MIXED TREATMENT COMPARISONS TO EVALUATE THE EFFECTIVENESS OF STRATEGIES FOR PREVENTING FIRE RELATED INJURIES IN CHILDREN WITHIN THE HOME

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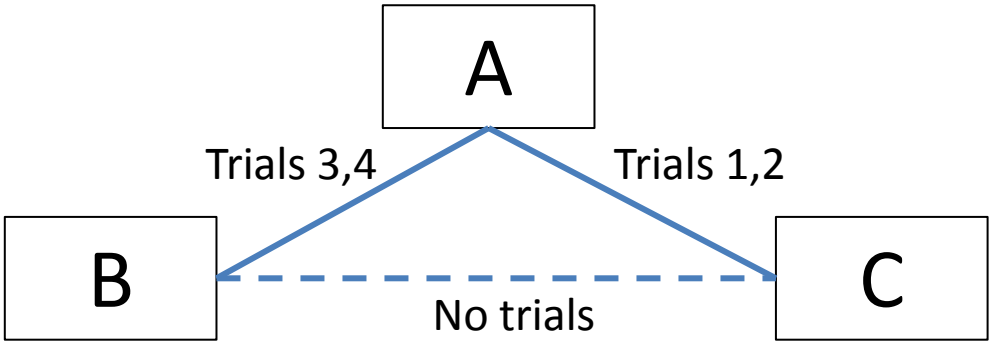
OBJECTIVES

- To identify the most effective (i.e. “best”) strategy for increasing the ownership of fire-related safety equipment in households (smoke alarms, fire extinguishers, fire guards, safe storage of matches/lighters, fire escape plans).

METHODS: Mixed Treatment Comparisons

- MTC methods (a generalisation of meta-analysis methods) allow comparisons of strategies not directly assessed within any individual primary study.



