CENTRE OF RESEARCH EXCELLENCE
REDUCING HEALTHCARE ASSOCIATED INFECTIONS

Minimising Bad Decisions in Infection Control

Nicholas Graves

AusHSI

QUT

It’s all about Economics

Some Evidence

Maybe it’s not all about Economics

Scarcity is a fundamental economic problem

seemingly unlimited human wants

in a world of limited resources

Choices

Food or clothes

Handbag or Spa Treatment

We aim to be efficient

carefully choose good/services

compare costs and returns

Individual's are good at responding to scarcity

$50

Food = 70 benefits

Clothes = 90 benefits

$500

Handbag = 10 benefits

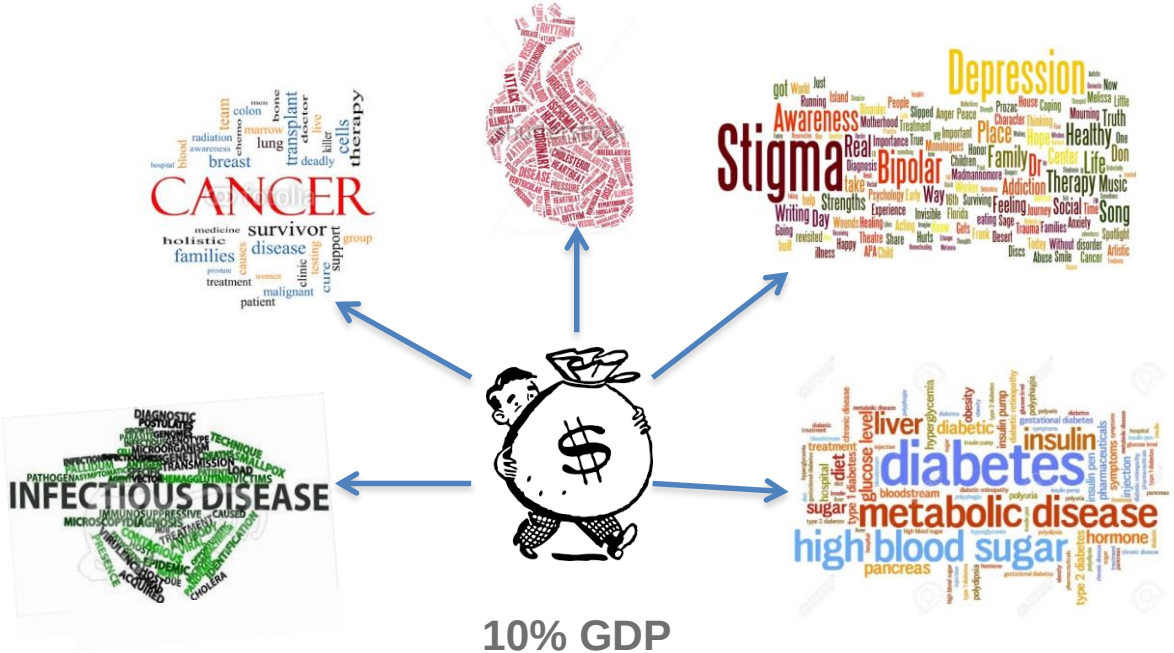
Spa treatment = 15 benefits

Scarcity happens in health care

We should carefully choose goods/services

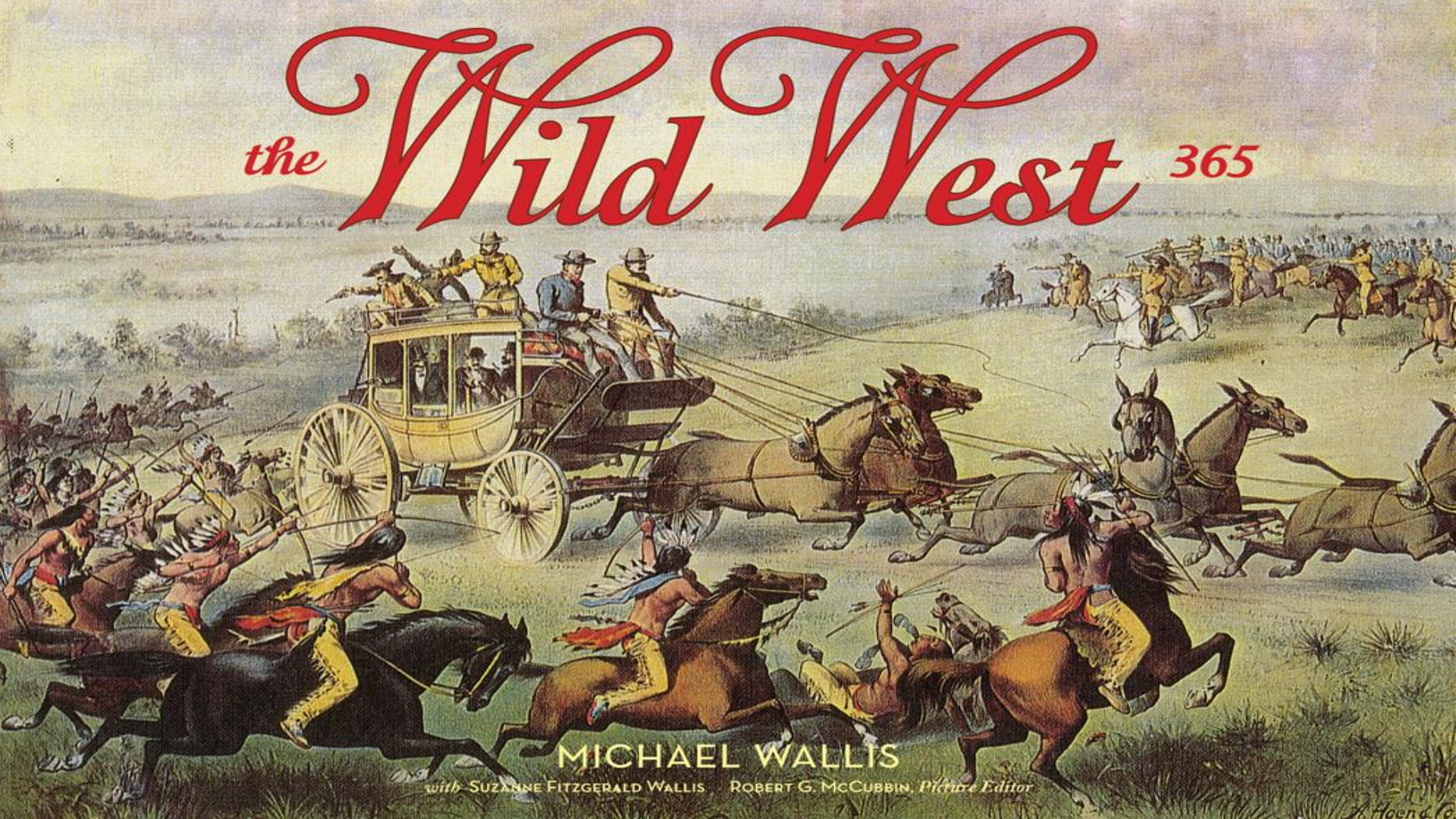
By comparing costs and returns

Australian Health Services are adequate at responding to scarcity

