Factors that influence value of helicopter EMS

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Mechanisms by which HEMS may improve trauma outcomes

Faster transport time: if expected ground transport time > 30 minutes

Higher level of care (staff, medications, procedures, equipment)

Speed is not everything: Identifying patients who may benefit from helicopter transport despite faster ground transport

Xilin Chen, MPH, Mark L. Gestring, MD, Matthew R. Rosengart, MD, MPH, Timothy R. Billiar, MD, Andrew B. Peitzman, MD, Jason L. Sperry, MD, MPH, *and* **Joshua B. Brown, MD, MSc**, *Pittsburgh, Pennsylvania*

Association Between Helicopter vs Ground Emergency Medical Services and Survival for Adults With Major Trauma

Samuel M. Galvagno Jr, DO, PhD
Elliott R. Haut, MD, FACS
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Context Helicopter emergency medical services and their possible effect on outcomes for traumatically injured patients remain a subject of debate. Because helicopter services are a limited and expensive resource, a methodologically rigorous investigation of its effectiveness compared with ground emergency medical services is warranted.

223,475 patients with major trauma

Propensity score analysis, national trauma registry

Outcome = survival to hospital discharge

- Helicopter vs. ground (**OR 1.16** [95% CI 1.14-1.18])
  - Absolute risk reduction 1.5%
  - i.e. **1.5 lives saved /100 transports**

Headline: "Air ambulances leave some with sky-high bills" 12/17/09

7 NEWS WWNYTV | FOX 28 WNYF

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NEWS WEATHER SPORTS FEATURE

Feedback: Man Weeps After Getting $40K Statement For Flight To Hospital

TOOLS

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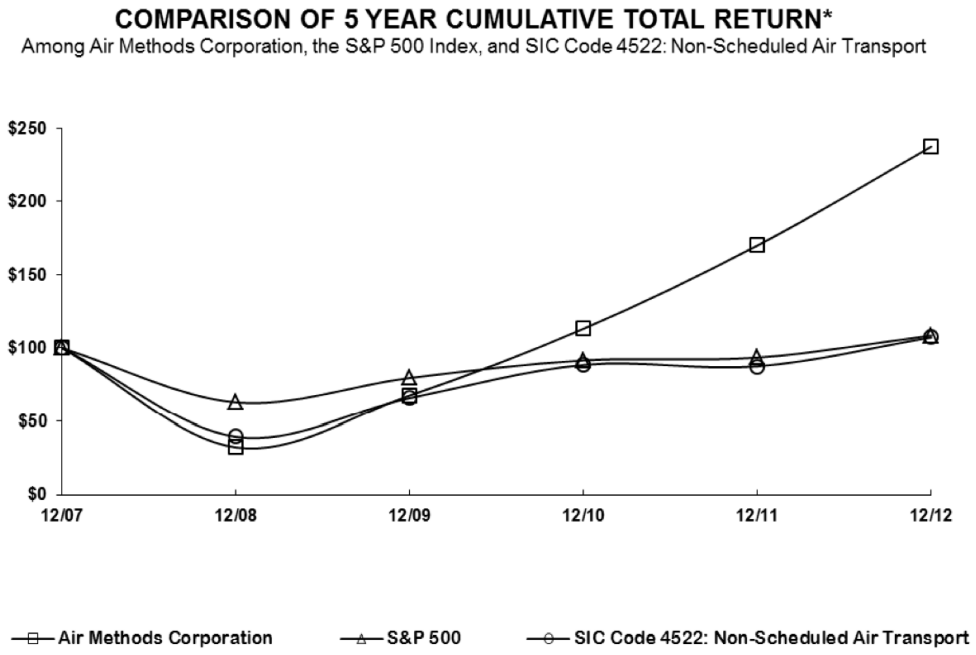
Story Published: Mar 8, 2013 at 5:02 PM EDT

(Story Updated: Mar 8, 2013 at 8:02 PM EDT)

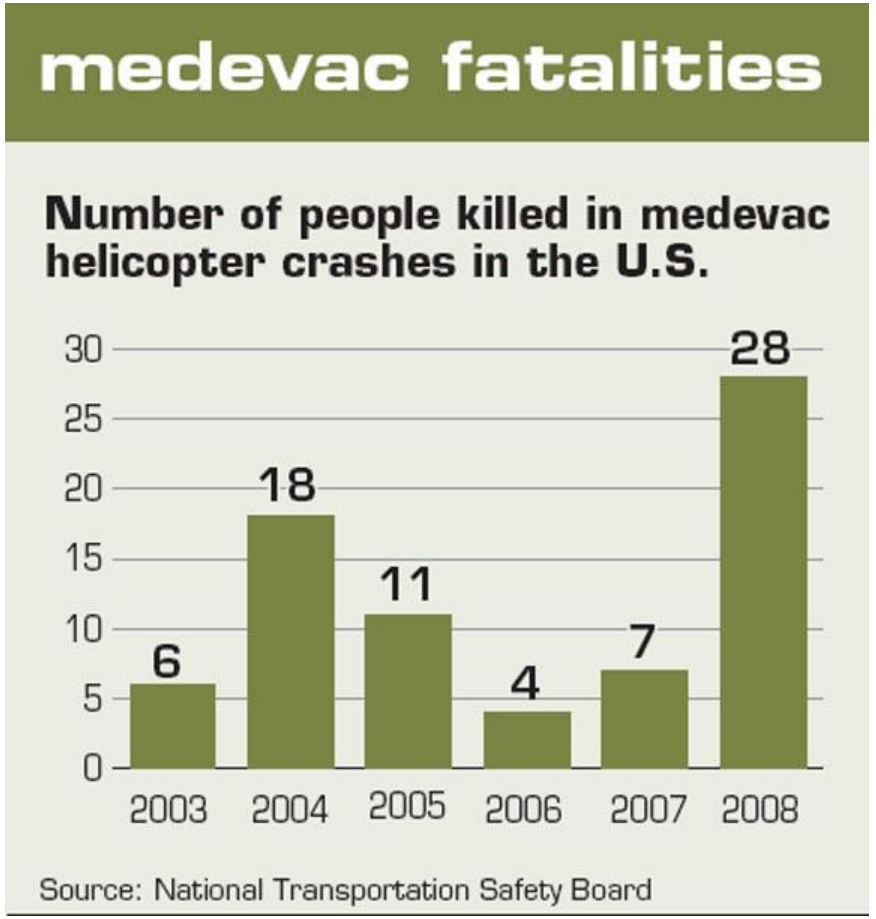


Mean HEMS transport bill:

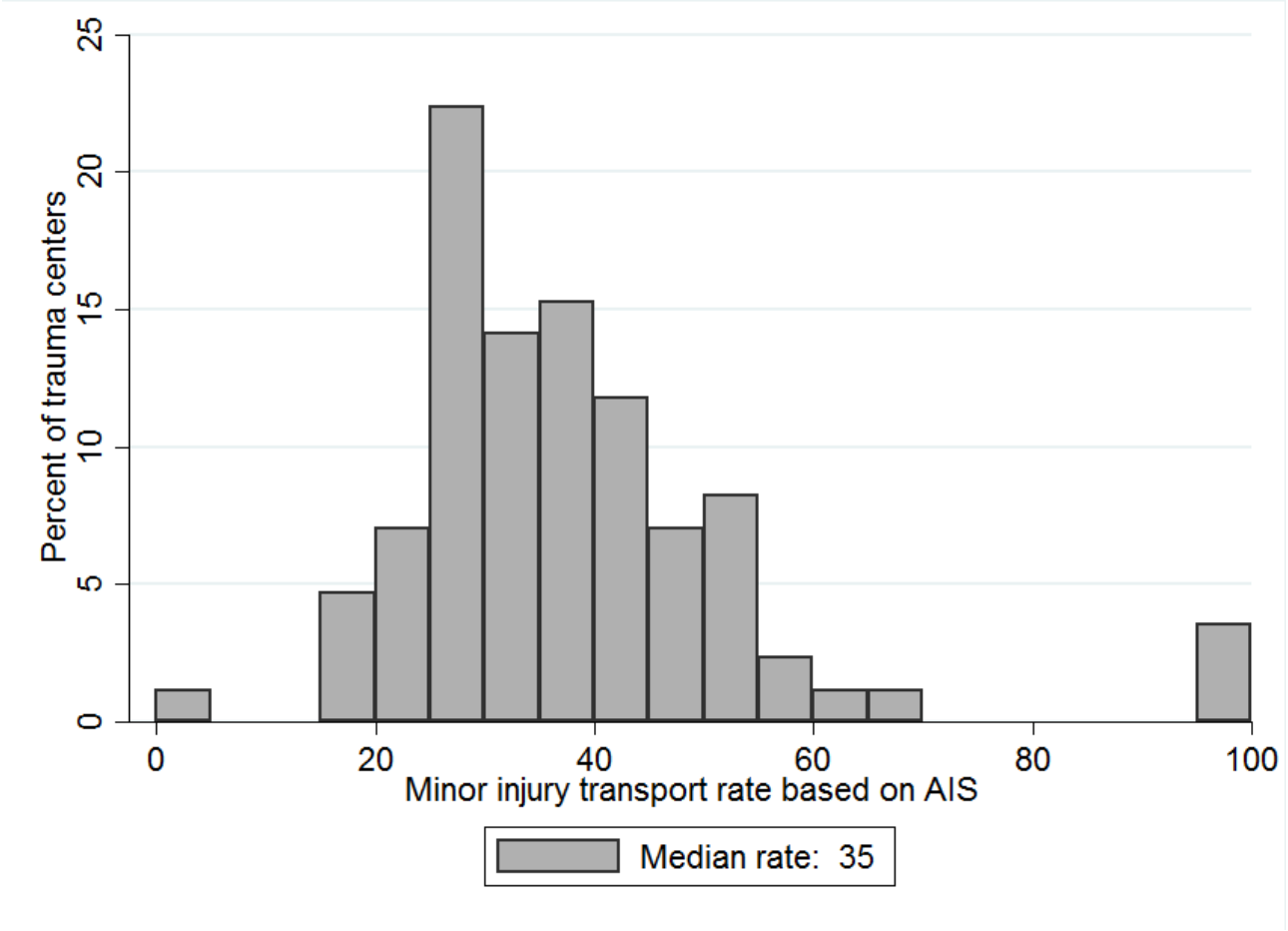
- 2007: $13,000
- 2013: $36,000

Crisis in the Sky: Medevac Helicopter Crashes and Deaths
Escalating Business Pressures, Insurance, Lack of Oversight Blamed for Rash of Accidents
By BRIAN ROSS, JOSEPH RHEE and ANGELA M. HILL
February 3, 2009—

The Washington Post



Wide regional variation in minor injury flights



Cheung, Delgado, Staudenmayer, *Academic Emergency Medicine*, 2014

Summary of challenges in assessing value of HEMS

- Estimates of effectiveness of HEMS depend on local context/alternatives, study methodology
- Public concerns re: costs, safety, overuse for minor injuries
- High fixed costs and economic incentives for overuse

Cost-Effectiveness of Helicopter Versus Ground Emergency Medical Services for Trauma Scene Transport in the United States

M. Kit Delgado, MD, MS; Kristan L. Staudenmayer, MD, MS; N. Ewen Wang, MD; David A. Spain, MD; Sharada Weir, PhD; Douglas K. Owens, MD, MS; Jeremy D. Goldhaber-Fiebert, PhD

- How much more effective do helicopters need to be compared to ground ambulances in order to be cost-effective for transport from the site of injury to a trauma center, given their costs, safety profiles, and inevitable use of minor injury patients?

> ?