- MTC uses the totality of the evidence to define a network of evidence

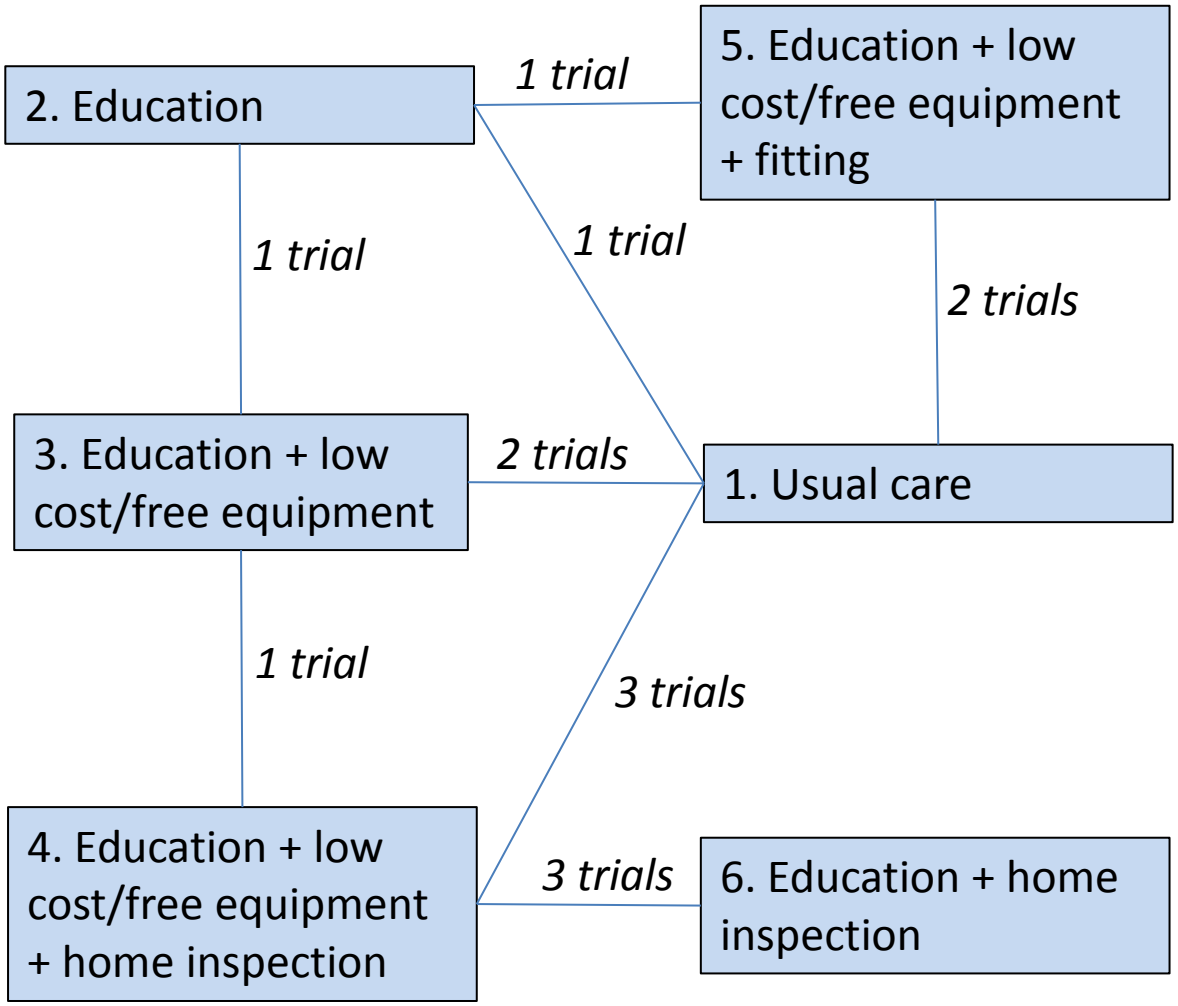
STAGES IN MTC

1. Find the evidence
2. Define the network
3. Synthesise the evidence

1. FINDING THE EVIDENCE

- Updated Cochrane systematic review of home safety education +/- safety equipment for the prevention of home injuries in childhood and meta-analyses of studies comparing intervention to usual care *(Kendrick et al 2007)*
- Systematic review of reviews with data extraction from relevant primary studies not in meta-analyses in Cochrane review (e.g. smoke alarm education vs. smoke alarm education + free fitted alarm)

2. DEFINING THE NETWORK



E.g. Interventions for increasing ownership of functioning smoke alarms

3. SYNTHESISING THE EVIDENCE

- **Mixed treatment random effects model** with a binary outcome (*have functioning equipment / do not have functioning equipment*)
- **Adjusted for clustering** in cluster trials that did not in original analysis (ICCs estimated from individual studies/literature)
- **Outcomes**:
  - Odds ratio of each intervention compared to one another
  - Probability of each intervention being the best

RESULTS: *Probability intervention is the "best"*

Probability	Smoke alarms	Fire extinguishers	Fire guards	Matches/lighters safe storage	Fire escape plans
Usual care	0.000	0.017	0.008	0.017	0.030
Education	0.000		0.126	0.025	0.144
Education + equipment	0.210		0.630		
Education + equipment (not related)		0.063			0.477
Education + equipment + home inspection	0.160	0.752	0.126	0.038	
Education + equipment (not related) + home inspection		0.107			
Education + equipment + home inspection + fitting			0.110		
Education + equipment + fitting	0.120			0.920	
Education + home inspection	0.510	0.030			
Community campaigns		0.031			0.349

RESULTS: *Odds Ratios versus standard care*

OR versus standard care	Smoke alarms	Fire extinguishers	Fire guards	Matches/lighters (safe storage)	Fire escape plans
Education	1.049 (0.14 to 3.944)		3.136 (0.081 to 15.62)	3.804 (0.09 to 14.2)	4.66 (0.163 to 28.34)
Education + equipment	4.901 (0.821 to 16.57)		10.84 (0.326 to 64.6)		
Education + equipment (not related)		1.773 (0.081 to 8.977)			17.82 (0.093 to 94.07)
Education + equipment + home inspection	5.862 (1.182 to 20.5)	11.06 (0.465 to 66.94)	2.403 (0.092 to 14.25)	1.244 (0.225 to 4.175)	
Education + equipment (not related) + home inspection		2.525 (0.036 to 19.09)			
Education + equipment + fitting	3.449 (0.537 to 12.24)		2.795 (0.061 to 13.72)	4127 (0.579 to 9299)	
Education + home inspection	14.21 (0.82 to 73.89)	1.215 (0.07 to 5.706)			
Community campaigns		1.097 (0.024 to 5.262)			5.268 (0.167 to 25.97)

DISCUSSION

- Mixed Treatment Comparison Methods allow a coherent analysis of the totality of the evidence
- Major assumption of the approach:
  - The intervention effect estimated by the *BC* trials would be the same as the intervention effect estimated by the *AC* and *AB* trials if they had included *B* and *C* arms etc.
  - Violated if factors interact with intervention effects and these factors imbalanced across interventions (e.g. social group of study participants etc.)
- Quality/validity of studies ignored
  - As for standard meta-analysis, difficult to incorporate
- Small number of studies for most comparisons
- Results from these analyses are to be used in decision modelling to ascertain cost-effectiveness of the different interventions

CONCLUSIONS

- Results from the MTC show that more intensive interventions are generally estimated to be more effective (i.e. with the best strategies usually offering free or low cost equipment)
- The best strategies varies across equipment types
  - may partly be due to limitations in the data
- Further studies needed to increase precision of estimates and distinguish most effective components of interventions

References and contact details

- **References:**

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