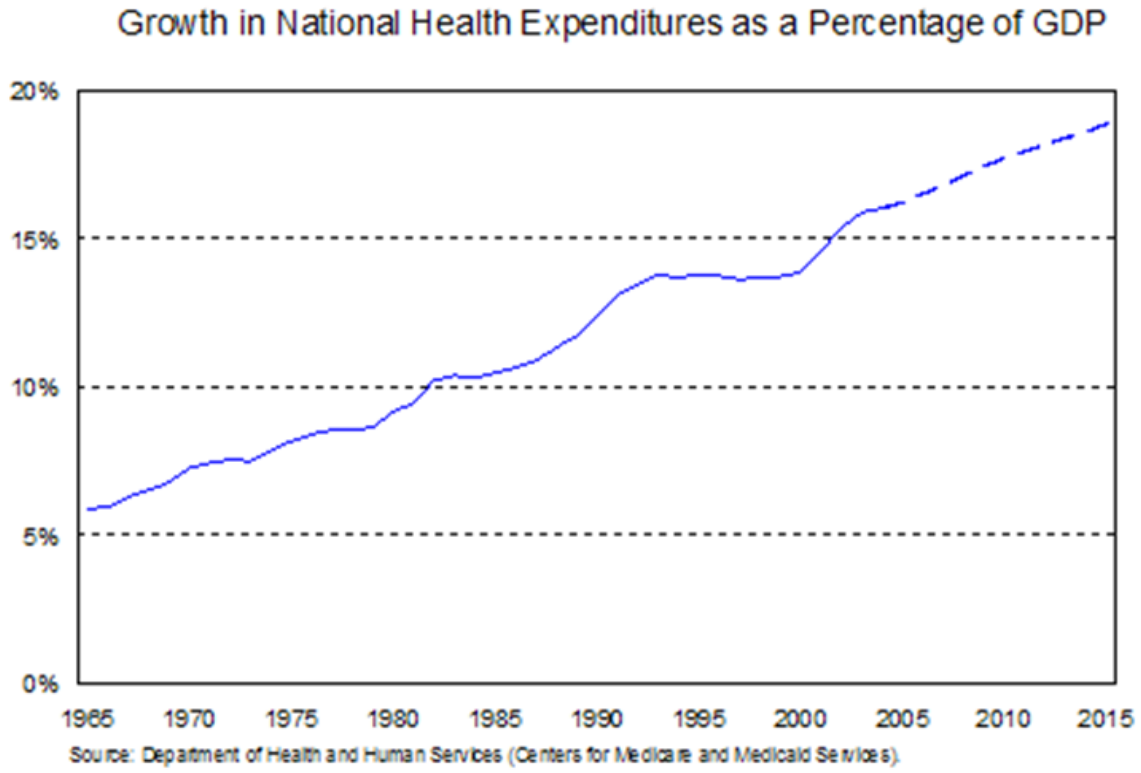


10% GDP

the Wild West 365



MICHAEL WALLIS
with SUZANNE FITZGERALD WALLIS ROBERT G. MCCUBBIN, *Picture Editor*

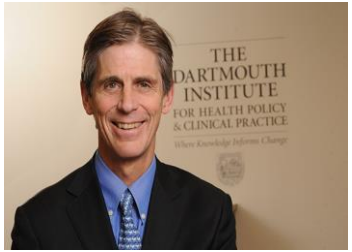


Typically 4-6% / year

Gains to health modest

Many resources wasted

Elliot Fisher



"Perhaps 1/3 of medical spending is for services that do not improve health"

Atul Gawande

Millions of Americans get tests, drugs, and operations that won't make them better, may cause harm, and cost billions.

Anupam Jena

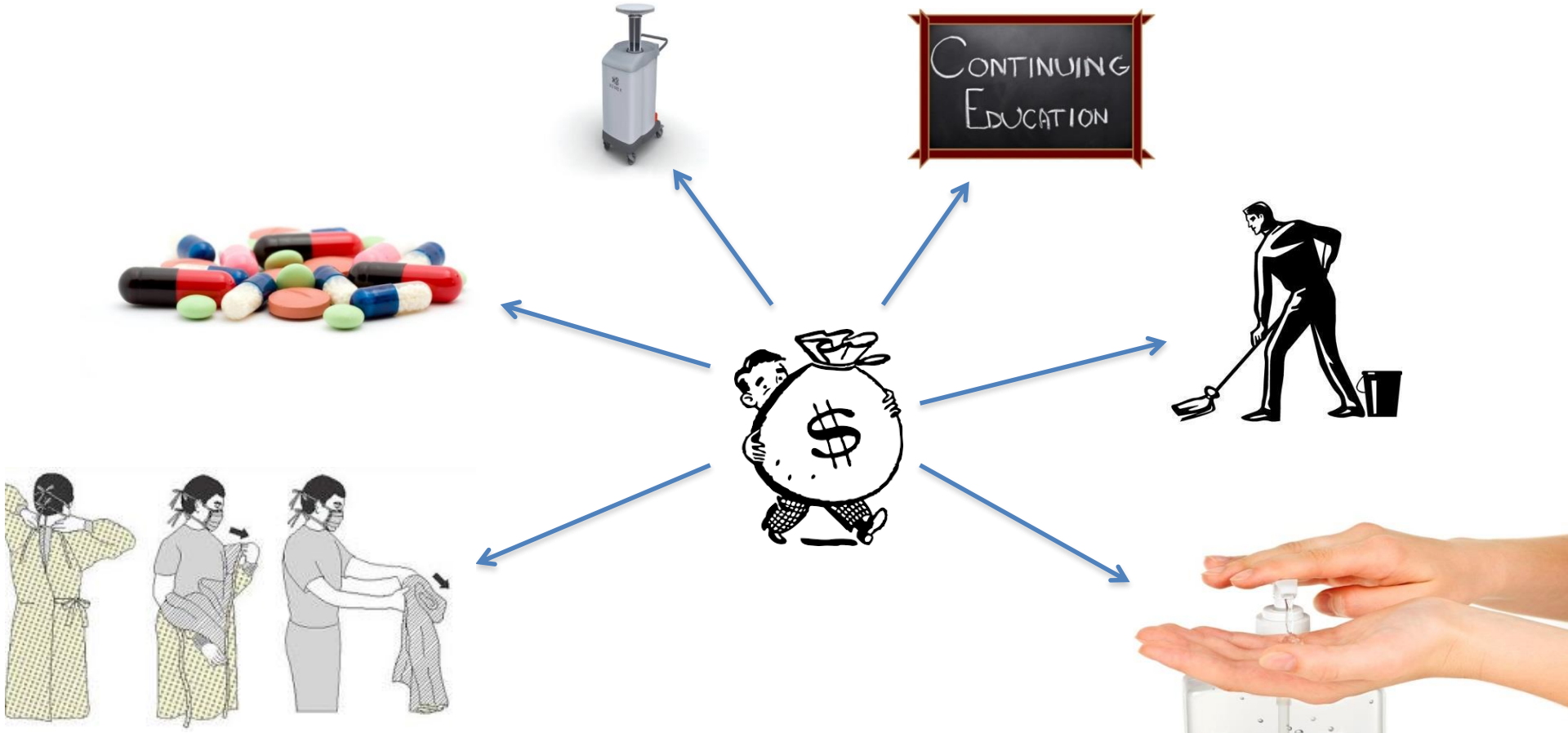
Original Investigation | LESS IS MORE

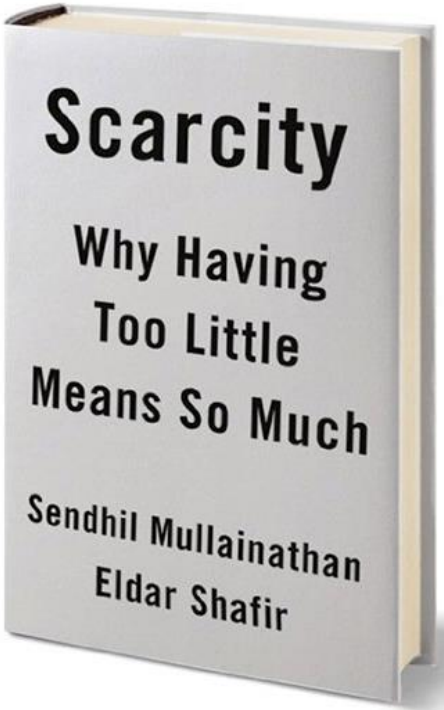
Mortality and Treatment Patterns Among Patients Hospitalized With Acute Cardiovascular Conditions During Dates of National Cardiology Meetings

Anupam B. Jena, MD, PhD; Vinay Prasad, MD; Dana P. Goldman, PhD; John Romley, PhD

"When cardiologists left the hospital patients outcomes improved"