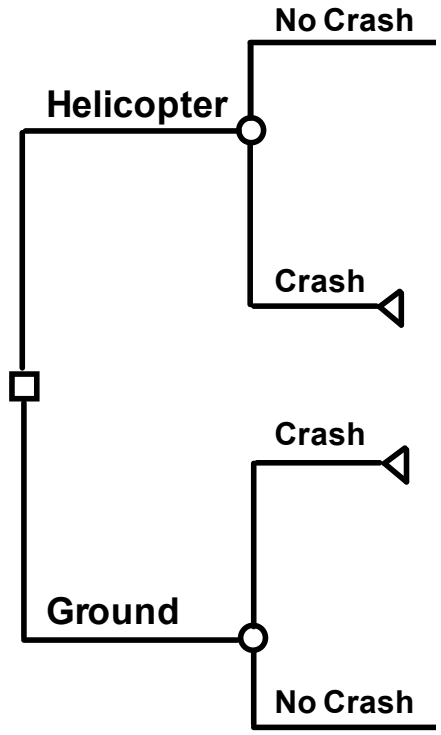
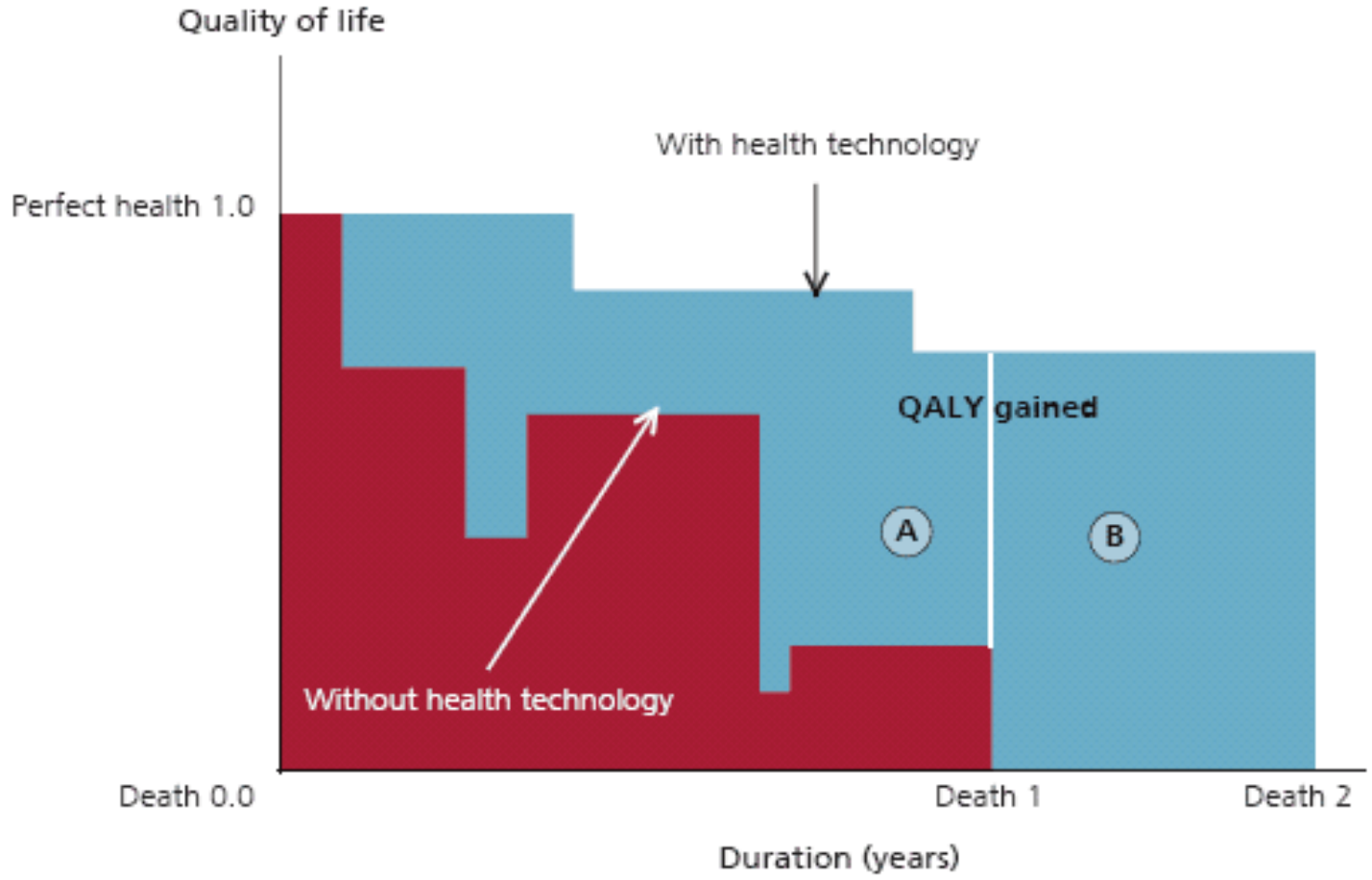
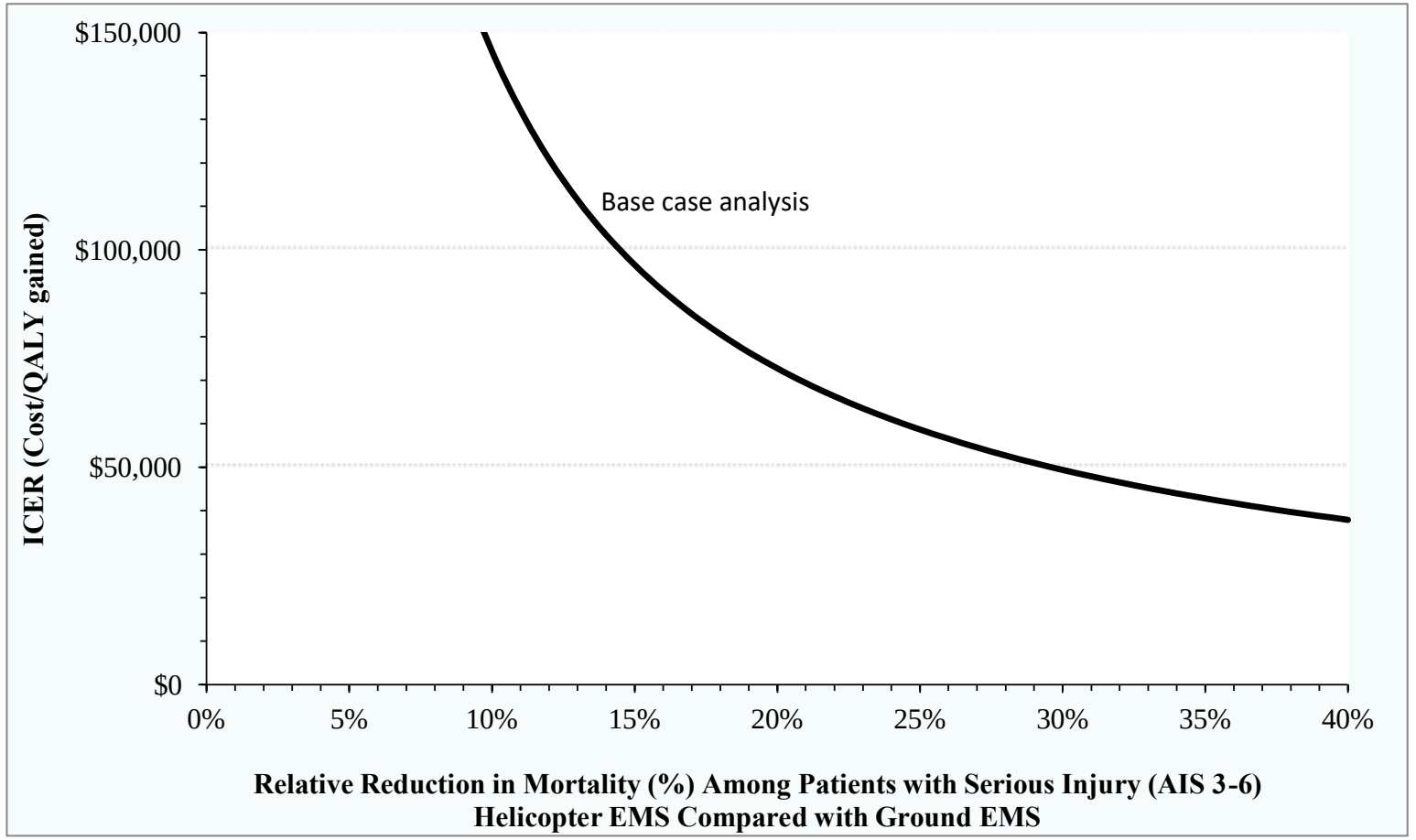

No Crash
Helicopter
Crash
Crash
Ground
No Crash

Figure. Diagram of the concept of QALY (quality-adjusted life years)

