

# Cost-effectiveness review

## TLIF versus PLIF

(Transforaminal Lumbar Interbody Fusion versus Posterior Lumbar Interbody Fusion)

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# Introduction

- US national bill for instrumented spinal fusion increased 7.9x in 10 years
- Most important reason: aging populations
- Two widely used techniques for instrumented spinal fusion:
  - TLIF: unilateral approach and 1 cage
  - PLIF: bilateral approach and 2 cages
- Retrospective data: TLIF associated with less complications and blood loss, shorter surgical time and hospital duration, but equal effectiveness compared to PLIF

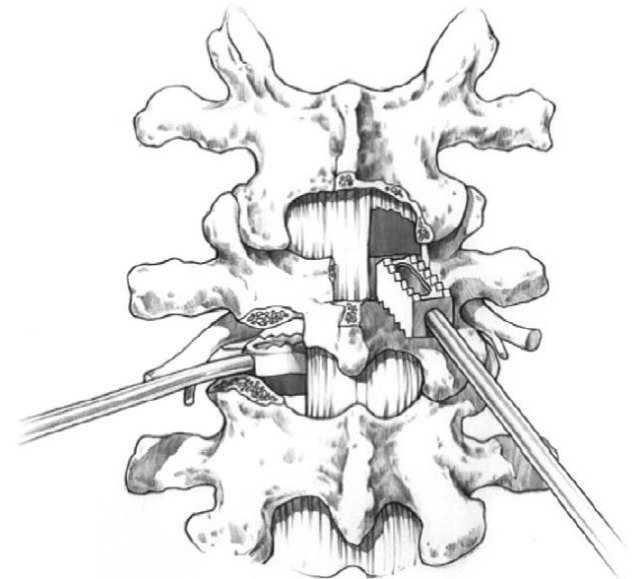
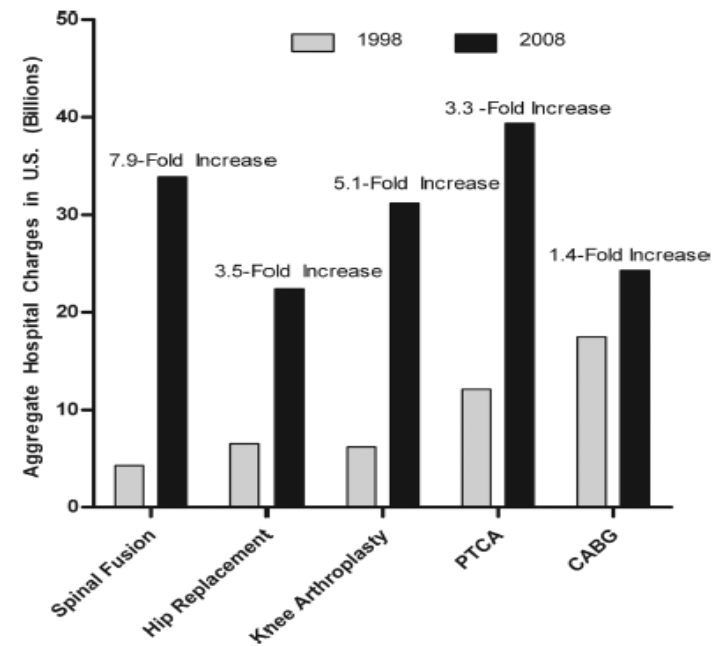


Fig. 2. Schematic representation of lumbar spine demonstrating the angle of interbody graft insertion for the PLIF procedure (top, medial) and TLIF procedure (bottom, lateral).

