Cost-Effectiveness of Therapeutic Hypothermia After Cardiac Arrest

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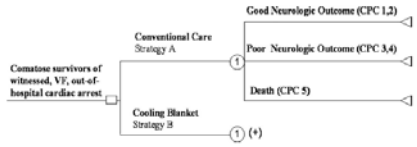
Introduction

- Meta-analysis:
  - six OHCA patients with hypothermia treatment
  - one patient with good neurological outcome
- 低溫療法可能讓原本會死亡的病人存活但有較差神經學預後和較差的生活品質 ➔ increased cost
- Goal of study: to evaluate the cost-effectiveness
  - 比較：therapeutic hypothermia vs. conventional care
  - 對象：postarrest patients with witness VF, OHCA

Methods - I

- Decision model: a hypothetical cohort of comatose patients with ROSC after a witnessed VF OHCA.
  - Met the inclusion and exclusion criteria of HACA trial
- Intervention: cooling blanket
- Outcome: CPC and quality-adjusted life years(QALYs)



Best CPC disposition at 6 months

Method -II

- Assumptions

包含neuromuscular block for 24hrs and sedation

1. 32~34oc for 32 hrs and rewarming for 8 hrs
2. More complication or beter outcome

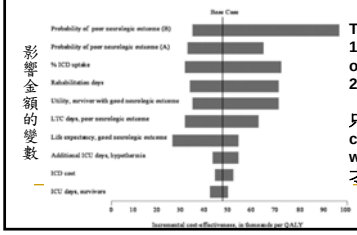
80% ICD penetration in both the hypothermia and conventional care group with CPC 1 and 2

Table 2. In-Hospital and Posthospital Discharge Costs

	Base-Case* (95% CI)
In-hospital care	
Intensive care unit	
Cost/day, $	2200 (2000–2400)
Days, survivors	2.9 (1.4–6.6)
Days, nonsurvivors	1.1 (0.4–2.6)
Additional ICU days for the hypothermia cohort‡	2 (−1–7)
Hospital ward	
Cost/day, $	820 (650–1020)
Days, survivors	18 (10–36)
Days, nonsurvivors	2 (1–4)
Postdischarge care	
Rehabilitation	
Cost/day, $	1390 (695–2500)
Days	30 (7–90)
Long-term care facility	
Nursing home, cost/day, $	250 (125–500)
Chronic ventilation care facility, cost/day, $	1520 (760–2730)
Long-term care facility, days	365 (180–545)
Lifetime expenditure cost of an ICD, $	123 870 (102 290–148 650)
Estimated % of CPC 1 and 2 patients eligible for an ICD	80% (46%–100%)

Results - I

- Base-Case analysis:
  - Therapeutic hypothermia: an average of 0.66 QALYs at an incremental cost of $31254
  - an incremental cost effectiveness ratio of $47168 per QALY (< $100000/ QALYs)
- Sensitivity analysis:

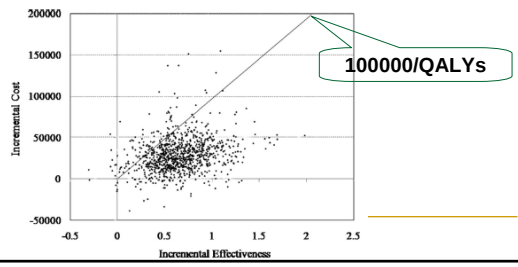


The most influential variables:
1.probability of poor neurological outcome
2.posthypothemia care

只有當hypothermia group 比 conventional group 多 5% patient with poor neurological outcome，才會超過 100000/QALYs

Results - II

- Monte Carlo Analyses
  - The random selections are repeated 10000 times to produce an empirical probability distribution of the cost-effectiveness estimate of the model.
  - 91% ➔ < 100000/QALYs



Discussion - I

- We demonstrated that hypothermia with a cooling blanket costs less than $100000/QALY gained, and this finding was sustained despite extensive variation in model inputs.
- 比較其他 cost-effectiveness的分析:
  - Widespread layperson resuscitation training → $202400/QALY
  - Public access defibrillation → $44000/QALY
  - Airline defibrillation programs in all US commercial aircraft → $94700/QALY

Discussion - II

- Postdischarge care was an important component of the total cost
  - In our model, even when we increased the proportion of neurologically impaired survivors in the hypothermia group, we still observed favorable cost-effectiveness estimates for hypothermia.
- Hypothermia can be induced with alternate methods
  - Ice bag → inexpensive
  - Endovascular cooling device →expensive

不同的方式會導致Incremental cost-effectiveness 改變

Limitations

- Our estimates of the effectiveness of hypothermia derive from a single RCT with fewer than 400 patients.
  - 只有VF病人，排除PEA和asystole
- In-hospital and postdischarge resource use for patients receiving hypothermia has not been extensively studied.
  - 大部分是由其他study推測

Conclusion

- therapeutic hypothermia with a cooling blanket technique in witnessed, VF, OHCA is an acceptable investment of health care.
  - incremental cost-effectiveness ratio of $47168/QALY
- From a societal perspective, postarrest hypothermia produces benefits that justify its costs.