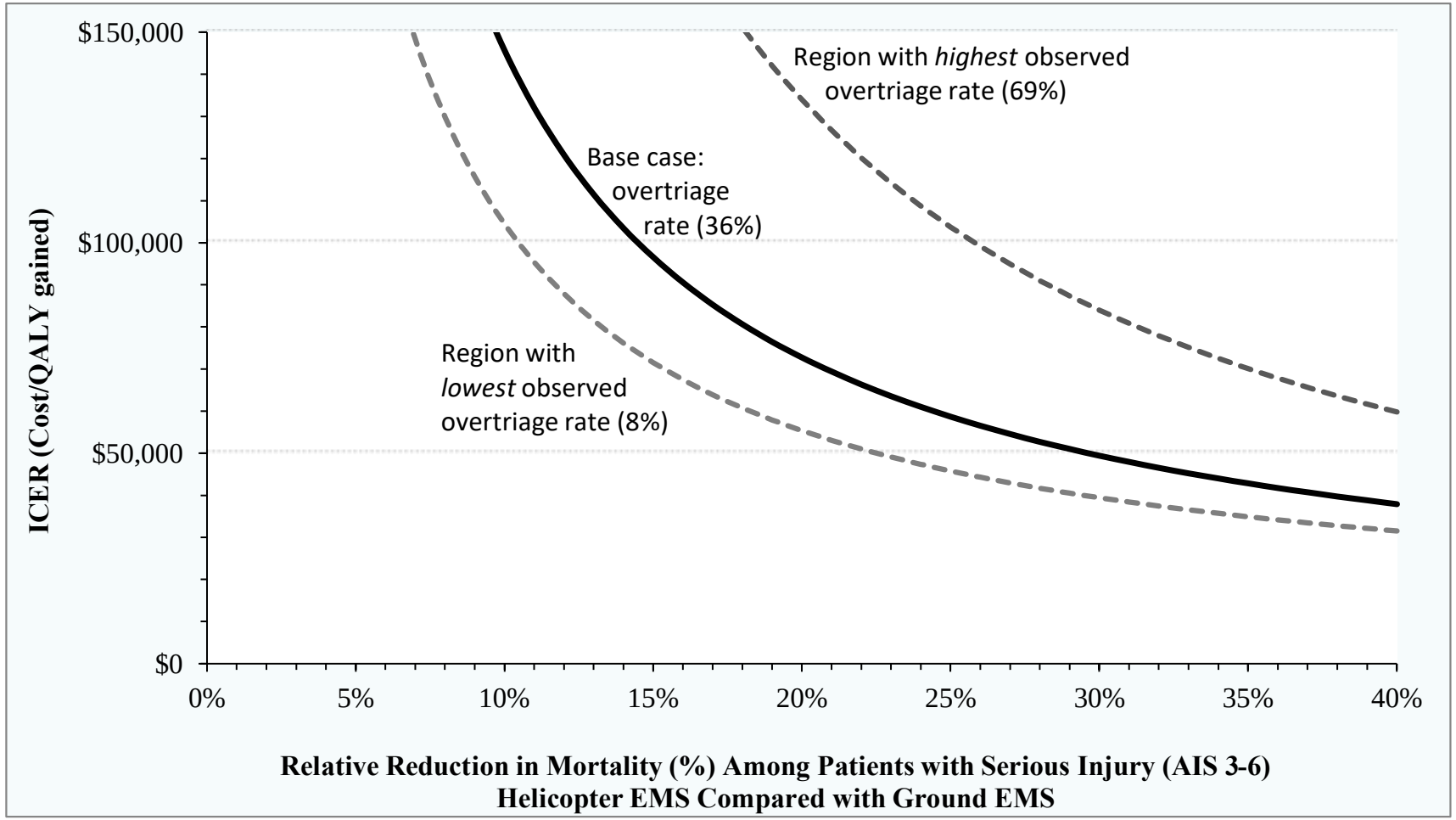


Source: http://www.gencat.cat/

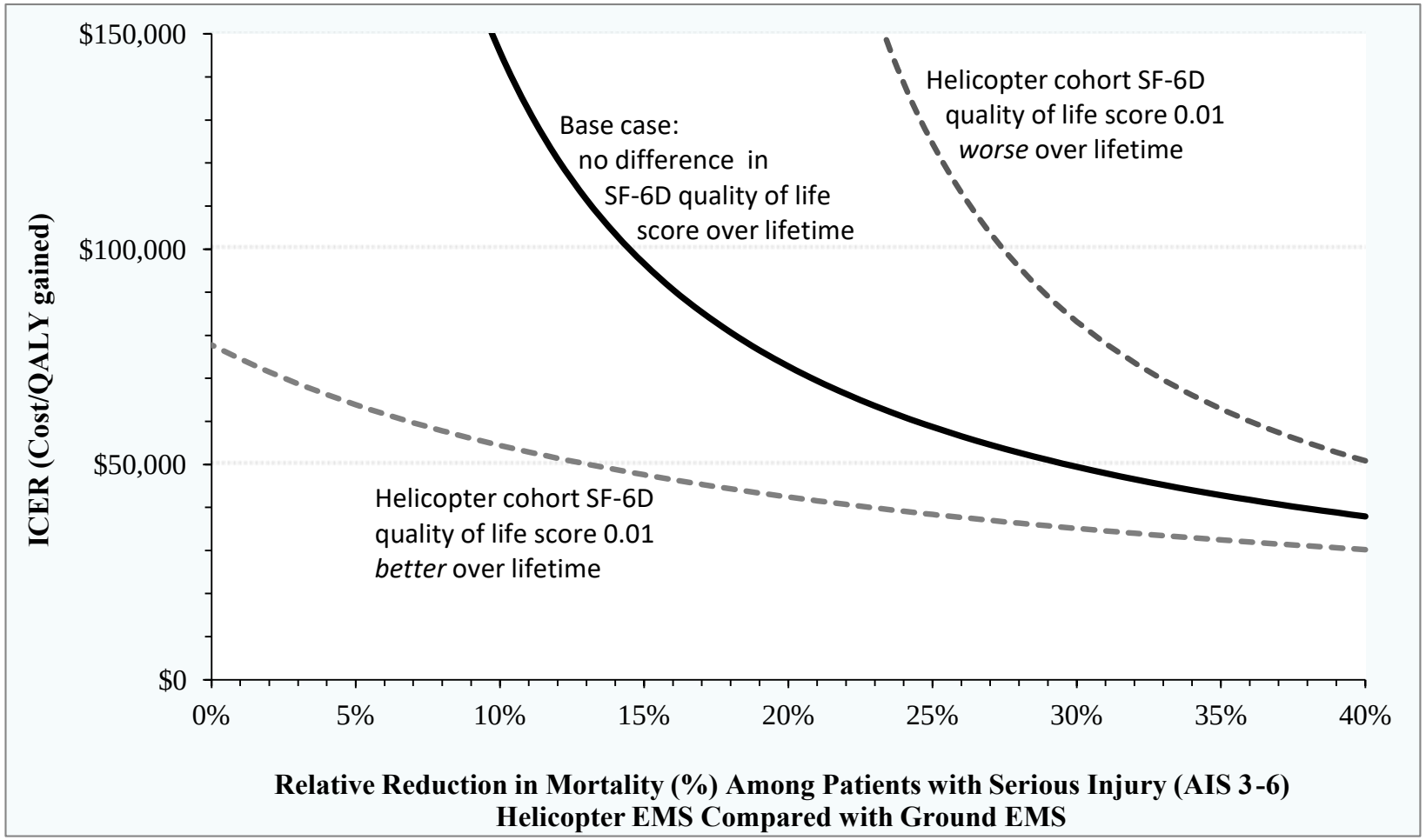
Threshold relative reduction in mortality needed for helicopter to be cost-effective



