

Environmental Cleaning:

Cost-effectiveness of the CLEEN study

ACIPC / GAMA IPC Tour 2025

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Acknowledgment of Country



Disclosures

CLEEN Study

- NHMRC funded grant
- Administered by Avondale University
- In-kind support from Hunter Medical Research Institute & GAMA
- No role in design, data collection, analysis

IPC Tour

- Funding provided for travel
- Have not received funding for this talk



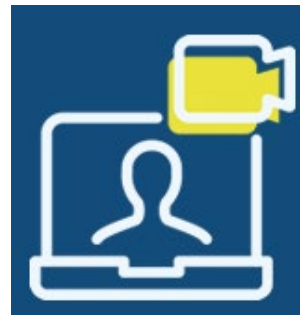
AusHSI

Australian Centre
for Health Services
Innovation



Research

- Large Government-funded competitive grants
- Major Partnership grants
- Research consultancy
- All projects are in partnership with health service providers



Education

- Short course options
- Graduate Certificate in Digital Health Leadership and Management
- Mentoring and supervision of higher degree research students



Consultancy

- Small research consultancy projects
- Large multi-stage research consultancy
- Deliver a range of outputs including public facing documents, academic publications, and presentations to policy makers

What I'll Cover Today

- CLEEN Study overview
- Why health economics?
- Present findings of the economic evaluation
- Advice for decision-making



First RCT to examine the impact of improved cleaning of
shared medical equipment on HAIs

The
**CLEANING AND ENHANCED
DISINFECTION study**

Shared Equipment

- Blood pressure monitor
- Commodes
- Computer on wheels
- Infusion pump
- IV drip stand
- Patslide
- Wheelchair
- Medication trolley

HAIs

- SSI
- EENT
- CDI
- BSI
- UTI
- PN
- LRI
- GI

CLEEN STUDY



STUDY WEBSITE
cleenstudy.com



MAIN PAPER

Does improved cleaning and disinfection of shared equipment reduce healthcare associated infections?

Summary of the study, key results and implications

The problem



Pathogens can be transferred through the environment, including shared equipment, to patients in hospital



Cleaning of shared equipment is often **not done** in hospitals



The importance of clean shared equipment

THE LANCET Infectious Diseases

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ARTICLES · Volume 24, Issue 12, P1347-1356, December 2024

Investigating the effect of enhanced cleaning and disinfection of shared medical equipment on health-care-associated infections in Australia (CLEEN): a stepped-wedge, cluster randomised, controlled trial

Katrina Browne, PhD^a · Nicole M White, PhD^b · Prof Philip L Russo, PhD^{a,e,g} · Prof Allen C Cheng, PhD^{c,d} · Andrew J Stewardson, PhD^f · Georgia Matterson, BBiotech^h · Peta E Tehan, PhD^{d,h} · Kirsty Graham, BNurs^j · Maham Amin, MHLthLdrⁱ · Prof Maria Northcote, PhDⁱ · Martin Kiernan, MCLinRes^k · Jennie King, PhD^l · David Brain, PhD^b · Prof Brett G Mitchell, PhD^{a,e,h,j,m} [Show less](#)

Affiliations & Notes [Article Info](#) [Linked Articles \(1\)](#)

...or extra
dedicated cleaning
for shared equipment,
supported with
training



Audits of cleaning thoroughness with feedback of results in refresher training to help improve cleaning



Implications



Improving the cleaning and disinfection of shared equipment **significantly reduces** healthcare associated infections



Findings
emphasise the
need for dedicated
approaches for
cleaning shared
equipment.



34.5%
in healthcare
associated
infections



Why Health Economics?

