


Laminar airflow, is it worth it?

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Total hip replacement

- ▶ **Common:** 16,600 hip replacement surgeries in 2012–13 in Australia
- ▶ **Costly:** \$22–25K per operation (including prosthesis)
- ▶ Deep surgical site infection:
 - ▶ Debridement & long-term oral suppression
 - ▶ One or two-stage revisions
 - ▶ Permanent resection



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Previous review

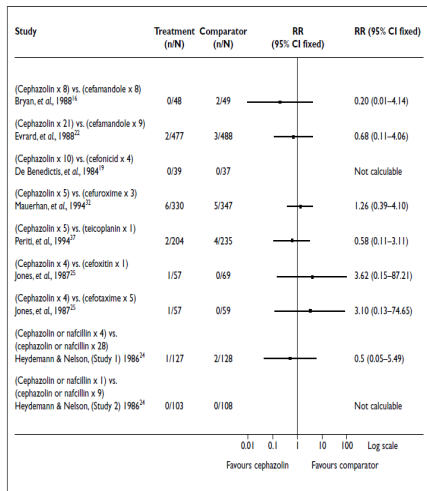


FIGURE 4 Cephazolin versus other antibiotics

AM Glenn, F Song, Antimicrobial prophylaxis in total hip replacement: a systematic review. *Health Technology Assessment* 1999

Search for evidence

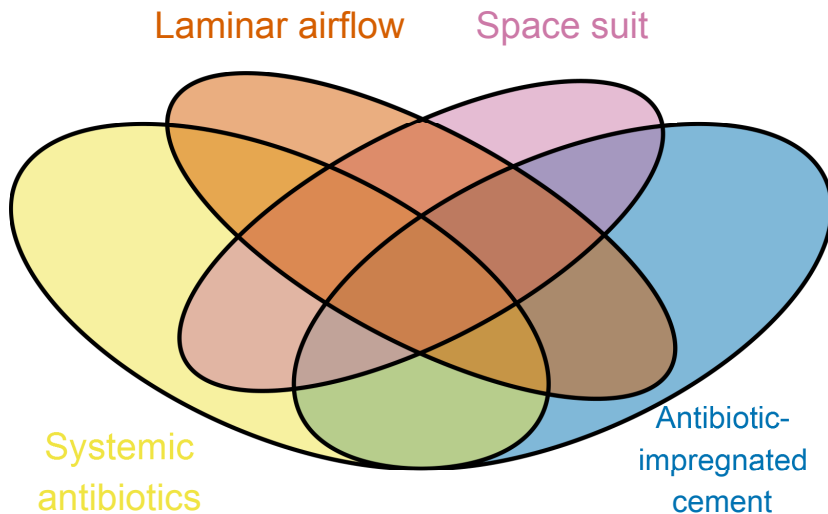
Population, Intervention, Comparison and Outcome (PICO)

- ▶ **Population:** Patients undergoing total hip replacement
- ▶ **Intervention:** Infection control strategies to prevent total hip replacement (THR)-related surgical site infection (SSI)
- ▶ **Comparison:** An infection control strategy compared with other control strategies in the mixed treatment comparison network
- ▶ **Outcome:** The number of THR-related SSIs

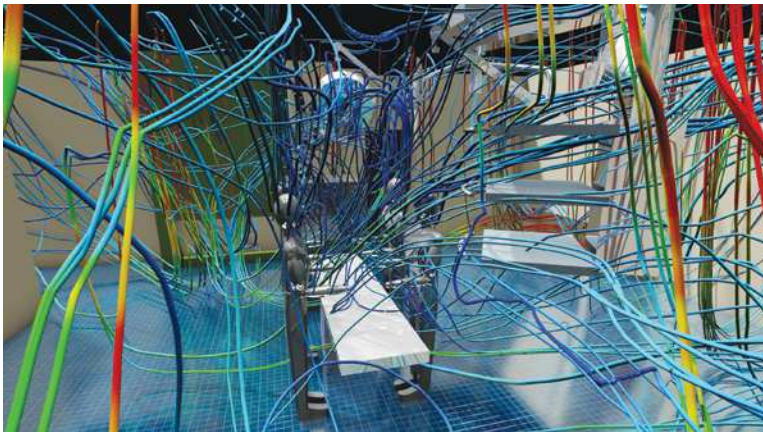
Search for evidence

- ▶ Searched 1966 to 2011
- ▶ Review team included infection control staff and orthopedic surgeons
- ▶ Data extracted independently
- ▶ 736 studies found and 12 met inclusion criteria (seven RCTs & five observational studies)
- ▶ 123,788 THR operations
- ▶ Mean patient age: 64 to 74 years
- ▶ Follow-up periods: less one year to eight years