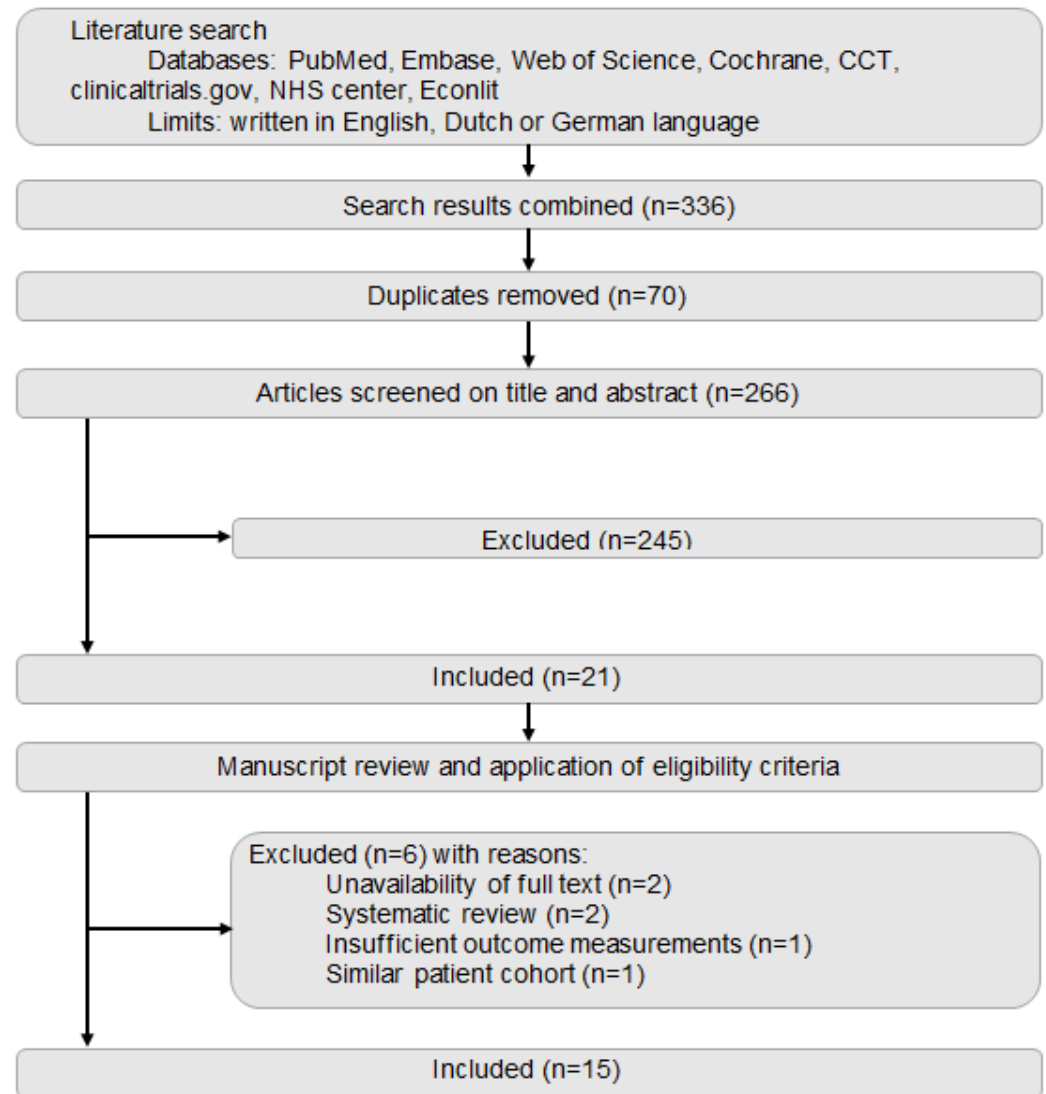
# Methods

- Research questions Cost-effectiveness Review:
  1. Is TLIF in adults with lumbar spondylolisthesis/instability more cost-effective than PLIF?
  2. What is the methodological quality of the included studies?
- Eligibility criteria:
  - (i) TLIF or PLIF
  - (ii) lumbar spondylolisthesis or lumbar instability
  - (iii) cost
- Data collected: study design, study population, utility measurement tool, cost resources, (total) costs, QALY, cost per QALY
- Costs converted to American Dollars with reference year 2015



# Results (1)

- Study design:
  - 8 cost-effectiveness studies
  - 6 financial studies
  - 1 prospective cohort on QALY
- Publication year: 2001 to 2016
- Follow-up time: 60 days to 3 years
- Origin studies:
  - 13 American
  - 1 European (Danish)
  - 1 Asian (Chinese)
- Indication of surgery
  - Degenerative spondylolisthesis (most)
  - Degenerative disc disease
  - Spinal stenosis
  - Failed back syndrome