Increasing interest from decision-makers

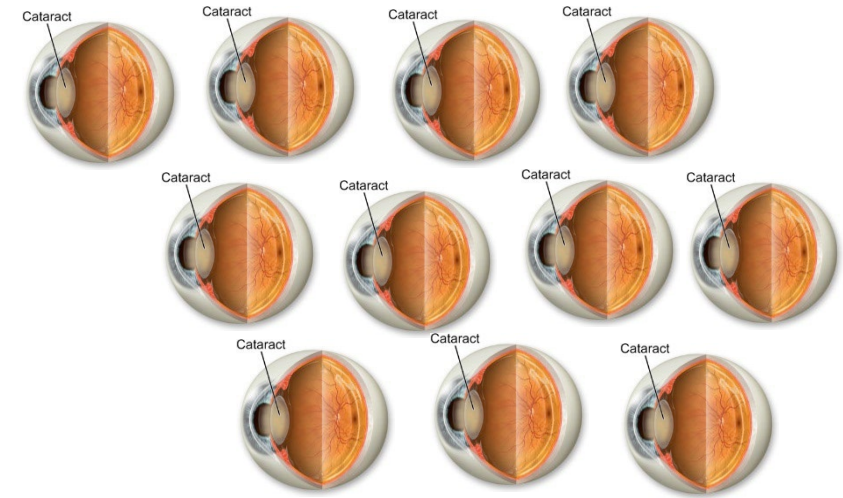
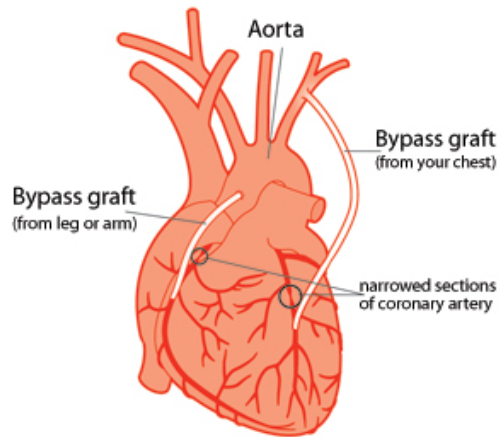
Hard to get funding without an economic argument

Triple threat clinicians



Economics in Healthcare

Every decision to do something, means something else is not done



Economics in IPC

Increase hand hygiene

Increase staff education



Less time on cleaning

Less time on procurement

The “S” Word

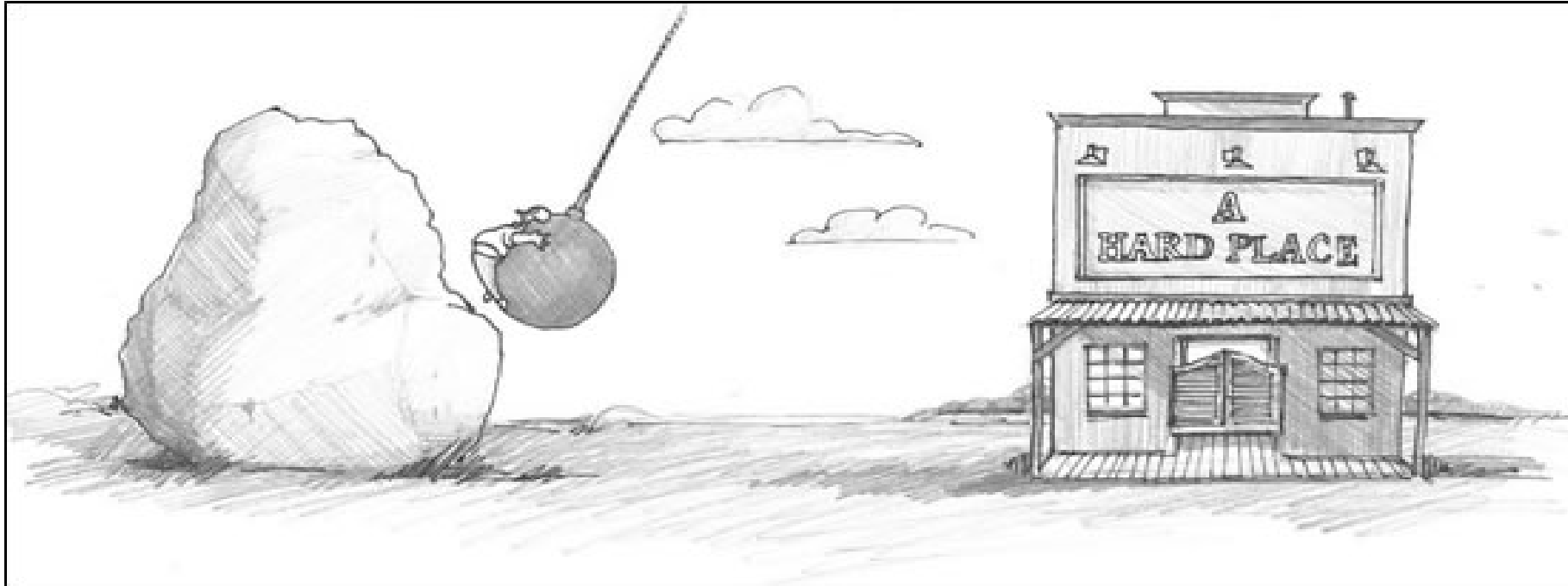
Scarcity exists because:

- Human wants are unlimited
- People are living longer
- New therapies are constantly emerging
- Administrators love machines that go ‘ping’
- We don’t divest well



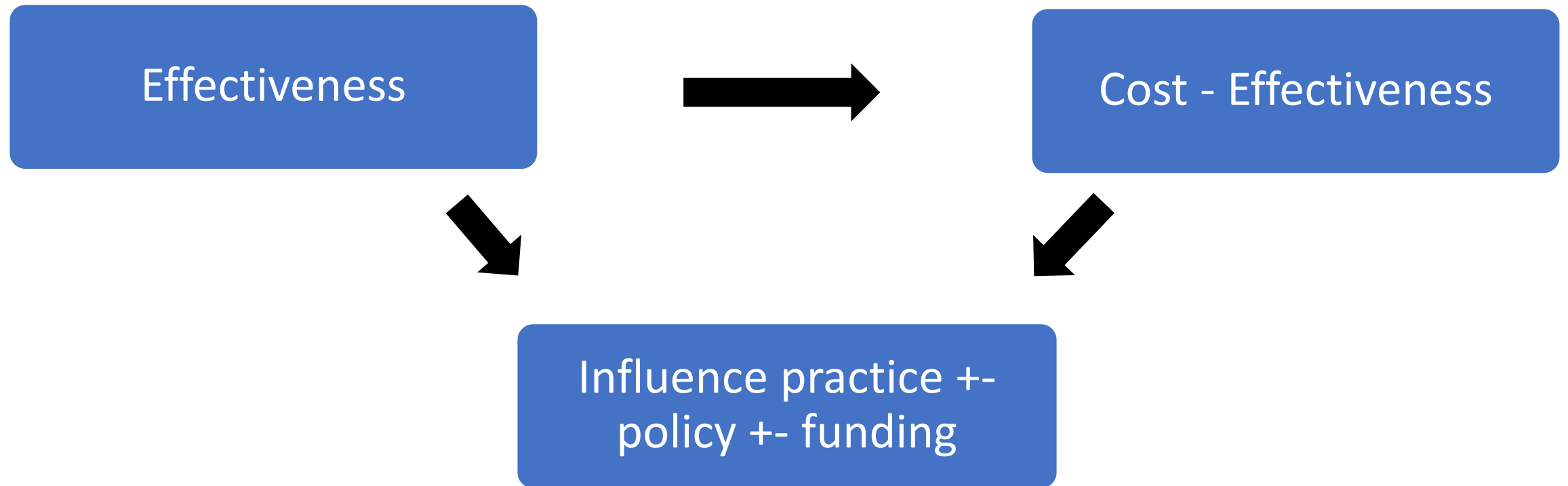
Decision-Making Reality

Finite Resources



Massive increases in need, demand & supply side pressures

Health Economics & IPC



Economic Evaluation Methods

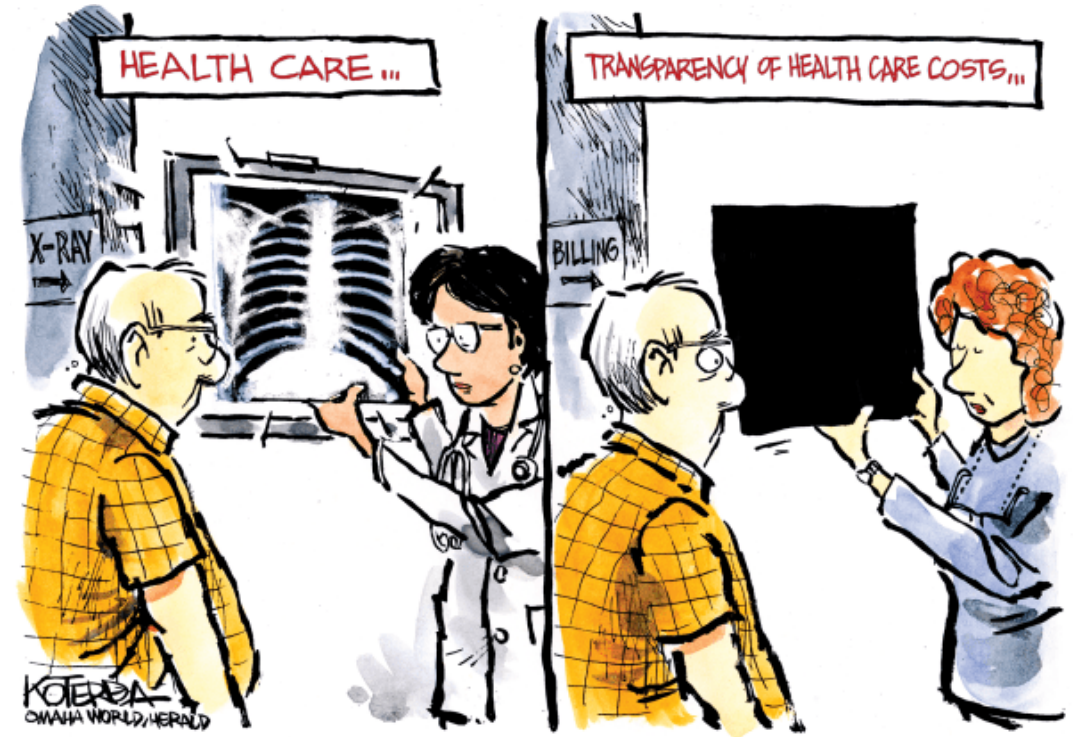
Provide a framework for evaluating costs and health benefits

CEA/CUA, CMA, CBA, CC

Transparent, clearly articulated model

Repeatable