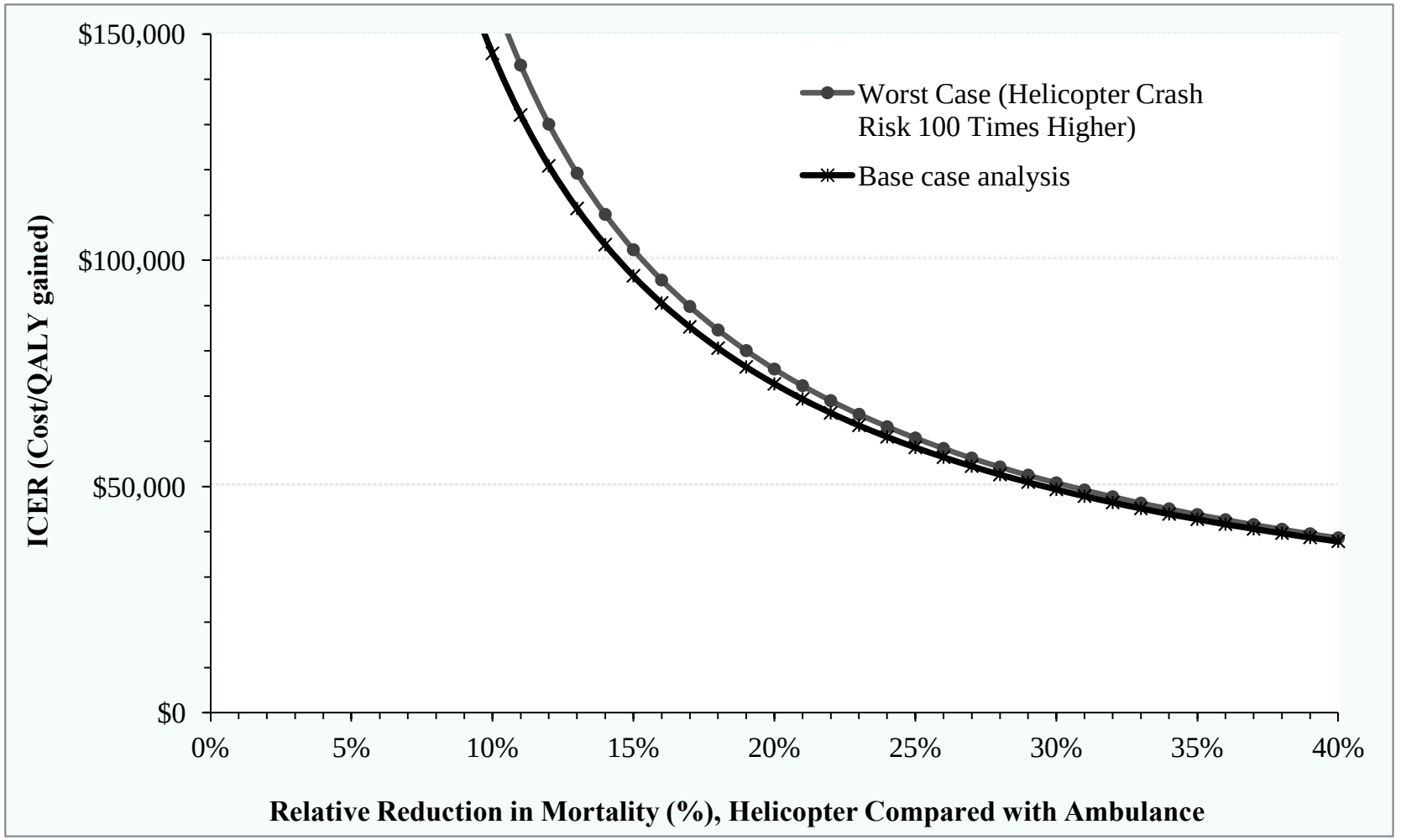
Effect of overtriage on cost-effectiveness



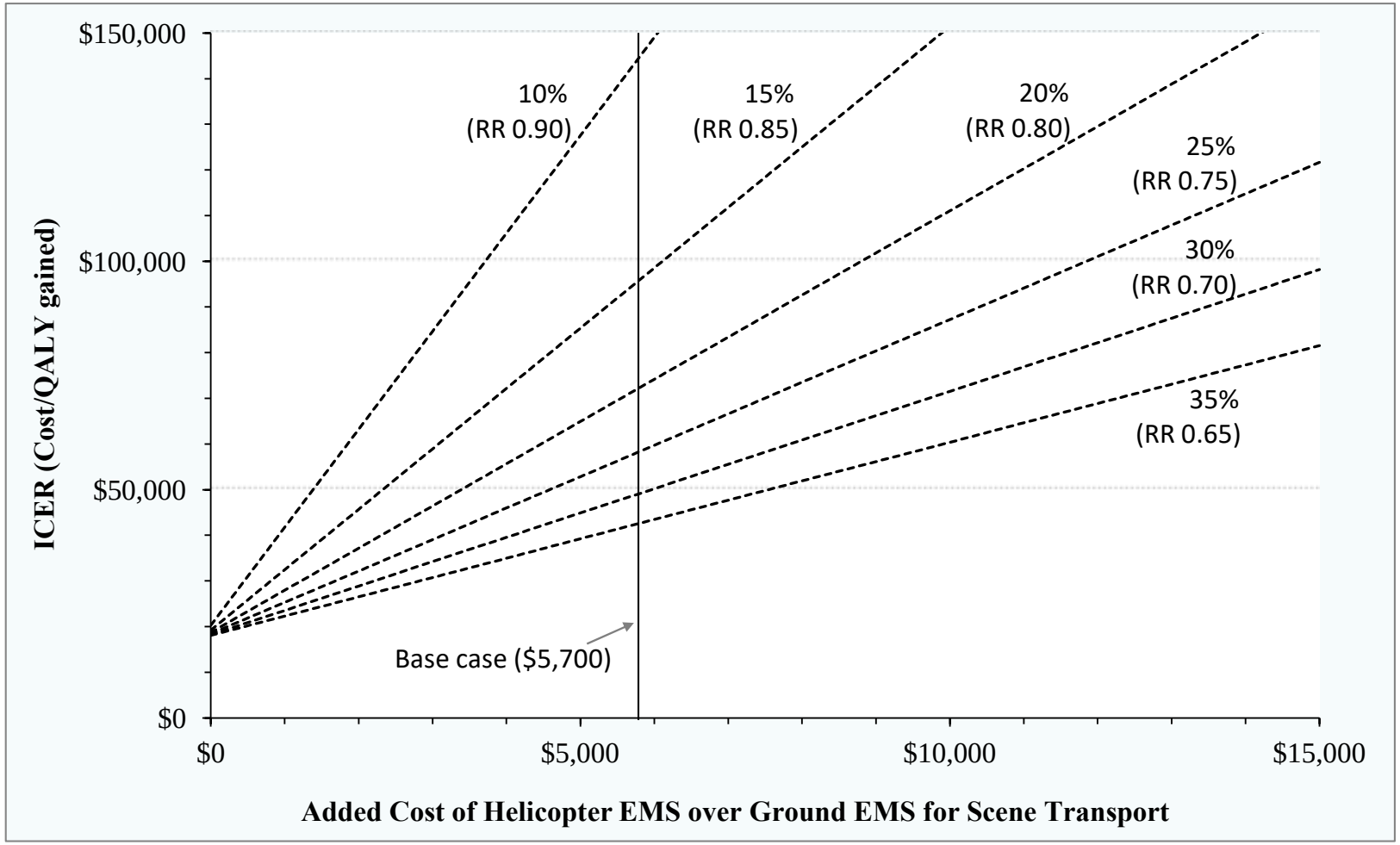
Effect of disability outcomes on cost-effectiveness