# Results (2)

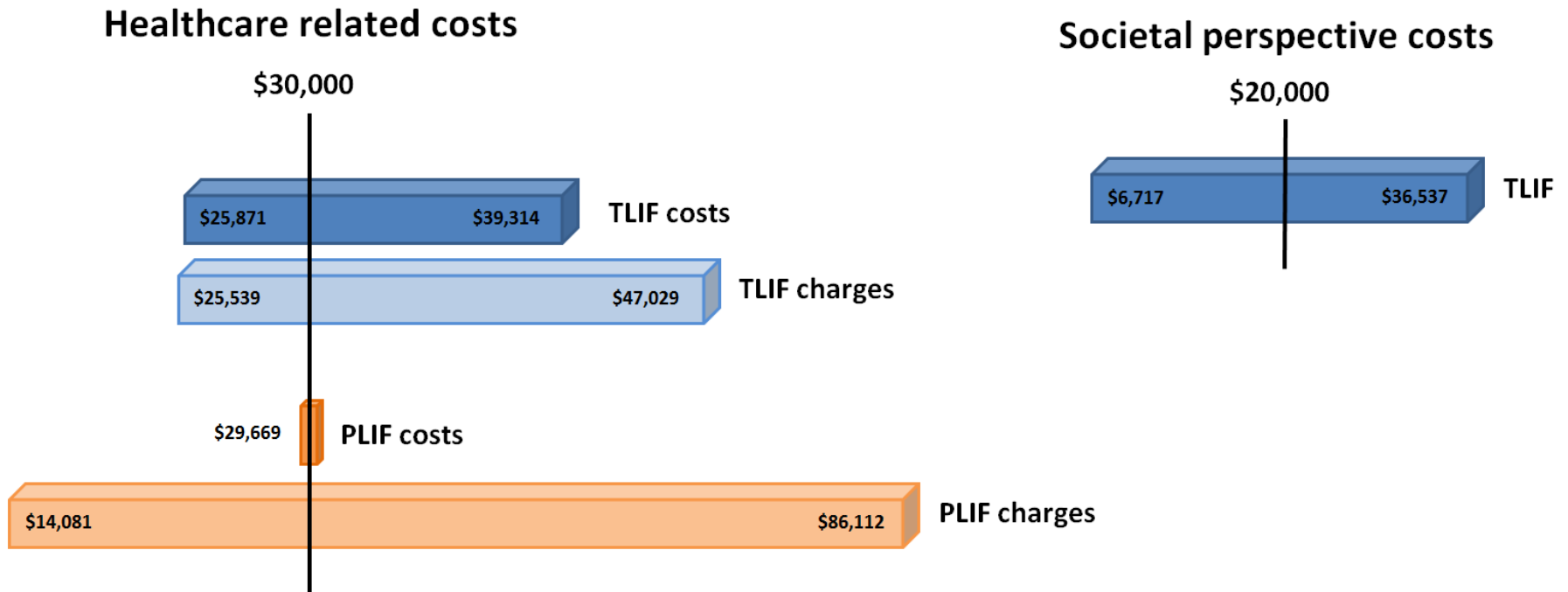
- No study comparing TLIF and PLIF directly!
- Costs and QALY mentioned in studies:
  - Healthcare perspective costs: 12 studies
    - Hospital costs: 7 studies
    - Hospital charges: 5 studies
  - Societal perspective costs and total costs: 6 studies (TLIF)
  - QALY gain: 6 studies (TLIF)
  - Cost-effectiveness: 2 studies (TLIF)
- All studies high risk of bias
- Methodological quality of economic evaluations is average in 4 studies, rest of studies are of low quality.