CHEERS



Economic Models

Require evidence synthesis

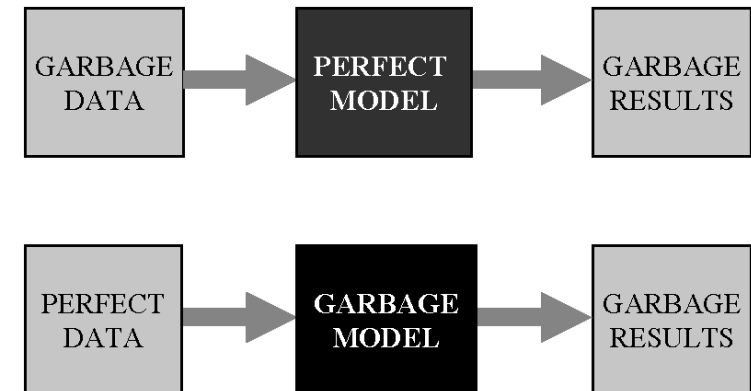
Balance simplicity and complexity

Governed by data availability

Team effort

MODEL CALCULATIONS

"Garbage In-garbage Out" Paradigm



Choosing (Data) Wisely



CLEEN Economic Evaluation

Effectiveness Information

How much do infections change with the intervention?

Used data direct from RCT

Preferred data source



"We're not giving out bonuses anymore. However, you'll be happy to hear that you DID earn a shiny gold-star sticker this quarter."