Four overlapping treatments



Fancy pictures



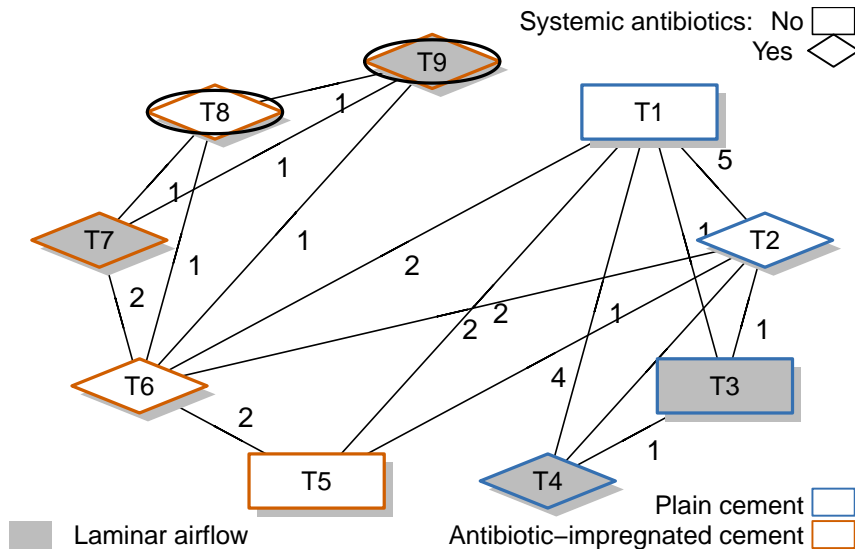
“If airflow is turbulent, contaminants float undirected, eliminating the ability for planners to predict where they will land.”

Fancy pictures - “protective curtain”



“Laminar flow is uniform in direction and velocity and directs particles and contaminants along a predictable path.”