Scarcity happens in infection prevention





Not a cinderella service

Budgets are meagre and precious

Probably an under funded service

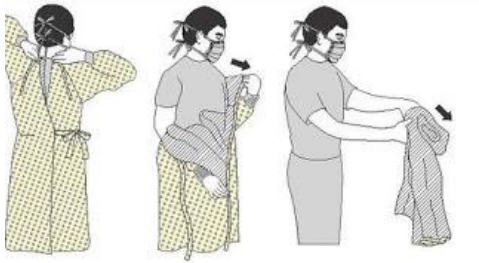
Cannot afford to waste resources

A **major challenge** for Infection Prevention Services

Carefully choose goods/services

Compare costs and returns

Infection prevention **MUST** maximise health returns per dollar spent



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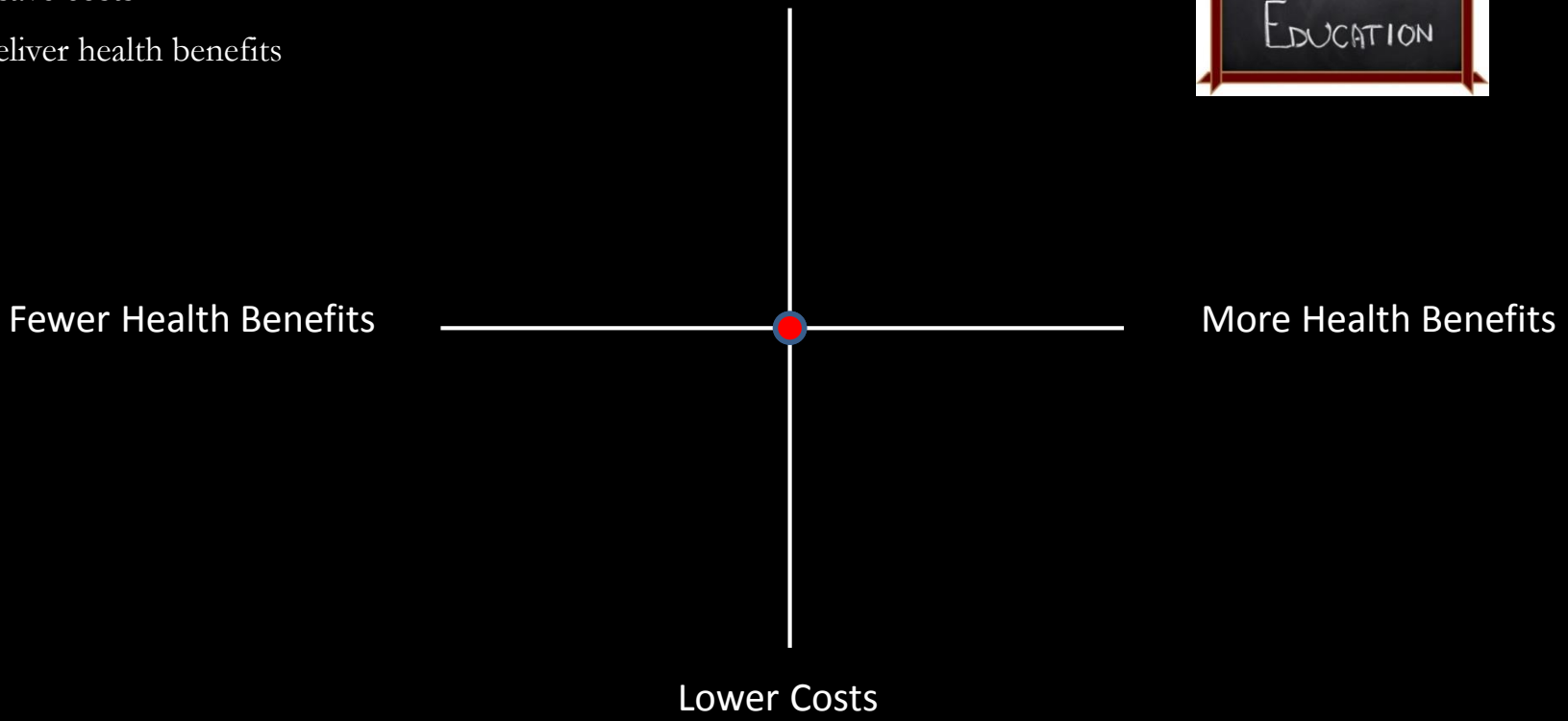
Infection prevention **MUST** maximise health returns per dollar spent