CLEEN Economic Evaluation

Cost Information

Intervention Costs

Staff training + Extra Staffing

Extra product

Audit & Feedback

Indicator Tags

Consumables

Refresher training

Biodegradable wipes

Majority direct from RCT



Journal of Hospital Infection

Volume 84, Issue 3, July 2013, Pages 200-205



Review

Humans, 'things' and space: costing hospital infection control interventions

K. Page , N. Graves, K. Halton, A.G. Barnett

CLEEN Economic Evaluation

Cost Information

Length of Stay Costs

Reducing infections = reductions in admission costs

LOS attributable to having HAI x daily admission costs

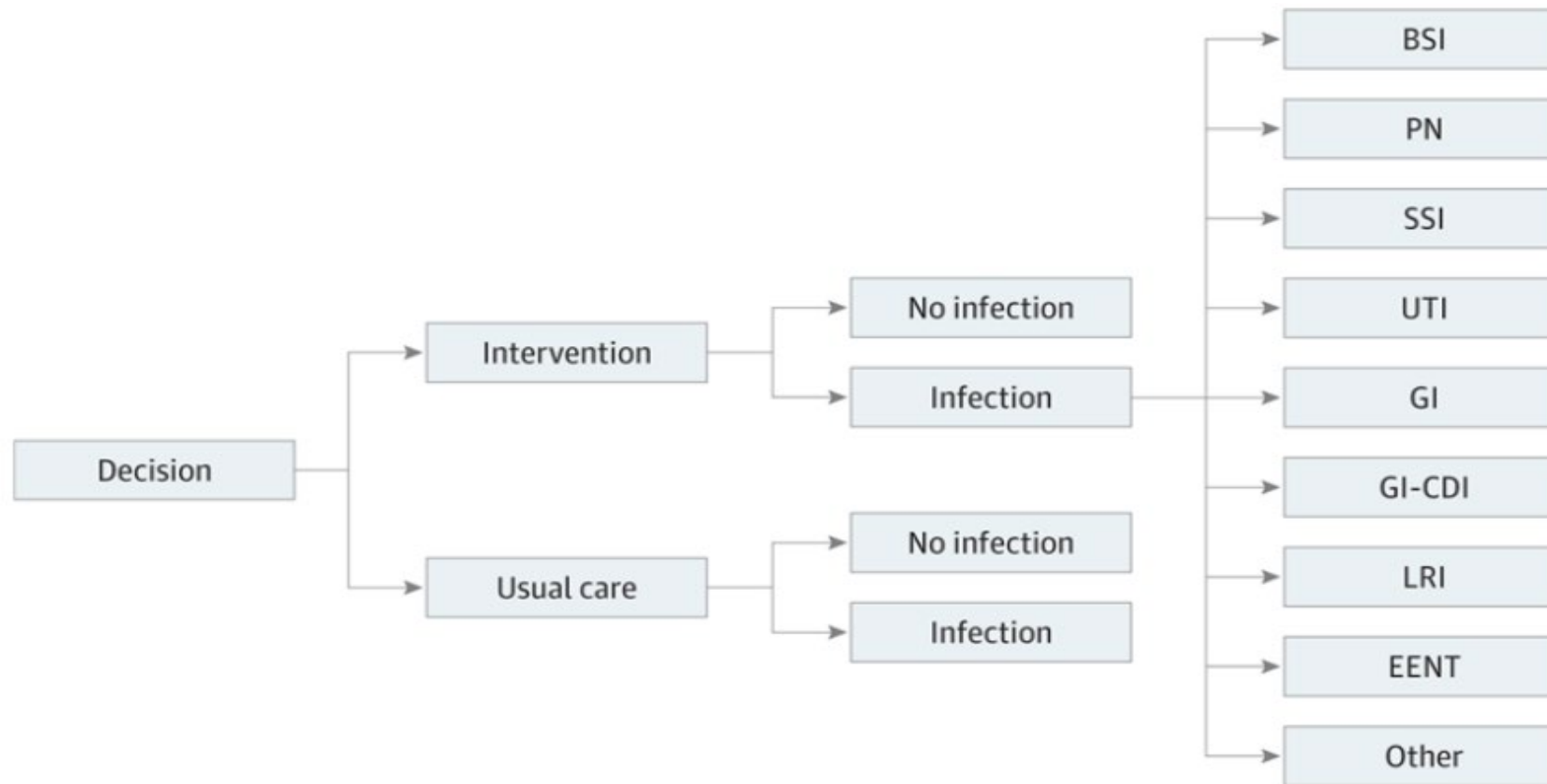
Estimates came from:

- Literature
- E-LOS with time-dependent bias account for

Improved performance (should) = improved efficiency... 'do more'

Decision Tree

Framework for calculating changes to costs and health benefits



Handling Uncertainty

Model Stress Testing

Parameter values included in model are not fixed

Statistical skulduggery or savvy?

