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Why should we walk, not run?
- While an idea may have surface validity and appear intuitively obvious,
  - Non-independent processes and incorrect initial decisions can lead to negative information cascades resulting in an incorrect decision being propagated.
  - We risk in our “rush to judgment” expending resources and effort that does not result in real improvement in patient safety and quality of care.
  - We also may forsake other strategies that work as well or better potentially with less costs.

Is this happening with Rapid Response Systems?
- Therapies and interventions need to be independently and critically evaluated before they are made the standard of care.
- Rapid Response Systems are well on their way to being viewed as the standard of care.
- But do we have enough evidence to make this leap?

Evidence Based Practice
- While RRSs seem to make intuitive sense, we must ask;
  - Is there adequate evidence of their effectiveness?
  - What are the costs?
  - Are they the best alternative?

How do we measure their effectiveness?
- Outcomes of Interest
  - Hospital mortality
  - Cardio-respiratory arrest
  - Unanticipated ICU admission
  - Length of Stay (ICU/Hospital)
  - Are these all that matters?

Review of the evidence.
- We will restrict ourselves to published studies that have examined the impact of RRSs on these outcomes in comparison to appropriate controls.
Descriptive Review of the Evidence.

- Effect on Hospital Mortality
  - 3 of 5 non-randomized studies individually found no statistically significant change.
  - 1 randomized study (2792 patients) found a significant improvement and 1 randomized study (125132 patients) found a no statistically significant change.

Pooled Analysis of Mortality.

- Non-randomized studies pooled OR=0.87 (95% CI=0.73-1.04)
- Randomized studies pooled OR=0.76 (95% CI=0.39-1.48)

Effect of RRSs on hospital mortality: non-randomized studies

- Non-randomized studies pooled OR=0.70 (95% CI=0.56-0.92) in favor of the RRS intervention.
- Randomized studies: only one study reporting OR=0.94 (95% CI=0.79-1.13) in favor of RRS intervention.
Effect of RRSs on arrests: non-randomized studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Risk ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buist (2003)</td>
<td>0.84 (0.82, 1.82)</td>
</tr>
<tr>
<td>Bristow (2000)</td>
<td>0.60 (0.40, 0.80)</td>
</tr>
<tr>
<td>Bellomo-04 (2004)</td>
<td>0.73 (0.60, 0.89)</td>
</tr>
<tr>
<td>Overall (95% CI)</td>
<td>0.79 (0.64, 0.90)</td>
</tr>
</tbody>
</table>

Descriptive Review of the Evidence.

- Effect on Unanticipated ICU Admission
  - 2 of 3 non-randomized studies reported statistically significant reductions.
  - One non-randomized study reported a statistically significant increase.
  - 1 randomized study found a no significant change in unanticipated ICU admission.

Pooled Analysis of Unanticipated ICU Admissions.

- Non-randomized studies pooled OR=0.78 (95% CI=0.46-1.32)
- Randomized studies: Only one study where the OR was 1.04 (95% CI=0.89-1.21)

Summary of pooled analysis

- All outcomes subject to pooled analysis have point estimates in favor of the Rapid Response System intervention.
- Only for the outcome of cardio-respiratory arrest in the non-randomized studies was this result statistically significant.
Summary of pooled analysis

- Pooled analysis of randomized studies was limited to one outcome (mortality) due to lack of data.
- The one randomized study examining cardio-respiratory arrest found a non-significant benefit.

More Recent Data?

- 

How can we interpret these results?

- Overall, there is weak to moderate evidence that RRSs are associated with reductions in hospital mortality and cardio-respiratory arrest rates.
- The impact on unanticipated ICU admission is more limited and heterogeneous.

How can we interpret these results?

- The evidence for RRSs reducing the incidence of cardio-respiratory arrest was the strongest result with a statistically significant impact in the non-randomized studies and a non-significant impact in the one randomized study evaluating this outcome.

How can we interpret these results?

- Pro
  - Despite some non-significant confidence intervals, all point estimates of the odds ratios are in favor of Rapid Response Systems.
  - General ward patients are being failed by our current systems.
  - Our patients don’t have time to wait to if this is the best alternative.
  - The evidence is good enough.
How can we interpret these results?

- **Con**
  - The data is insufficient to draw conclusions
  - Too few studies, too few patients
  - Too few studies using randomization in their methodology
  - Not all studies look at all outcomes
  - Heterogeneity
  - The largest randomized one found no significant changes
  - (the “Best” study?)
  - RRSs have costs that require stronger evidence before we adopt them as the standard of care.

What are the Costs?

- There is very limited published data on costs
- Human resources
  - “robbing Peter to pay Paul”
- Financial
  - Covering the FTE’s
  - Generating revenue

Additionally,

- Systems and teams are heterogeneous.
- RRTs vs METs, team composition, team strategy, alert scores vs alert criteria, education and training are all issues that have not been well addressed.
- The weak to moderate results in favor of RRSs may be a reflection of this state.

Finally,

- Are we examining the wrong outcomes?
- Are there better measures and tools for evaluating patient safety and quality interventions.
- Are death and cardiac arrest the best measures for systems and patient safety and quality improvement?

Finally,

- Are there process or other measures that are appropriate for evaluation of RRSs?
- How do RRSs compare to other strategies for improving general ward patient safety and quality of care?
  - Hospitalists
  - Improved nursing to patient ratios
  - Other strategies?