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Appendix 3

This appendix was part of the submitted manuscript and has been peer reviewed.
It is posted as supplied by the authors.

Appendix to: Scott IA, Wakefield JB. Deciding when quality and safety improvement interventions warrant widespread adoption. *Med J Aust* 2013; 198: 408-410. doi: 10.5694/mja12.10858.

On-line appendix 3. Applying the checklist to research evidence relating to rapid response teams (RRTs)*

Evaluative criteria	Response
1. Was the problem fully characterised?	Yes - multiple studies have documented deterioration in vital signs up to 12 hours prior to cardiac arrest which have not been correctly interpreted and/or acted upon by attendant medical or nursing staff for various reasons.
2. Does a sound theory of behaviour change underpin the intervention?	No - intervention has several components: designing call criteria and notification procedures, team make-up, roles and training; staff and management agreement to RRT implementation. Potential difficulties in implementation based on change theories include: break from traditional hierarchy of seeking review from usual attendant medical team; challenges patient ownership; perceived shame in calling RRT; variation in monitoring of vital signs; differing interpretation of call criteria; delays in activating RRT. How these barriers to implementation were to be overcome were not addressed in designing the intervention.
3. Was there preliminary testing in confirming proof of concept?	No – there were no reports prior to large-scale clinical studies.
4. Is the QSII standardised and replicable?	No – marked variation across hospitals and between studies in team composition, links with ICU, call activation criteria, target populations (only surgical patients, patients in shock, all patients outside critical care areas). Interventions performed at patient level by RRTs were not standardised.
5. Have effects been evaluated with a sufficient level of rigour?	
- Were outcome measures standardised and appropriate?	No - all-cause mortality, unexpected cardiac arrests and unplanned ICU transfers in patients with no do-not-resuscitate (DNR) status are the most appropriate outcome measures which most studies did not report. Definition of cardiac arrest did not adopt standardised terminology and varied between studies as did inclusion of patients with DNR status.
- Quality assurance procedures for data collection?	No - most studies did not report quality assurance procedures for data collection.
- Minimisation of risk of confounding?	Only to a limited extent. Of more than 30 studies reported up to 2009, 18 were prospective and only 6 studies (5 adult and 1 paediatric) were categorised as high quality.[5] The numbers of deaths prevented were disproportionate to reductions in the numbers of cardiopulmonary arrest, suggesting unidentified confounders. Very few studies reported power calculations and no dose-response gradient was demonstrated.
6. Have observed effects been reconciled with underpinning	

theoretical framework	
- Were data collected that adequately tested theory?	No - data collected in surveys related to theory-based impediments were performed independently of clinical trials with little reporting of intended solutions or their effectiveness.
- Were process evaluations reported?	Some trials undertook process evaluations which showed call rates to vary considerably, from 2.7 to 48.7 calls per 1000 admissions. Others reported RRT utilisation was proportional to staff education about, and interpretation of, call activation criteria, understanding of RRT functions, and positive attitude to RRTs.
7. Has potential for adverse and unintended effects been evaluated?	No – potential harms were not assessed such as unwarranted resuscitation of clinically futile cases or patients who declined such intervention; deskilling of ward teams in resuscitation; lower quality care because of perceived easy access to 'rescue' RRTs; professional discord between RRTs and attendant medical teams.
8. Have resource use and costs been assessed?	No - cost or cost-effectiveness analyses have not been reported.
9. Have effects been clinically plausible and consistent?	No – there is significant heterogeneity in mortality outcome. In pooled analyses of 11 prospective studies involving adults,[5] two studies showed significant reduction, one reported a decreased trend, six reported no effect, one reported an increased trend, and one reported increased mortality. Cardiorespiratory arrests were reduced by 34% but confidence intervals ranged from 20% to 46% decrease.
10. Has sustainability of effect been assessed?	No – reports of sustained effect beyond 2 years are lacking
11. Have methodological limitations and conflicts of interest been assessed?	While many studies have discussed limitations, conflicts of interest statements have been lacking.
12. Is publication bias likely?	Probably not - systematic review of prospective studies concluded no evidence of publication bias.[5]

*Additional supporting references available on request from authors