Effect of fatal crash risk on cost-effectiveness



Effect of cost/transport on cost effectiveness



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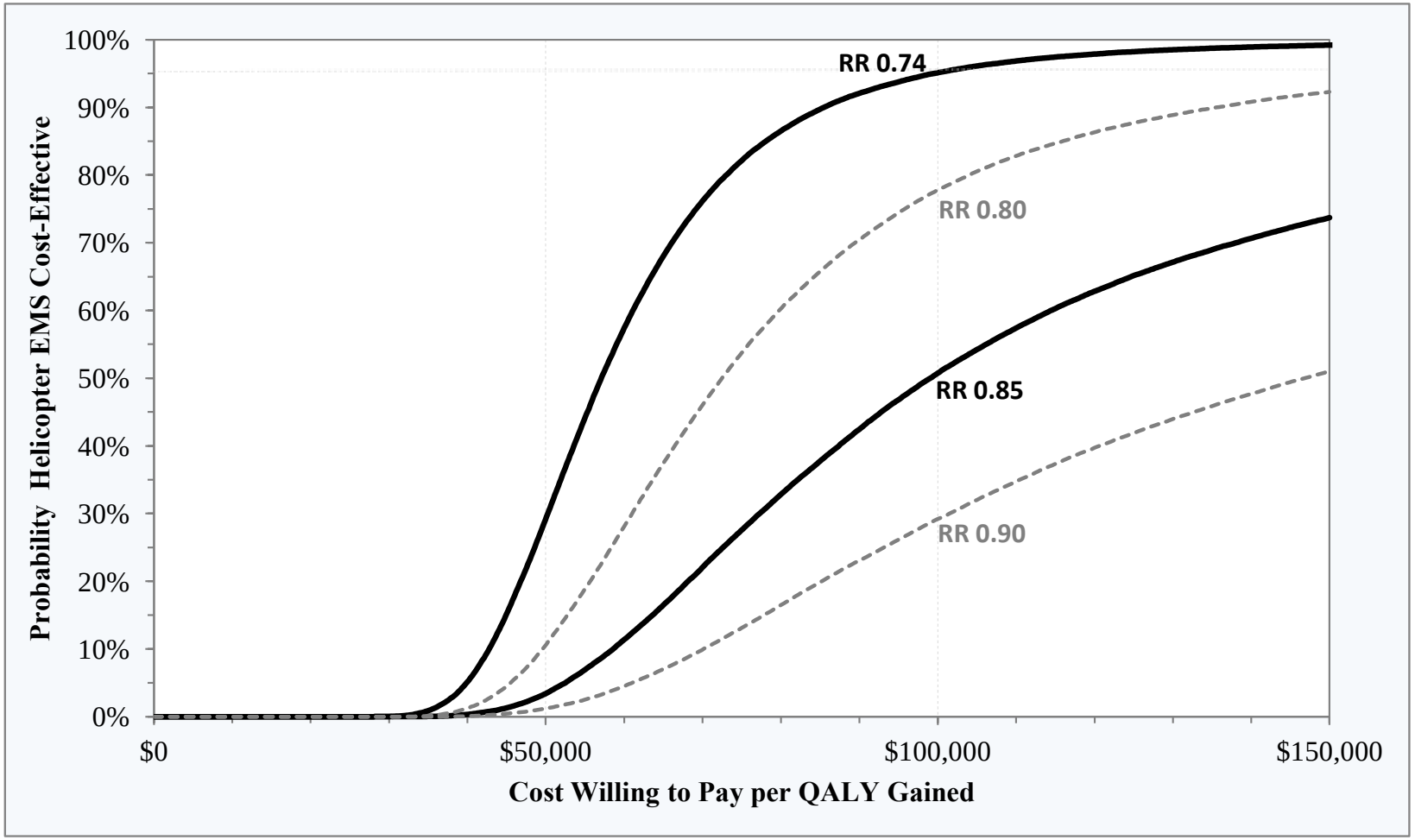


Limitations

- **Findings only applicable to:**
  - Regions where both options exist, feasible
  - Regions that do not suffer opportunity costs from ground ambulance leaving

- **Option of helicopter EMS to trauma center vs. ground transport to non-trauma center not considered**

Conclusions

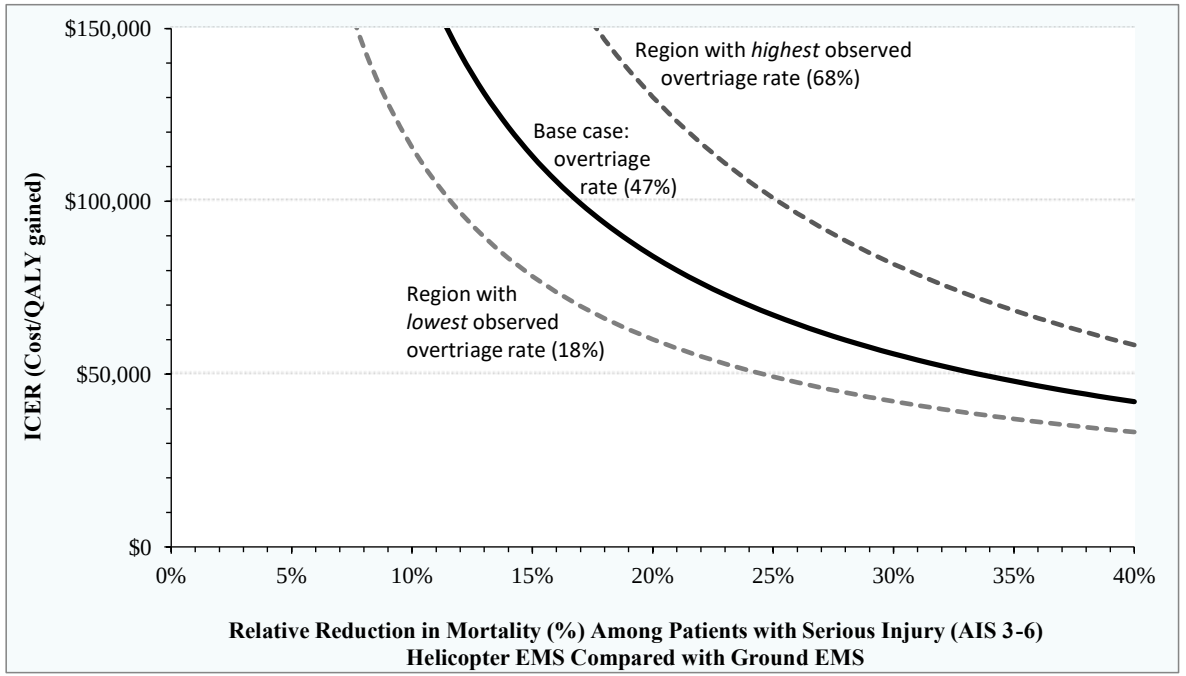
For the average patient requiring trauma center care, our analysis suggests the needed RRR of mortality to be cost-effective:

- 15% (i.e. *1.3 lives/100 transports*) for $100,000/QALY gained
- 30% (i.e. *3.3 lives/100 transports*) for $50,000/QALY gained

Given current uncertainties, if helicopter EMS reduces mortality by > 26%, there is a > 95% chance it costs <$100,000/QALY

Implications

- **Reducing overtriage most likely way to improve the cost-effectiveness of helicopter EMS**



JAMA Surgery | Original Investigation

Comparing the Air Medical Prehospital Triage Score With Current Practice for Triage of Injured Patients to Helicopter Emergency Medical Services
A Cost-effectiveness Analysis

Joshua B. Brown, MD, MSc; Kenneth J. Smith, MD, MS; Mark L. Gestring, MD; Matthew R. Rosengart, MD, MPH; Timothy R. Billiar, MD; Andrew B. Peitzman, MD; Jason L. Sperry, MD, MPH; Joel S. Weissman, PhD

