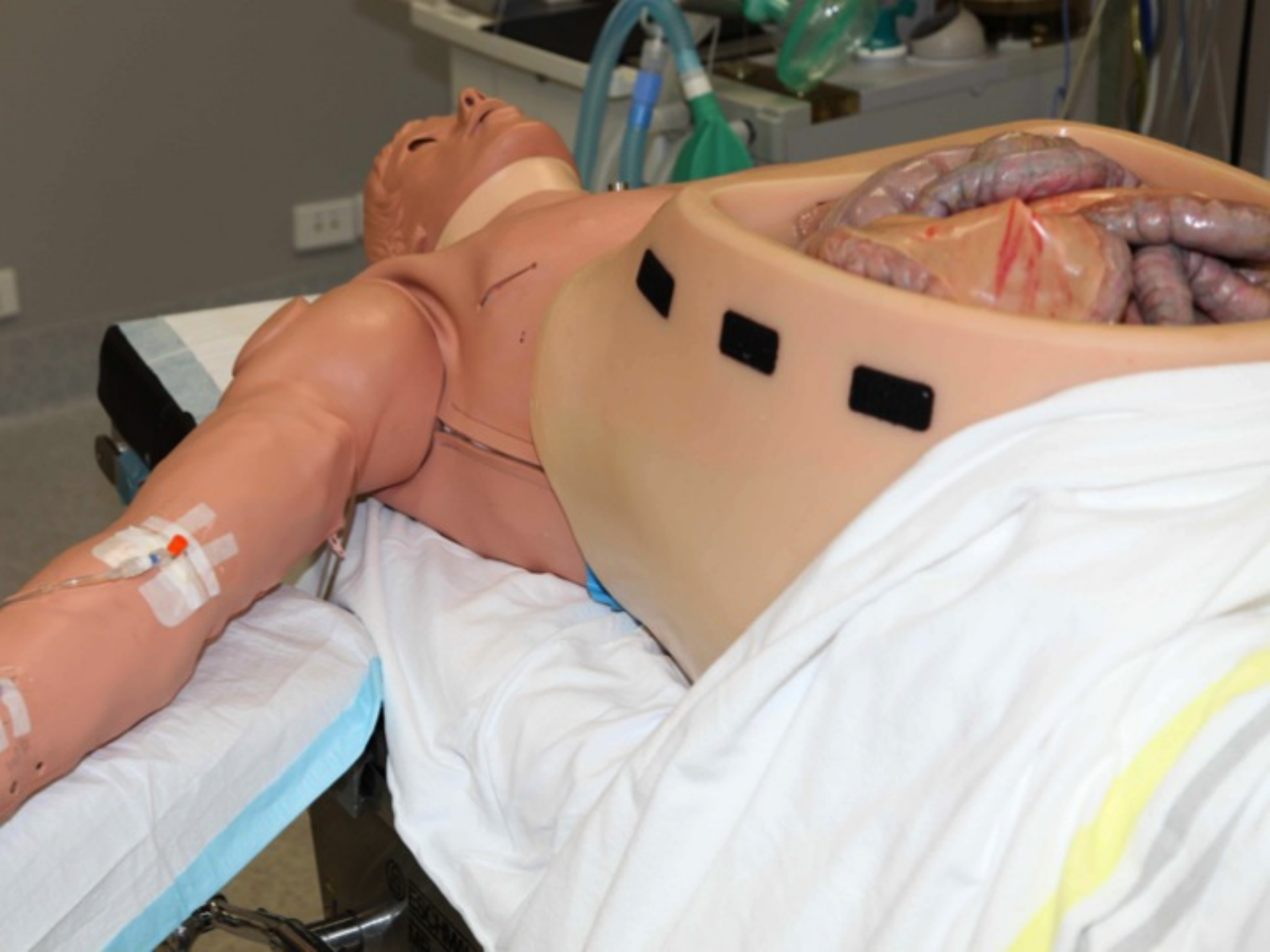
Salas et al 2005 *Small Group Research* 36: 555-99

Team Training Improves Team Performance

Meta-analysis - 2,650 non-clinical teams

- Nearly 20% of the differences in team processes and outcomes attributed to previous participation in team training

Salas et al 2008 *The Journal of the Human Factors and Ergonomics Society* 50:903-33



Speaking Up

P robe

A lert

C hallenge

E mergency

R esponse

The Two Challenge Rule

Juniors are expected to express their concerns

Seniors are expected to listen and reply

1. The economy and other adverse events
2. The Commission and the Triple Aim
3. Simulation in medical education
4. Simulation in evaluating performance
5. Simulation in patient safety research
6. Simulation and teamwork
7. **Conclusions**

AUCKLAND CITY HOSPITAL
GREEN LANE DEPARTMENT OF ANAESTHESIA

HEALTH QUALITY & SAFETY COMMISSION NEW ZEALAND

THE UNIVERSITY OF AUCKLAND
FACULTY OF MEDICAL AND HEALTH SCIENCES

Reducing Harm

We need to reduce harm caused by

- falls
- healthcare-associated infections
- medication
- surgery

Health Quality & Safety Commission New Zealand
Kupu Taurangi Hauora o Aotearoa


ALLEN HEATH

"The real problem isn't how to stop bad doctors from harming, even killing their patients. It's how to prevent good doctors from doing so."

Atul Gawande 1999

The New Yorker