A Previous Time

Invest in an effective programme

It will save costs

And deliver health benefits

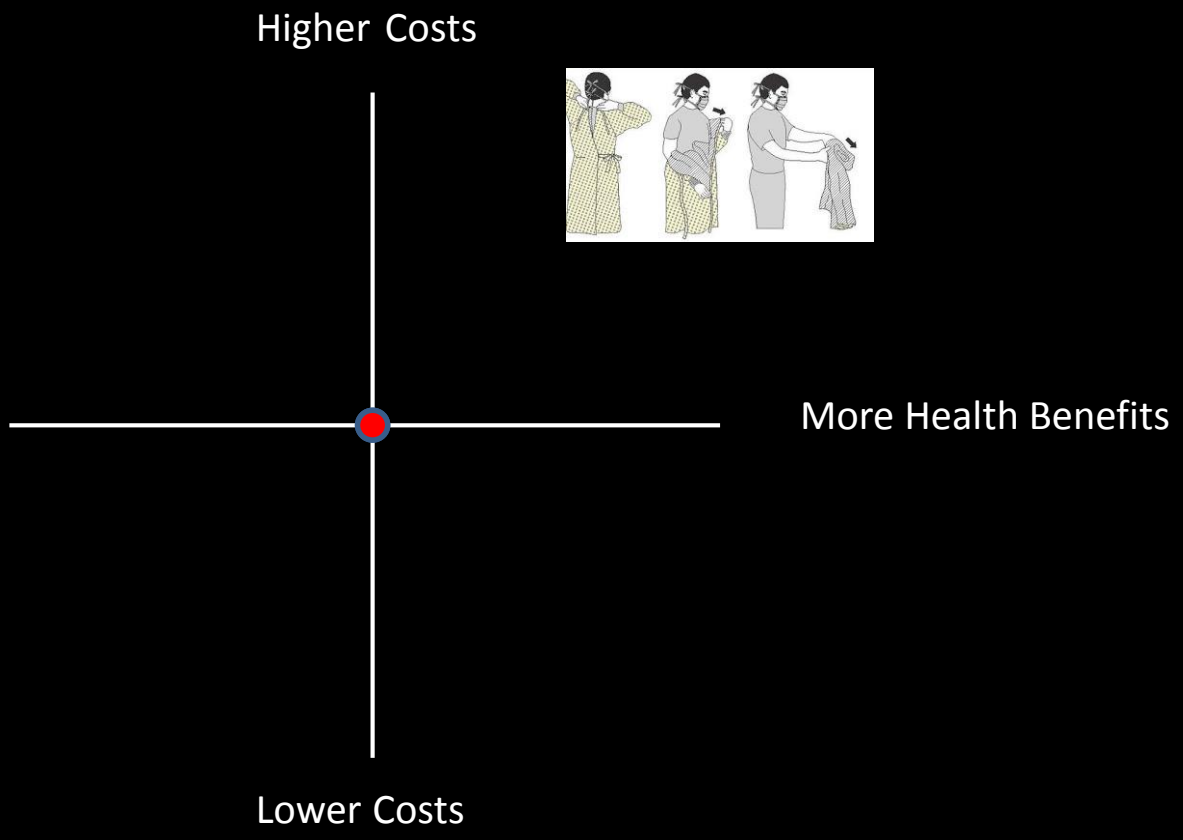


Today

Invest in an effective programme

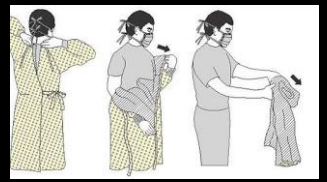
It will save some costs

And deliver health benefits



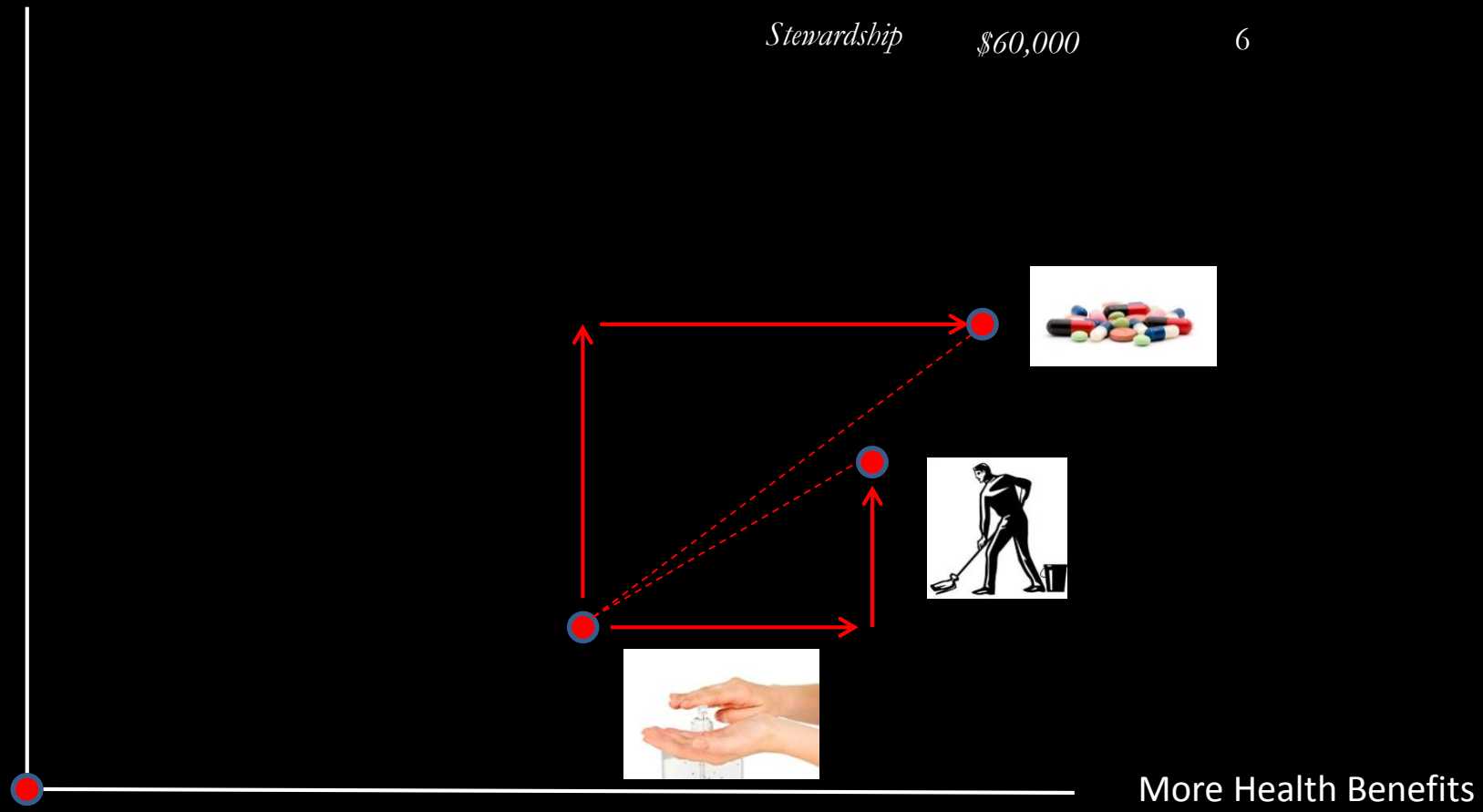
Higher Costs

This is a good decision only if there is no cheaper way of achieving the same health benefit



More Health Benefits

	extra cost	QALY	gradient
Cleaning	$30,000	4	$7,500
Stewardship	$60,000	6	$10,000



Higher Costs

Excluded by cost-effectiveness

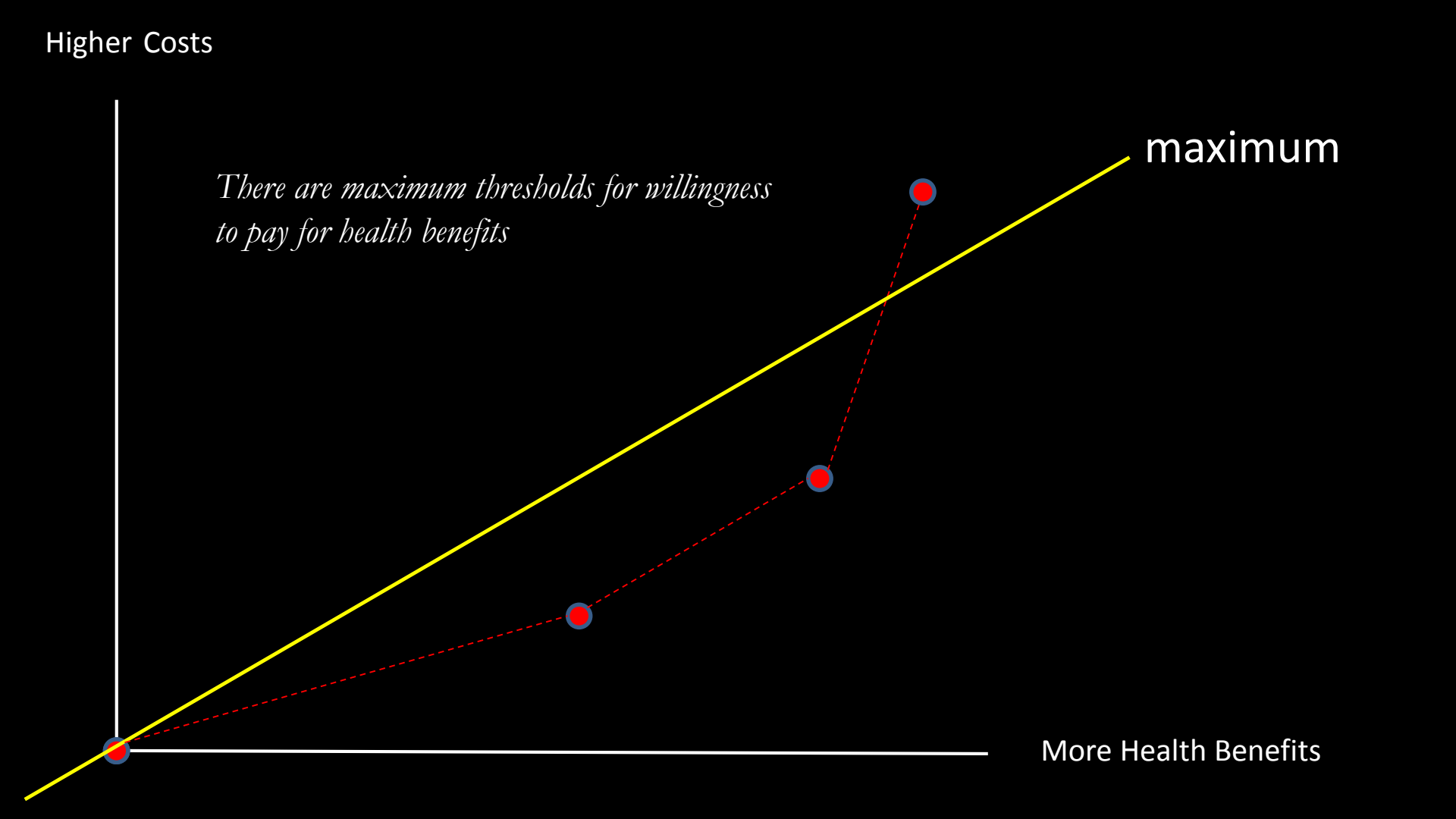
We are being efficient with scarce resources

More Health Benefits

Higher Costs

Wi

No way of getting cheaper health benefits


Higher Costs
maximum
There are maximum thresholds for willingness to pay for health benefits
More Health Benefits

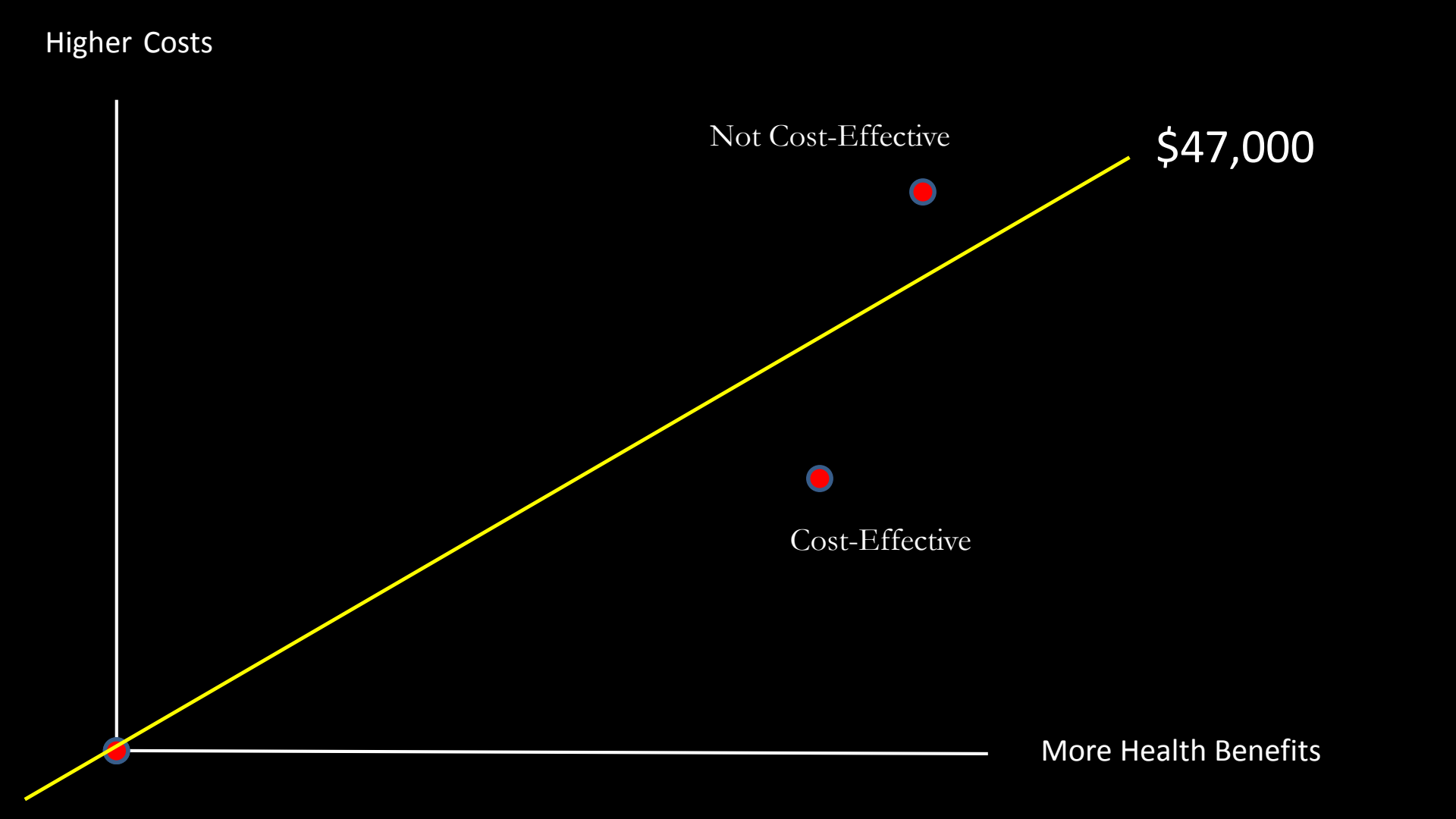
HEALTH ECONOMICS
Health Econ. (2009)
Published online in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/hec.1481