Table 1. Air Medical Prehospital Triage (AMPT) Score

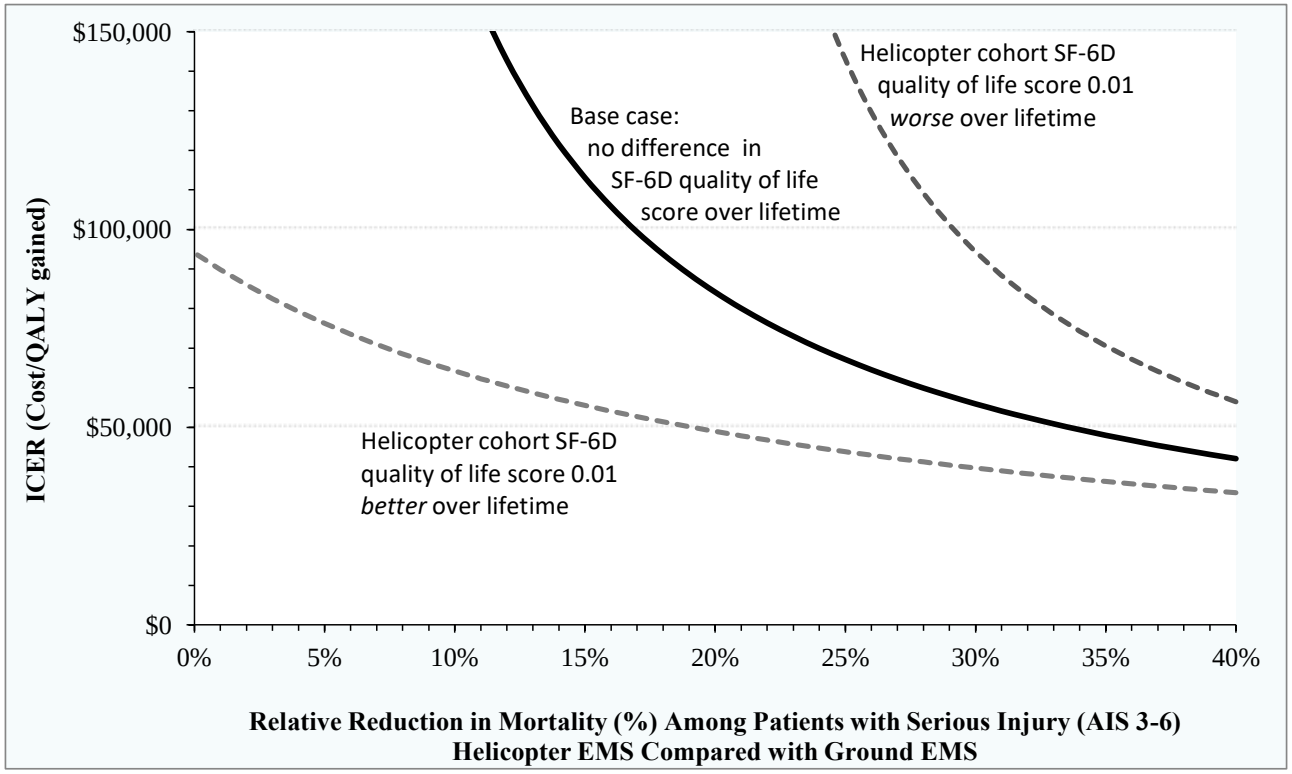
Criterion	Points
Glasgow Coma Scale score <14	1
Respiratory rate <10 or >29 breaths/min	1
Unstable chest wall fractures[a]	1
Suspected hemothorax or pneumothorax[b]	1
Paralysis	1
Multisystem trauma[c]	1
Physiologic plus anatomic criteria[d]	2
Helicopter transport should be considered if the AMPT score ≥2	

RESULTS The base case had an incremental cost-effectiveness ratio of $255 333 per quality-adjusted life-year for current practice compared with the AMPT score. Assuming 20% of patients have severe injuries and assuming HEMS only benefits these patients, current practice had an incremental cost-effectiveness ratio of $176 686 per quality-adjusted life-year. Probabilistic sensitivity analysis demonstrated that current practice is inferior in 85% of iterations, only becoming favored when the cost-effectiveness threshold is greater than $310 000 per quality-adjusted life-year.

Bottom Line: better triage using validated instruments, increases value of HEMS

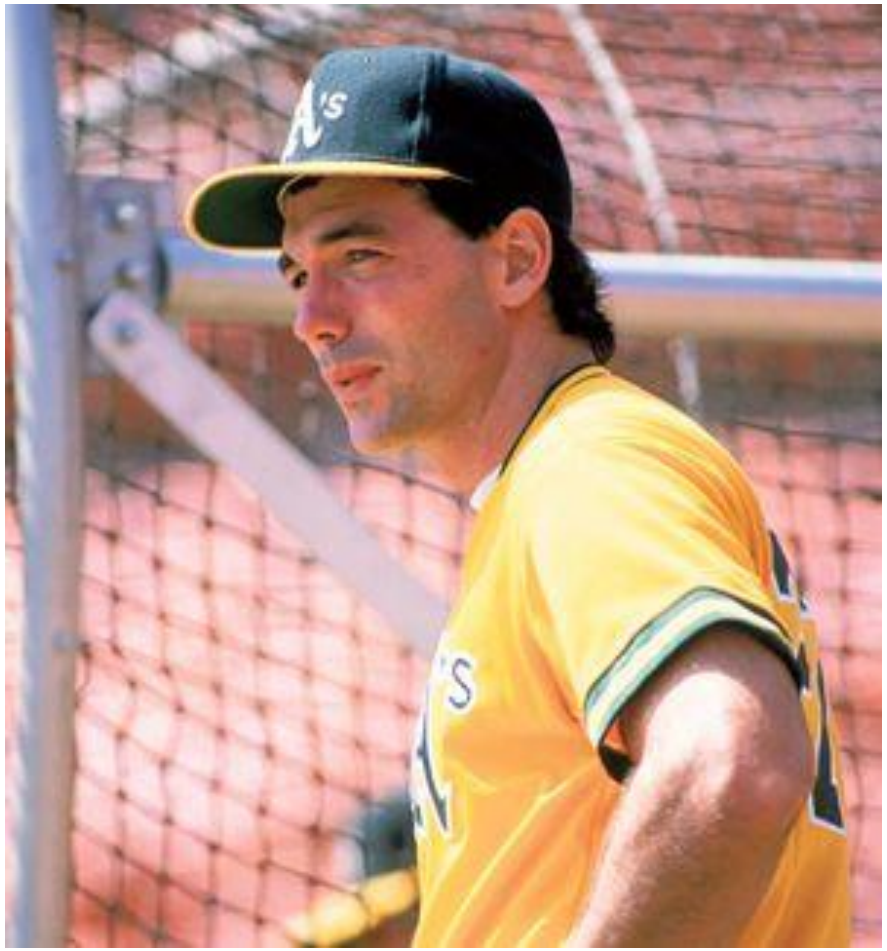
Implications

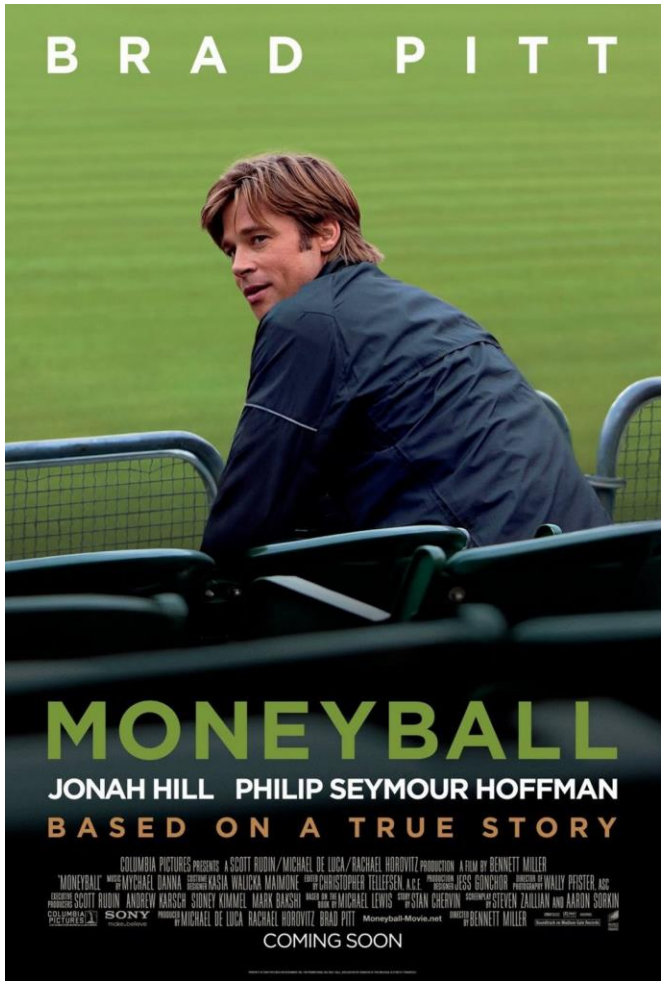
- **Huge need to study non-mortality outcomes more rigorously in U.S.**