Head-to-head comparisons

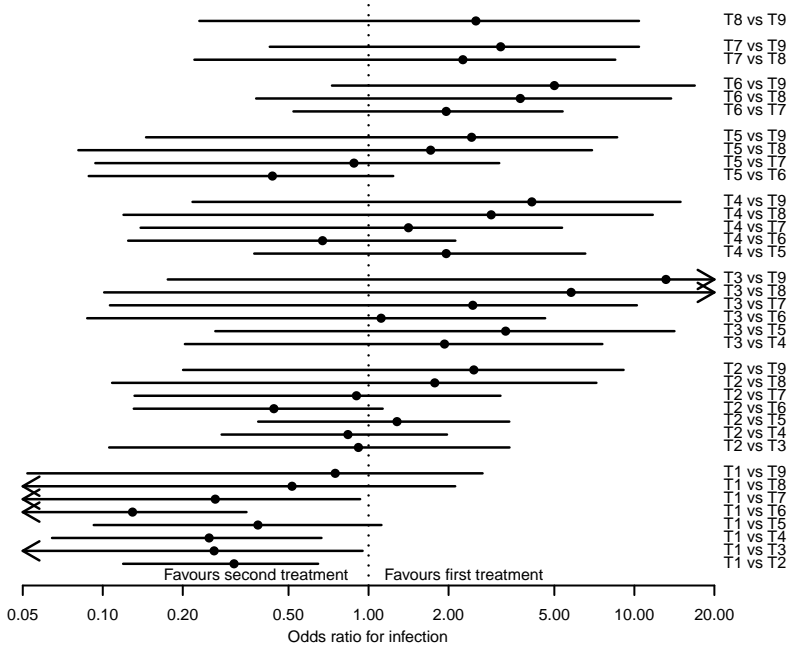


Bayesian network meta-analysis

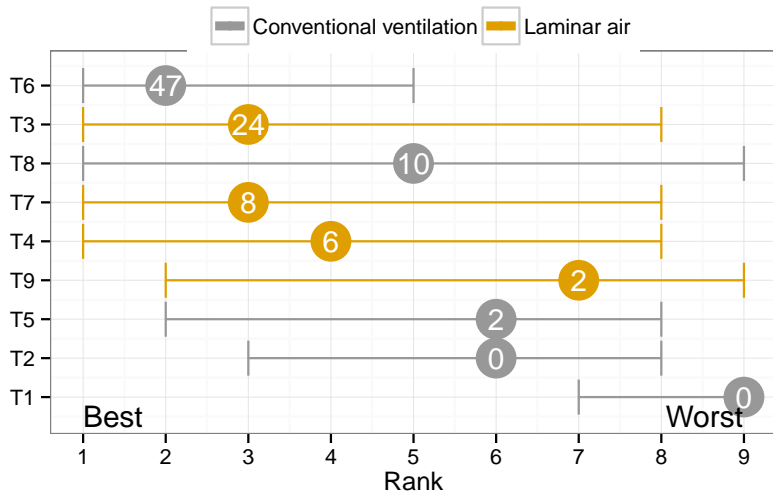
- ▶ Allows comparison of treatments that don't have head-to-head study
- ▶ Observed A vs B and B vs C
- ▶ Infer A vs C



Thomas Bayes 1701–1761, image: Wikipedia



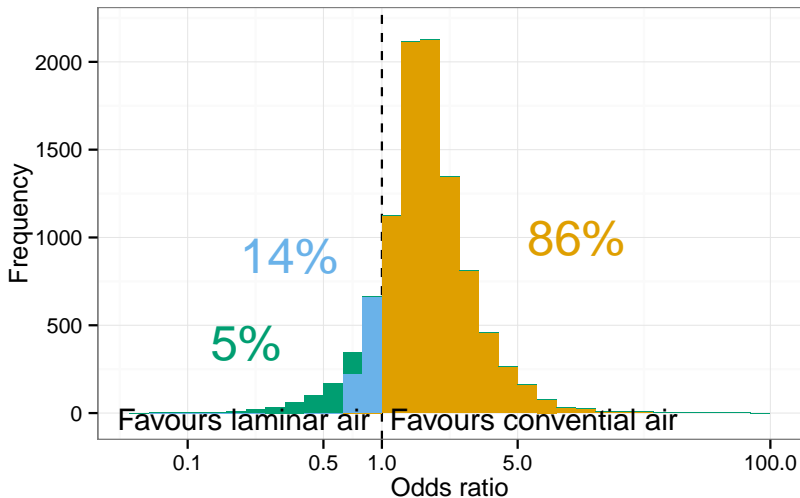
Rank and probability of best treatment option



T6 = Systemic antibiotics + Antibiotic-impregnated cement + Conventional ventilation

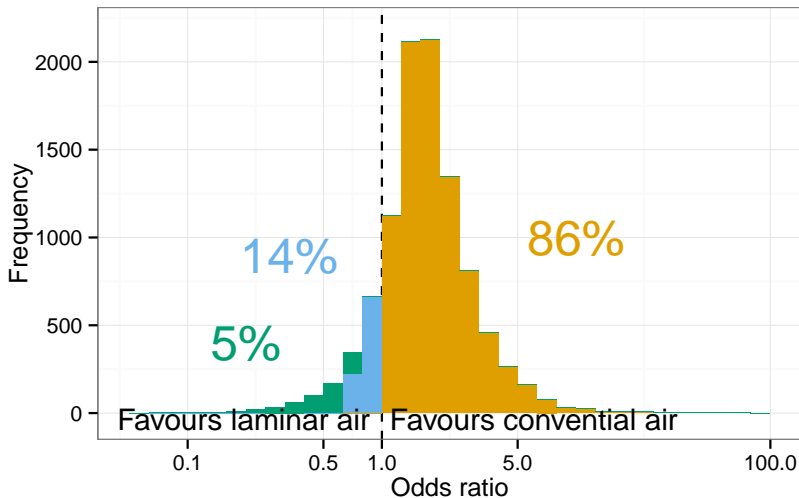
Is laminar air a blockbuster?

Probability that laminar air flow reduces infections



Is laminar air a blockbuster?

Probability that laminar air flow reduces infections



Odds ratio < 0.7 has just a 5% probability

Estimated costs of laminar air flow

- ▶ For 30,000 primary hip replacements:
 - ▶ 179 more deep infections
 - ▶ 4 more deaths (lose 127 QALYs)
 - ▶ \$4.5M extra costs from infection
- ▶ Plus costs of installation and maintenance



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- ▶ “Surgeons [...] often rely on sparse data from manufacturers to argue their case for the use of a new device in a hospital where costs might be of increasing concern”
Sedrakyan, *Lancet* 2014
- ▶ Stronger data needed to justify the costs