INTERNATIONAL SURVEY ON WILLINGNESS-TO-PAY (WTP) FOR ONE ADDITIONAL QALY GAINED: WHAT IS THE THRESHOLD OF COST EFFECTIVENESS?

TAKERU SHIROIWA[a,*], YOON-KYOUNG SUNG[b], TAKASHI FUKUDA[c], HUI-CHU LANG[d], SANG-CHEOL BAE[b] and KIICHIRO TSUTANI[a]

Our value judgements

Country	Threshold ($US)
Japan	$41,000
Republic of Korea	$74,000
Taiwan	$77,000
United Kingdom	$36,000
Australia	$47,000
United States	$62,000


Higher Costs
Not Cost-Effective
$47,000
Cost-Effective
More Health Benefits

It’s all about Economics

Some Evidence

Maybe it’s not all about Economics

Line Related BSI

Total Hip Replacement

Hand Hygiene Programmes

Research

Open Access

Cost effectiveness of antimicrobial catheters in the intensive care unit: addressing uncertainty in the decision

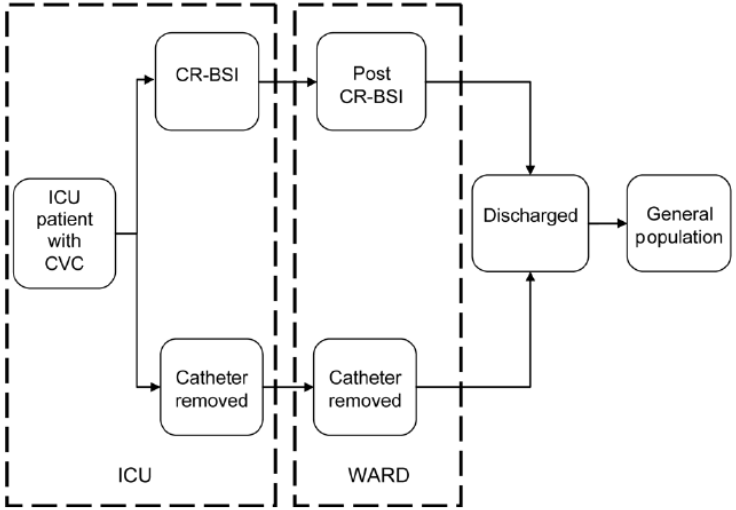
Kate A Halton[1,2], David A Cook[3], Michael Whitby[4], David L Paterson[1,5] and Nicholas Graves[1,2]

Silver Platinum Carbon

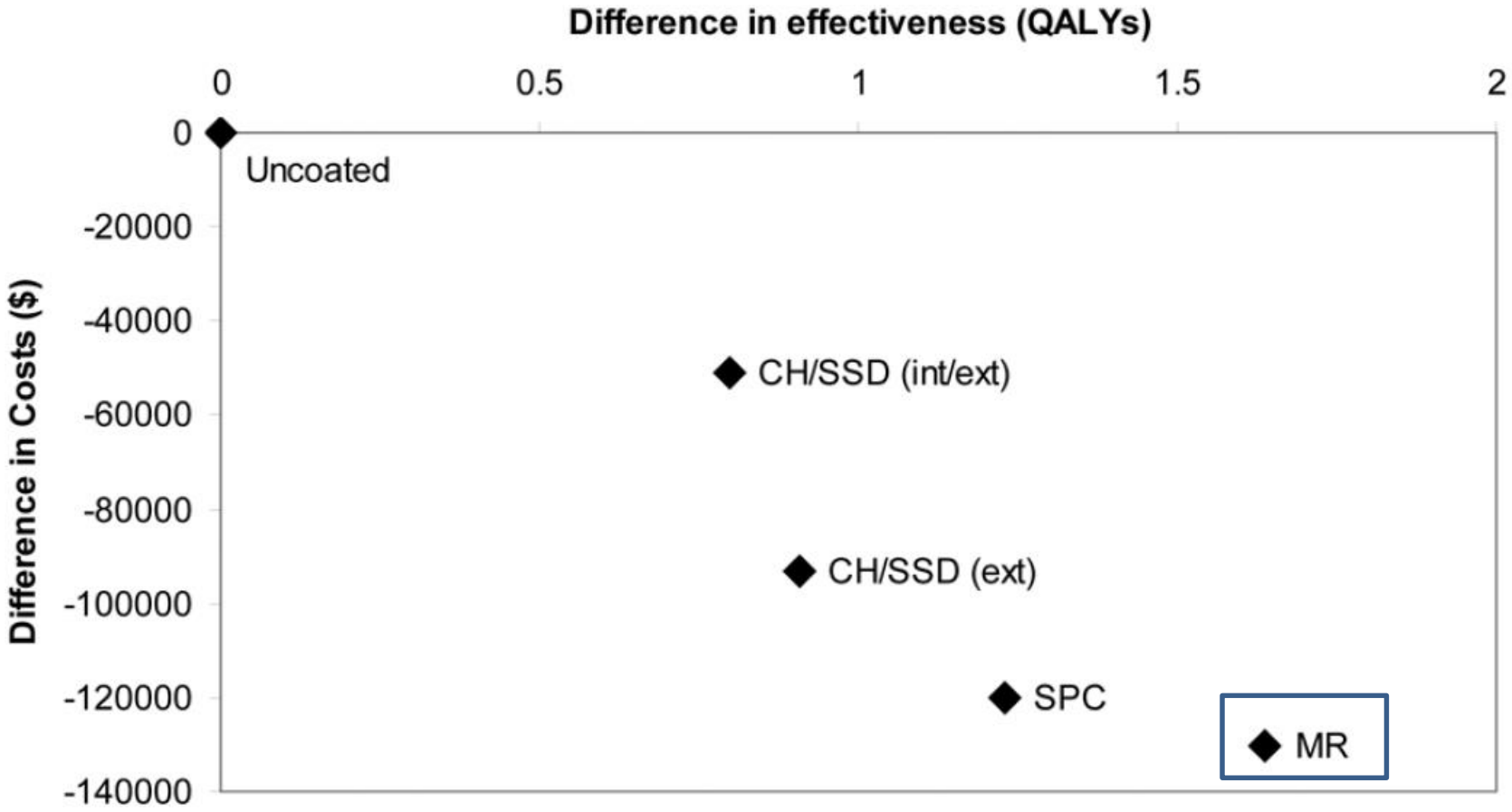
CH/SSD (external)

CH-SSD (internal)

Minocycline and Rifampicin



Markov model used for the evaluation.