Thank You

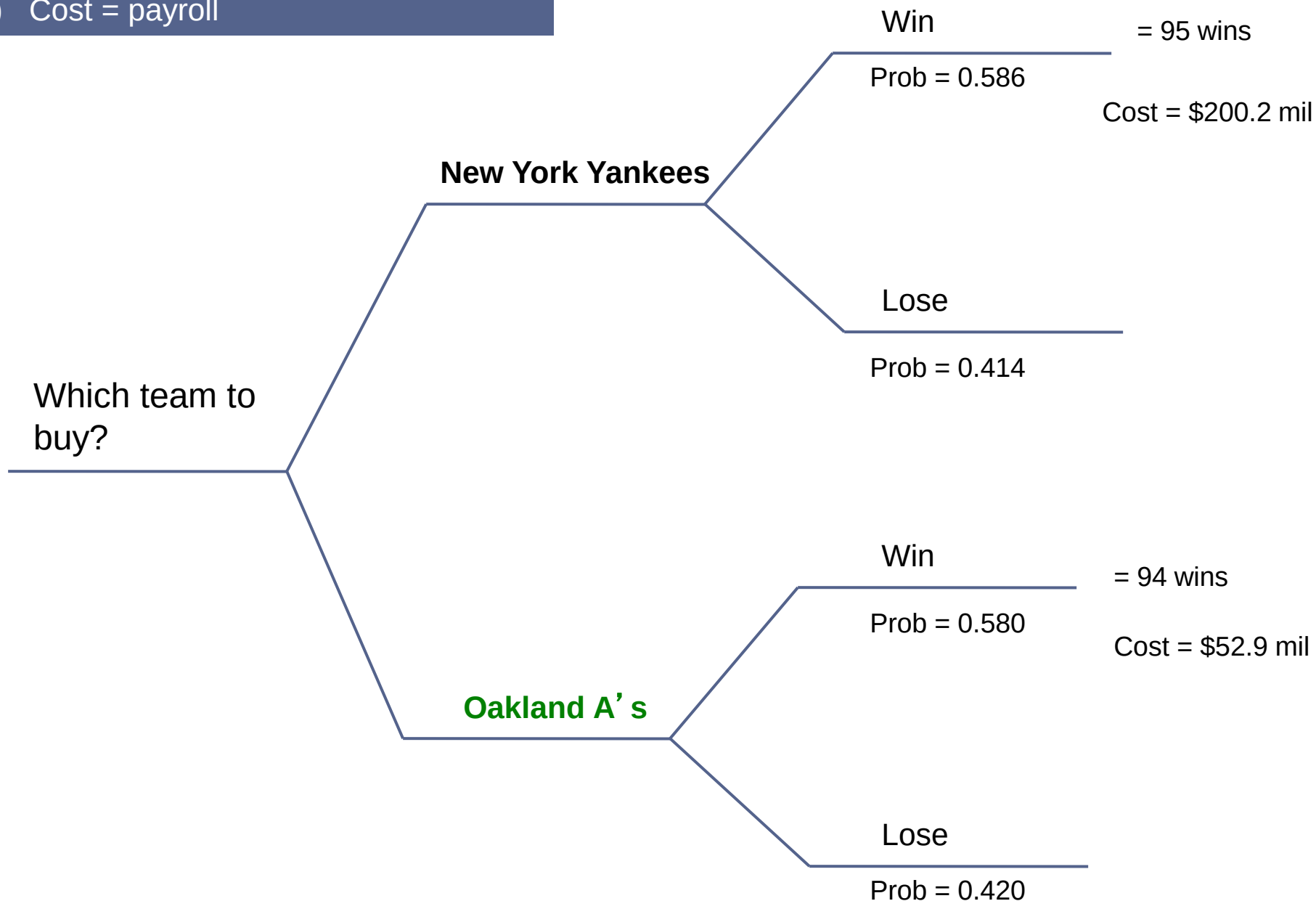
Appendix: Cost-effectiveness analysis in 5 minutes or less




BRAD PITT
MONEYBALL
JONAH HILL PHILIP SEYMOUR HOFFMAN
BASED ON A TRUE STORY
COLUMBIA PICTURES PRESENTS A SCOTT RUDIN / MICHAEL DE LUCA / RACHAEL HOROVITZ PRODUCTION A FILM BY BENNETT MILLER
"MONEYBALL" MUSIC BY MYCHAEL DANNA COSTUME DESIGNER KASIA WALICKA MAIMONE DIRECTED BY CHRISTOPHER TELLEFSEN, A.C.E. PRODUCTION DESIGNER JESS GONCHOR DIRECTOR OF PHOTOGRAPHY WALLY PFISTER, ASC
LINE PRODUCER SCOTT RUDIN ANDREW KARSCH SIDNEY KIMMEL MARK BAKSHI BASED ON THE BOOK BY MICHAEL LEWIS STORY BY STAN CHERVIN SCREENPLAY BY STEVEN ZAILLIAN AND AARON SORKIN
COLUMBIA PICTURES SONY PRODUCED BY MICHAEL DE LUCA RACHAEL HOROVITZ BRAD PITT Moneyball-Movie.net DIRECTED BY BENNETT MILLER
COMING SOON

Model Assumptions:

1) Effectiveness = winning percentage
2) Cost = payroll



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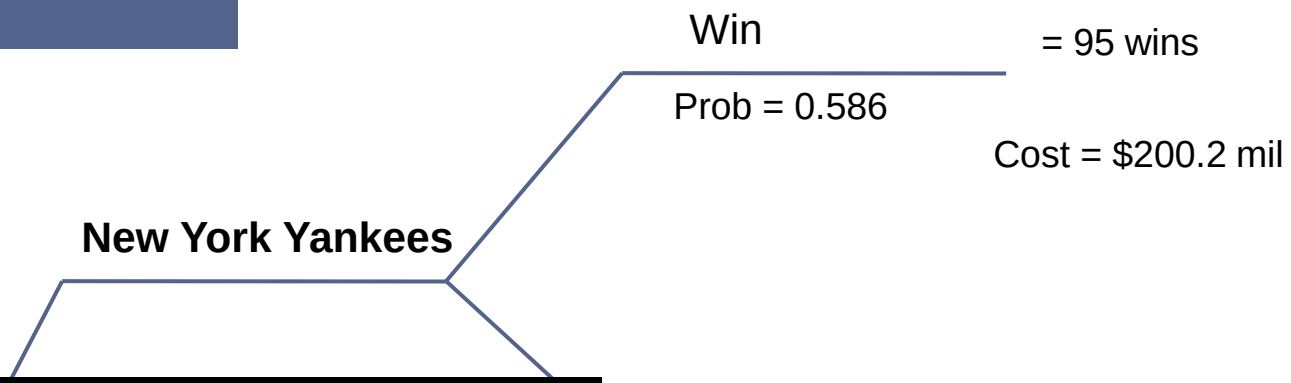

Yankees expected to win more, but cost more.
Can afford the A's, but should you buy the Yankees?

Cost: $200.2 mil – 52.9 mil

Effectiveness: 95 wins – 94 wins

Incremental Cost-Effectiveness Ratio (ICER):
$147.3 million/additional win

Depends on your "willingness-to-pay" threshold

In baseball, market value for player salaries is $3-5 million/additional win they are expected to produce