**Some US hospitals charge 10 times the cost of services, study finds**

Michael McCarthy

# Results (3)

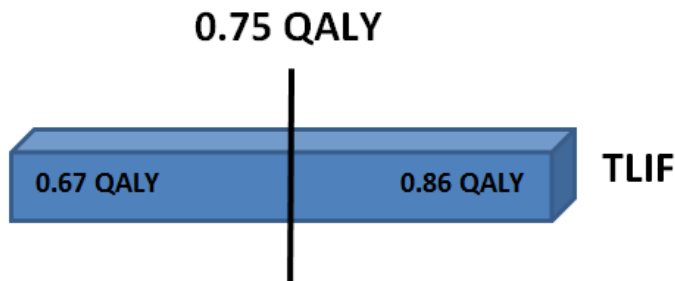
- Results presented in ranges because of heterogeneity



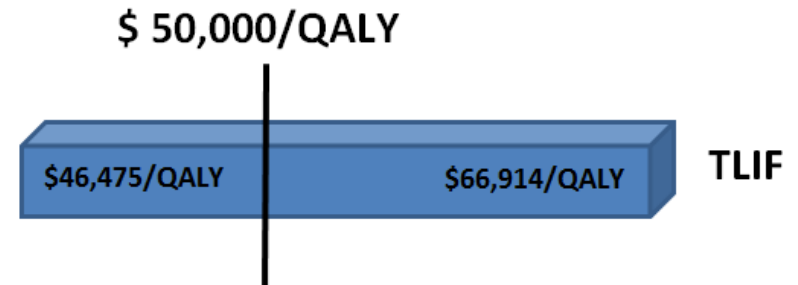
# Results (4)

- Results presented in ranges because of heterogeneity
- Treatment is cost-effective if  $\$/\text{QALY} < \$50,000/\text{QALY}$  (threshold can be different per country)

2 years Cumulative QALY gain

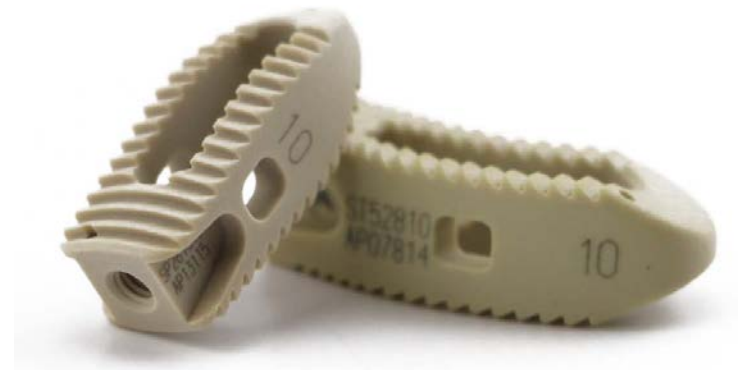


Cost-effectiveness in  $\$/\text{QALY}$



# Discussion (1)

- Lowest healthcare costs: \$14,081 for PLIF
  - Asian study
  - Only index hospitalization costs
  - Determined in charges
- Highest healthcare costs: \$86,112 for PLIF
  - Multiple aspects calculated in healthcare costs
  - Determined in charges
- Lowest societal perspective costs: \$6,717 for TLIF
  - Patients did not receive workers' compensation
- Highest societal perspective costs: \$36,537 for TLIF
  - European study
  - Longest period of work loss (34.2 weeks)
- Lowest cost-effectiveness: \$46,475/QALY for TLIF
  - Determined in costs
- Highest cost-effectiveness: \$66,914/QALY for TLIF
  - Determined in charges





## Discussion (2)

- No studies comparing TLIF and PLIF directly!
- Great heterogeneity in healthcare related costs and societal perspective costs:
  - Differences in-, and exclusion factors to determine costs
  - Different methods for calculations
  - Differences in use of costs and charges
- Low quality economic evaluation
- High risk of bias

# Conclusion and recommendations

- Cost-effectiveness is limitedly and differently reported in 15 studies
- Reported healthcare related costs and societal perspective costs varied greatly and are not always transparent
- Based on this review it is not possible to draw a solid conclusion if TLIF or PLIF is more cost-effective
- This review shows that instrumented spine surgery is expensive
- Retrospective data shows that TLIF associated with less complications and blood loss, shorter surgical time and hospital duration, making TLIF a better candidate to be more cost-effective compared to PLIF
- Randomized controlled trials and economical evaluations are needed.

# Disclosures

- The authors declare that this content was composed in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