Difference in effectiveness (QALYs)
0
0.5
1
1.5
2
Difference in Costs ($)
0
-20000
-40000
-60000
-80000
-100000
-120000
-140000
Uncoated
CH/SSD (int/ext)
CH/SSD (ext)
SPC
MR

Line Related BSI

Total Hip Replacement

Hand Hygiene Programmes

NHS
National Institute for Health Research

Cost-effectiveness of strategies to reduce risk of infection following primary hip replacement

QUT

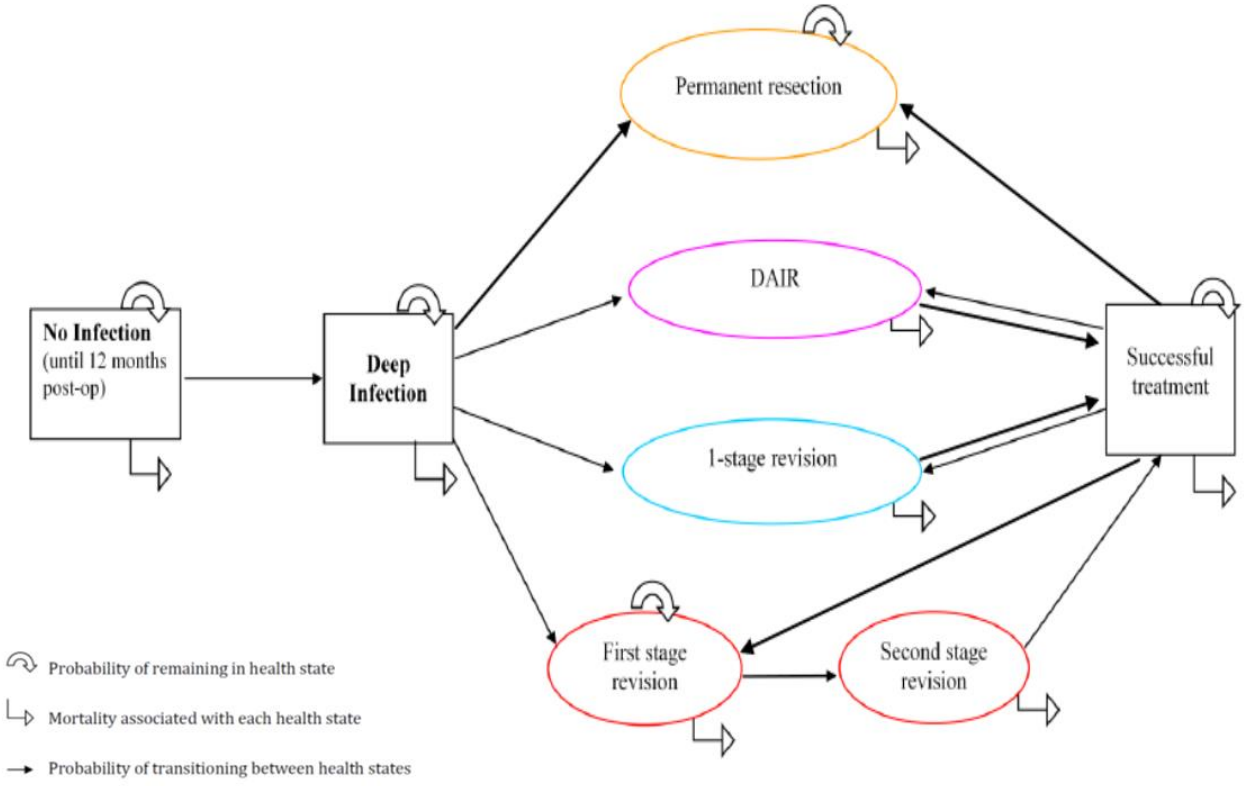
Health Protection Agency

Oxford University Hospitals NHS
NHS Trust

University of Leicester

Nicholas Graves
Catherine Wloch
Jennie Wilson
Adrian Barnett
Anthony Berendt
Alex Sutton
Nicola Cooper
Katharina Merollini
Victoria McCreanor
Qinglu Cheng
Edward Burns
Theresa Lamagni
Andre Charlett

Objective(s). To compare the costs and health benefits of strategies that reduces risk of deep infection following total hip arthroplasty in NHS hospitals.



BMJ Open

Control strategies to prevent total hip replacement-related infections: a systematic review and mixed treatment comparison

Henry Zheng,[1] Adrian G Barnett,[1] Katharina Merollini,[1] Alex Sutton,[2] Nicola Cooper,[2] Tony Berendt,[3] Jennie Wilson,[4] Nicholas Graves[1]

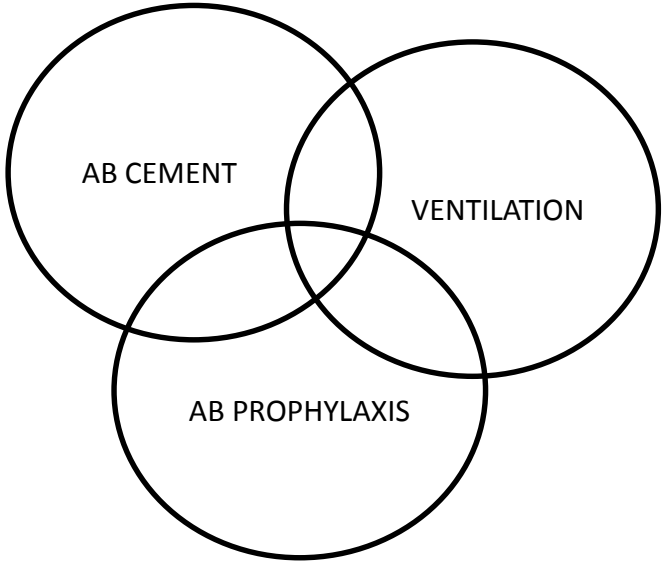
736 studies found and 12 met inclusion criteria