Probabilistic Sensitivity Analysis

Uncertainty is OK



Results

For a cohort of 1000 patients:

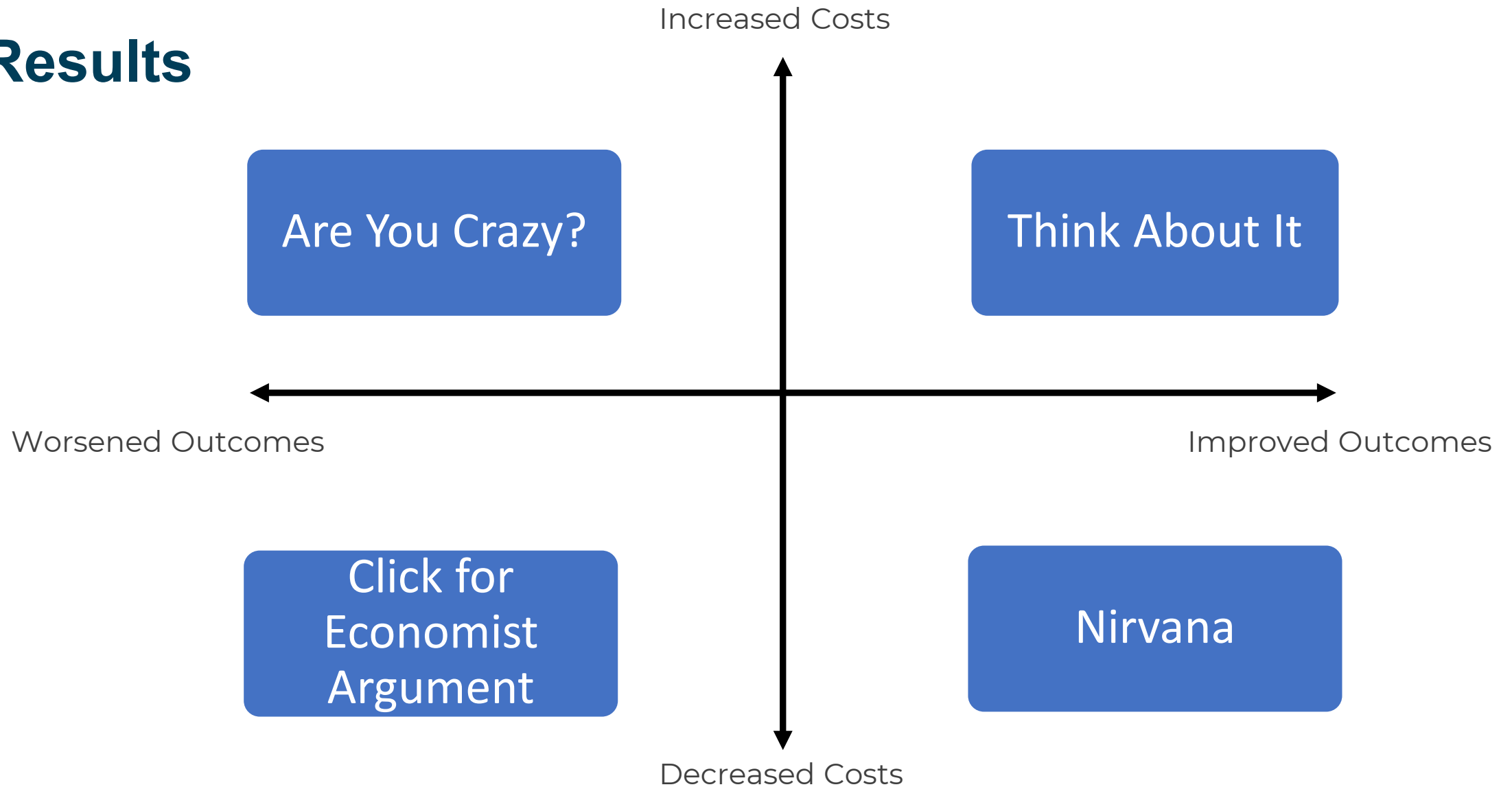
Usual Care cost \$2,155,310