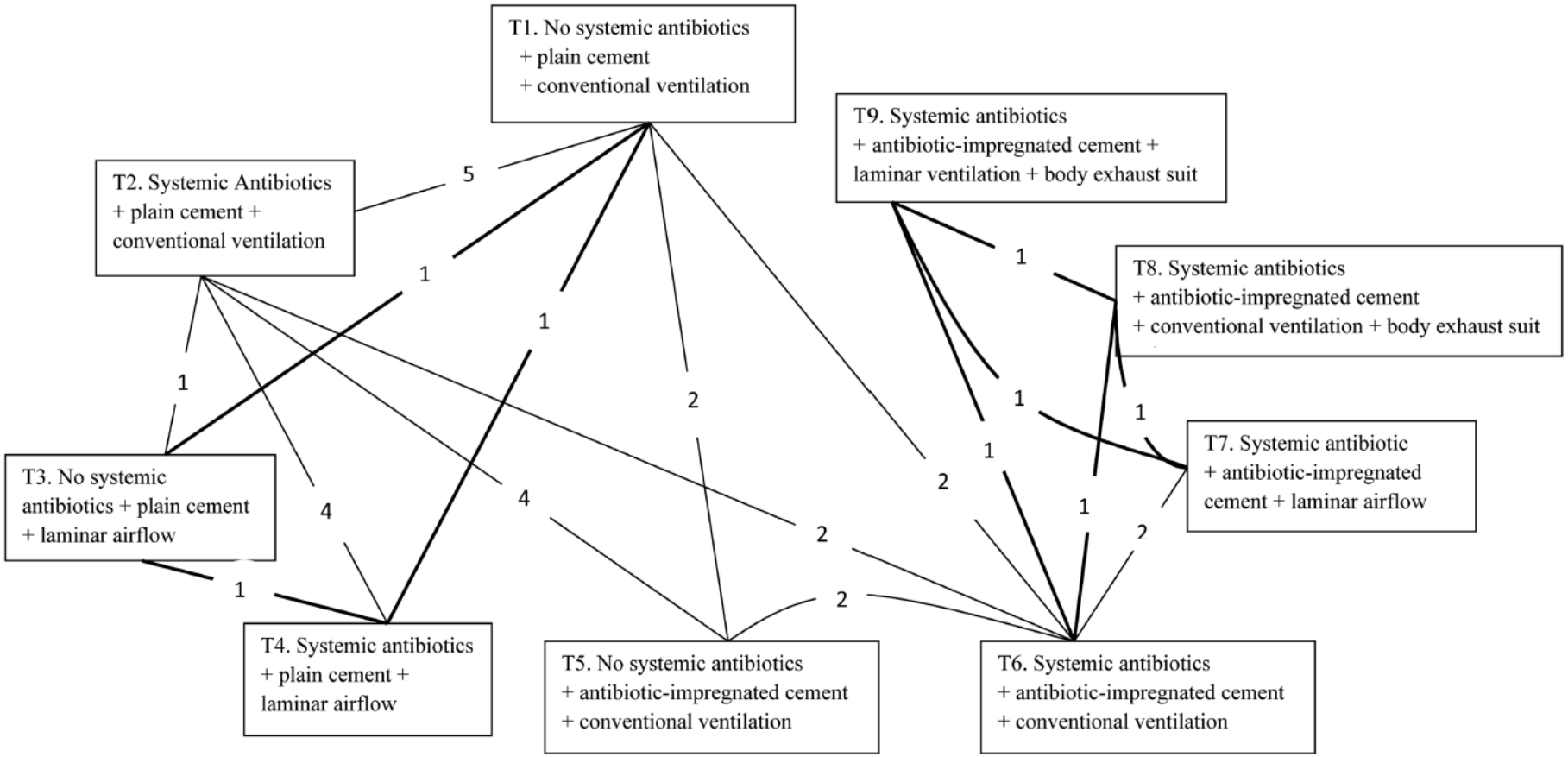
7 RCTs & 5 observational studies

123,788 cases of THR

Mean pt. age between 64 and 74

Follow up periods less one year to eight years




T1. No systemic antibiotics
+ plain cement
+ conventional ventilation
T2. Systemic Antibiotics
+ plain cement +
conventional ventilation
T3. No systemic
antibiotics + plain cement
+ laminar airflow
T4. Systemic antibiotics
+ plain cement +
laminar airflow
T5. No systemic antibiotics
+ antibiotic-impregnated cement
+ conventional ventilation
T6. Systemic antibiotics
+ antibiotic-impregnated cement
+ conventional ventilation
T7. Systemic antibiotic
+ antibiotic-impregnated
cement + laminar airflow
T8. Systemic antibiotics
+ antibiotic-impregnated cement
+ conventional ventilation + body exhaust suit
T9. Systemic antibiotics
+ antibiotic-impregnated cement +
laminar ventilation + body exhaust suit
5
1
1
1
2
1
1
1
1
1
2
4
4
2
2
1
2

	odds ratio	95% credible interval
T1	referent	
T2	0.31	0.12–0.65
T3	0.26	0.03–0.95
T4	0.25	0.06–0.66
T5	0.38	0.09–1.12
T6	0.13	0.03–0.35
T7	0.27	0.03–0.93
T8	0.52	0.03–2.12
T9	0.74	0.05–2.69
T7 vs. T6	1.96	0.52–5.37

Laminar Airflow is costly & harmful

T6 is ‘systemic antibiotics + antibiotic-impregnated cement + conventional ventilation’

T7 is ‘systemic antibiotics + antibiotic-impregnated cement + laminar airflow’

For a 1000 primary hips that get infected

Choosing T7 over T6

12 fewer QALYs and **£1,007,000** extra cost

NHS
National Institute for Health Research

T6 is ‘systemic antibiotics + antibiotic-impregnated cement + conventional ventilation’

T7 is ‘systemic antibiotics + antibiotic-impregnated cement + laminar airflow’

For a 30,000 cases of THR

Choosing T7 over T6

179 extra deep infections
$30,000 each
4 more deaths (lose 127 QALYs)

Line Related BSI

Total Hip Replacement

Hand Hygiene Programmes

The Australian National Hand Hygiene Initiative

March 2009 = 63.5% compliance

March 2014 = 80.3% compliance

Strong leadership

Federal endorsement

AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

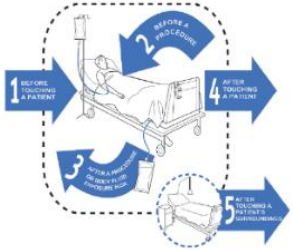
Common definitions and audit method

Training & accreditation

Information and support

Hand Hygiene Australia
www.hha.org.au

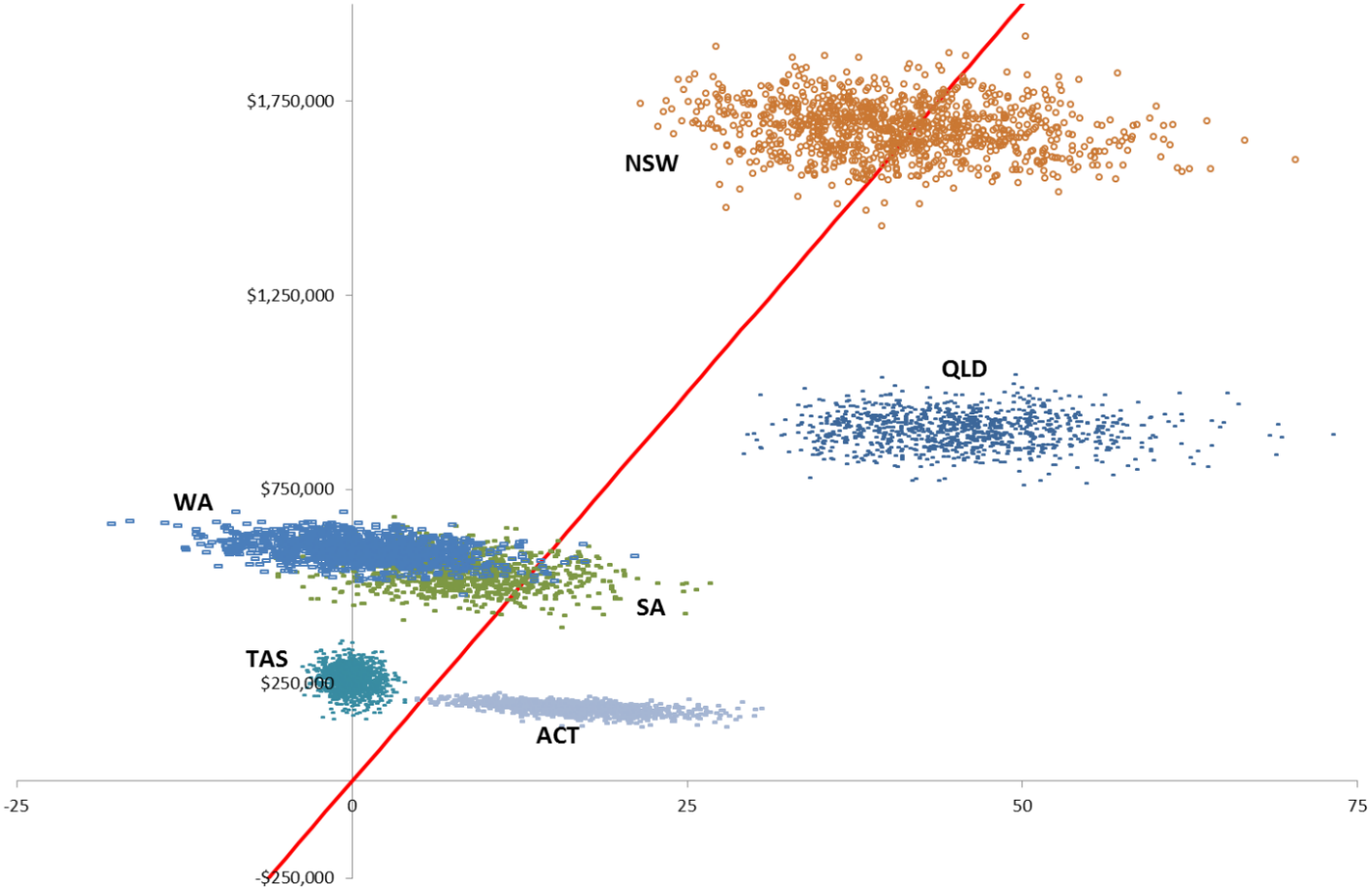
5 Moments for HAND HYGIENE



Results

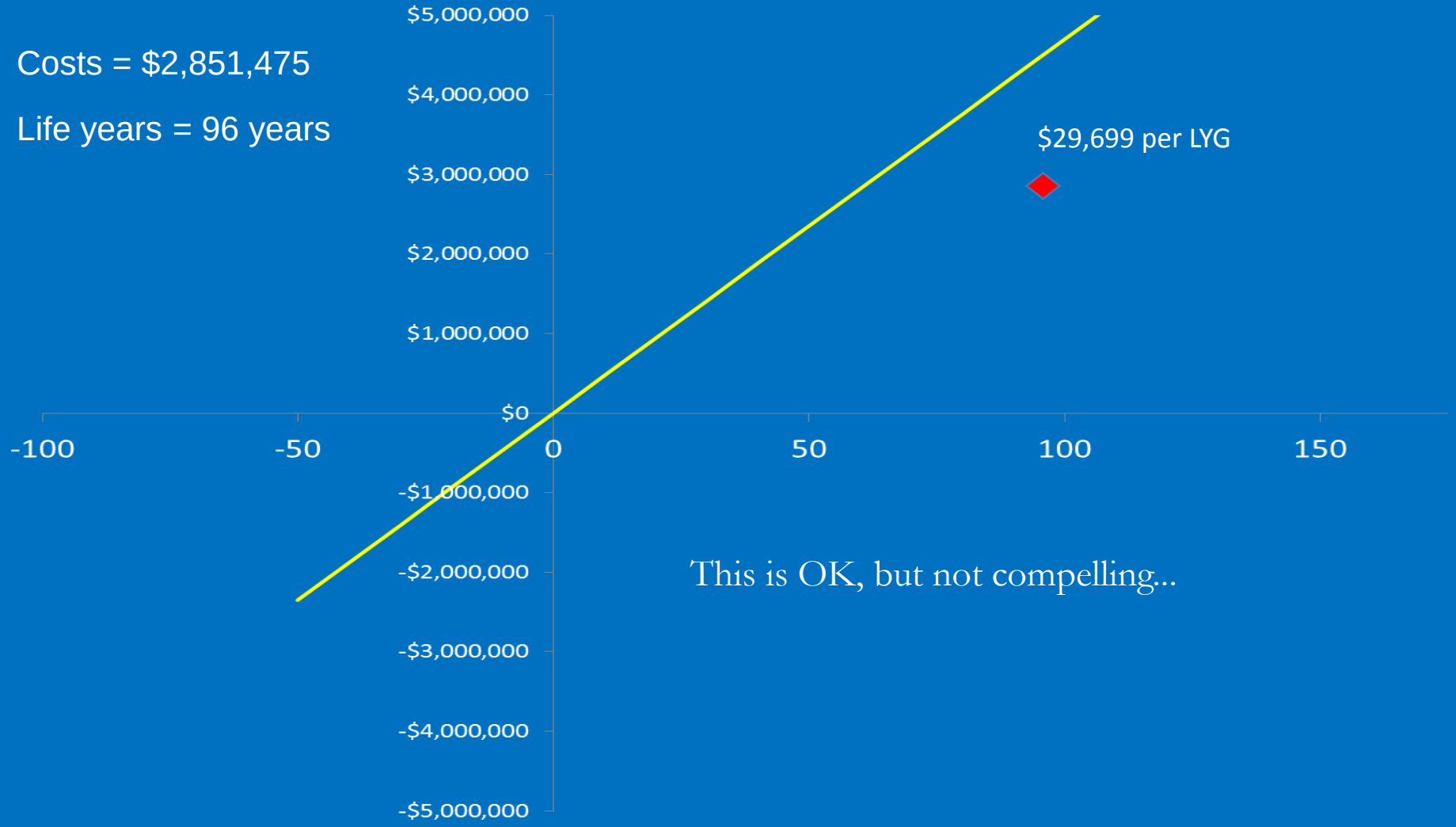
Patient cohort included in model				Baseline starting rates SAB *		Reduction in rates †		Relative risk of SAB †		Nature of the Decline
State/Territory	Hospitals	Beds	Admissions	Mean	St. Dev.	Mean	95% CI	Mean	St. Dev.	
QLD	9	5,366	246,699	1.48	1.08	17%	6 to 27%	0.83	0.10	Immediate reduction sustained over time
ACT	1	619	31,841	2.91	n/a	28%	6 to 45%	0.72	0.24	Immediate reduction sustained over time
NSW	15	7,739	404,869	2.60	1.38	11%	7 to 16%	0.90	0.08	Linear reduction per year
SA	5	2,065	122,435	2.08	2.05	8%	1 to 15%	0.92	0.13	Linear reduction per year
TAS	3	1,007	41,850	0.90	0.68	0%	-52 to 34%	1.00	0.21	No reduction
WA	5	2,167	122,025	1.96	1.62	0%	-22 to 18%	1.00	0.17	No reduction
VIC	11	5,184	305,270	No data	No data	No data	No data	No data	No data	n/a
NT	1	335	19,667	No data	No data	No data	No data	No data	No data	n/a
Total	50	24,482	1,294,656							

Results with uncertainty



Costs = $2,851,475

Life years = 96 years



This is OK, but not compelling...

It’s all about Economics

Some Evidence

Maybe it’s not all about Economics

Implementation Science

My previous understanding of evidence into practice

Research

Swoon

Improve

Quality in Health Care 1998;7:149–158

Enabling the implementation of evidence based practice: a conceptual framework

Alison Kitson, Gill Harvey, Brendan McCormack

Rejected ‘linear’ paradigm to improving health services

Interplay between

Evidence
Context
Facilitation

A Evidence

	Low	High
Research	Anecdotal evidence Descriptive information	Randomised controlled trials Systematic reviews Evidence-based guidelines
Clinical experience	Expert opinion divided Several "camps"	High levels of consensus Consistency of view
Patient preferences	Patients not involved	Partnerships

B Context

Culture

Low	High
Task driven Low regard for individuals Low morale Little or no continuing education	Learning organisation Patient centred Valuing people Continuing education

Leadership

Low	High
Diffuse roles Lack of team roles Poor organisation or management of services Poor leadership	Clear roles Effective team work Effective organisational structure Clear leadership

Measurement

Low	High
Absence of: Audit and feedback Peer review External audit Performance review of junior staff	Internal measures used routinely Audit or feedback used routinely Peer review External measures

C Facilitation

Characteristics

Low — High

Low	High
Respect Empathy Authenticity Credibility	Respect Empathy Authenticity Credibility

Role

Low — High

Low	High
Lack of clarity around: Access Authority Position in organisation Change agenda	Access Authority Change agenda successfully negotiated

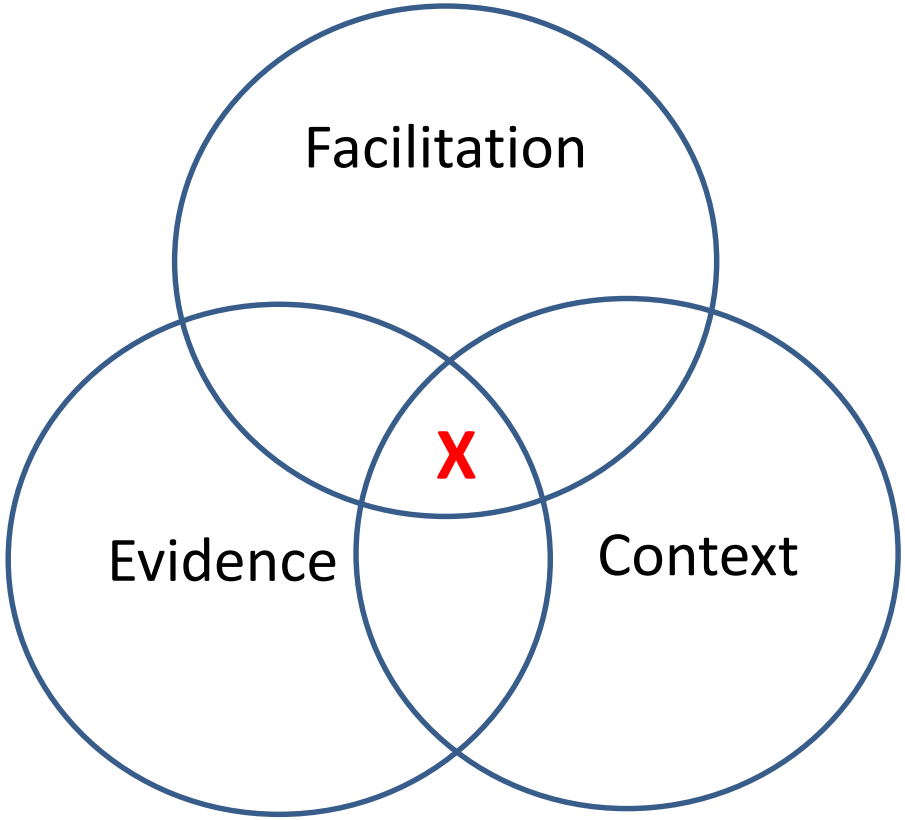
Style

Low — High

Low	High
Inflexible Sporadic Infrequent Inappropriate	Range and flexibility of style Consistent and appropriate presence and support

"It has argued that equal recognition should be given to the level of evidence, the context into which the evidence is being implemented, and the method of facilitating the change"

"By explicitly acknowledging equal importance, the framework can begin to explore the actual relations between these three core elements"



Minimising Bad Decisions in Infection Control

Summary

Getting good **Evidence** is important
I would emphasise value for money
That’s not enough
We need to start thinking Implementation Science

Context
Facilitation

Thank you for listening