Intervention cost \$1,513,000

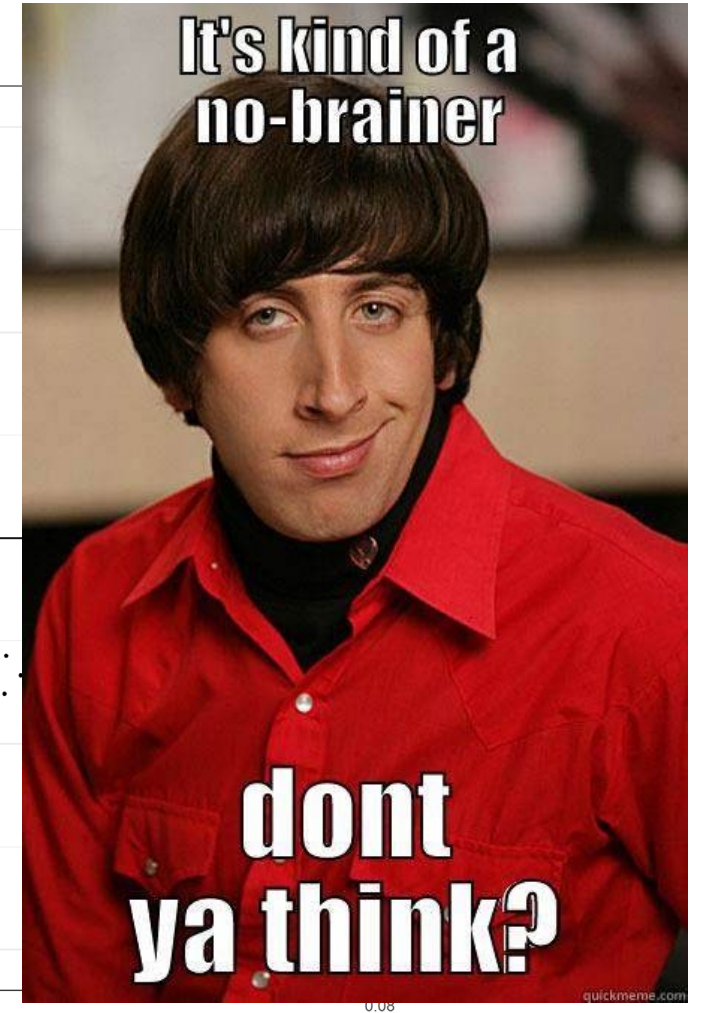
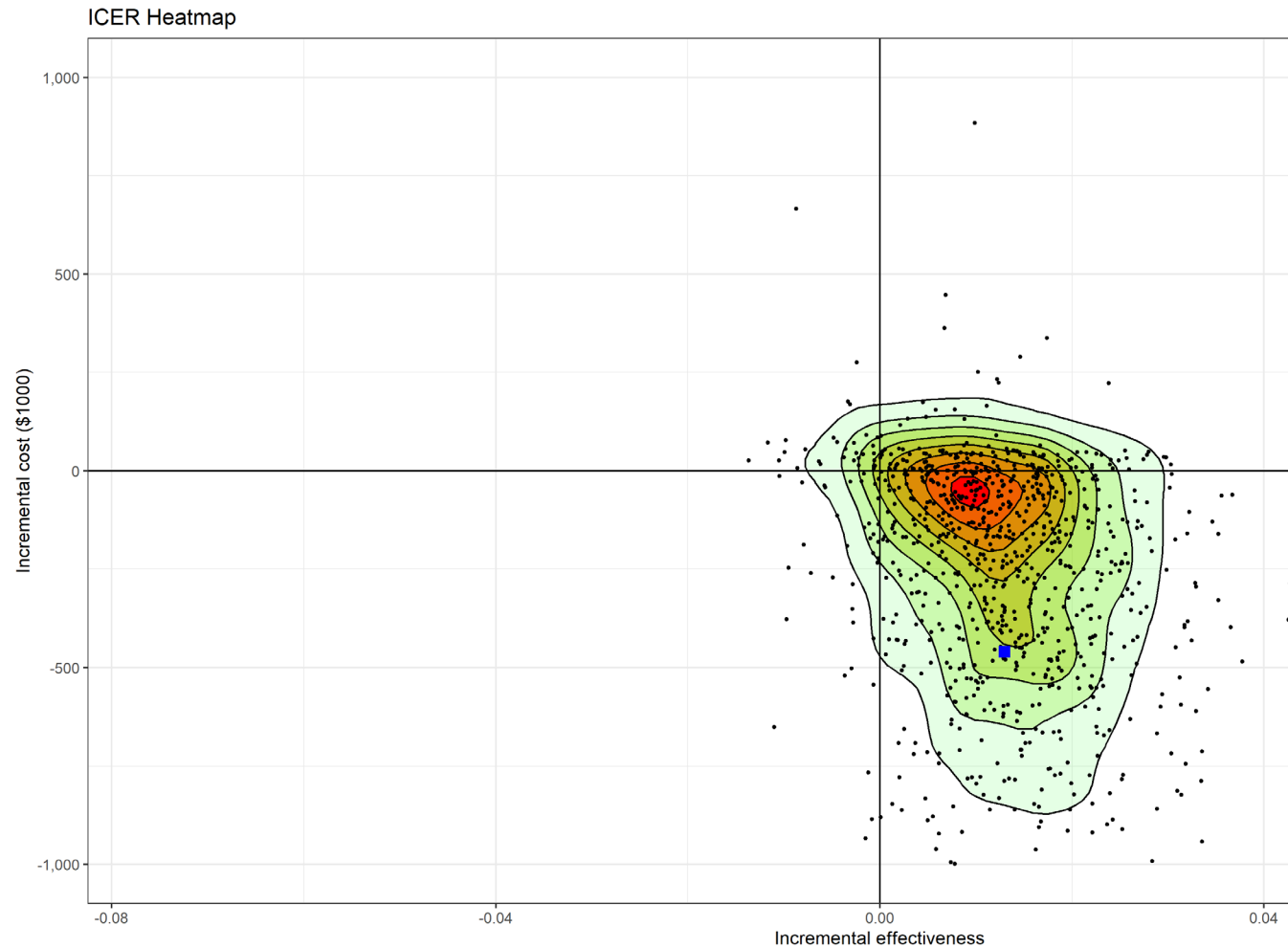
30 infections prevented by the intervention

On average, each infection prevented saved \$21,400

Results



Results



But wait...my hospital is different

Scenario Analysis

We changed key parameter inputs that reflect plausible conditions beyond the RCT

- #1 – halved the intervention's effectiveness
- #2 – used a more expensive, eco-friendly biodegradable wipe

Both scenarios still provided a cost-saving result where:

The intervention remained cheaper than usual care

The intervention reduced infections

Future Implementation & Modelling

CS596108

- Dedicated cleaners like CLEEN
 - Can we recruit?
- Increase/change cleaning hours for current cleaners
 - Would they clean shared equipment?
- Centralised cleaning model
 - Would there be space to facilitate?
- Clinical staff to improve cleaning capability
 - Opportunity costs?



"This part we still need to iron out."

Advice for Decision-Makers

Despite there being numerous unknowns in IPC...

Maturing and growing evidence demonstrating the importance of cleaning in infection prevention

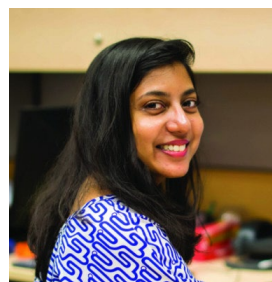
Many 'simple' interventions are cost-effective, or cost-saving

Investment in cleaning is a 'no-brainer'

The Final Word

*If a decision-maker is looking to **maximise health gain** per dollar spent they should **invest in** an intervention that focuses on **cleaning shared medical equipment***

*If they don't, they will **forego** opportunity to **save money, reduce healthcare associated infections** and **improve patient safety** in the hospital setting*



Assistance Requested

Quick, anonymous questions about the CLEEN study
Less than 1 min to complete



<https://www.surveymonkey.com/r/S6VH7N8>