



## Tele-ICU leads to overall reduction in ICU mortality



A new systematic review and meta-analysis has found that implementation of tele-ICU services was associated with an overall reduction in ICU mortality. Furthermore, in subgroup analysis, the pooled odds ratio for ICU mortality suggests a significant benefit in publications with high baseline observed to predicted (O/P) mortality ratios but not with low baseline O/P mortality ratios.

This review and meta-analysis included 13 trials which looked at the effect of tele-ICU implementation on ICU mortality. The review team, consisting of researchers from Westchester Medical Center in Valhalla, NY, abstracted study characteristics, patient characteristics, severity of illness scores, and ICU mortality rates.

The before-after tele-ICU implementation pooled odds ratio for overall ICU mortality was 0.75 (95% CI, 0.65–0.88;  $p < 0.001$ ). In subgroup analysis, the pooled odds ratio for ICU mortality between the greater than 1 versus less than 1 observed to predicted mortality ratios was 0.64 (95% CI, 0.52–0.77;  $p < 0.001$ ) and 0.98 (95% CI, 0.81–1.18;  $p = 0.81$ ), respectively. Test for interaction was significant ( $p = 0.002$ ).

These findings, according to the review team, suggest that baseline O/P mortality ratio might be helpful in predicting degree of ICU mortality change after implementation of tele-ICU services. Future studies should be directed at confirming these findings with standardised mortality ratios (SMRs) of patient-level data, the reviewers added.

Past studies have examined numerous components of tele-ICU care to decipher which elements increase patient and institutional benefit. These factors include review of the patient chart within 1 hour, frequent collaborative data reviews, mechanisms for rapid laboratory/alert review, and interdisciplinary rounds. Also, based on previous meta-analyses, tele-ICU care could lead to overall improvement in ICU mortality; however, subgroup analyses found few differences.

A core function of tele-ICU is to standardise ICU processes while compiling performance data. Individual ICU performance can then be compared with prediction models. An observed to predicted (O/P) mortality ratio or standardised mortality ratio (SMR) is useful in determining how well an individual ICU is performing with respect to ICU mortality relative to peers. If the ratio is less than one, ICU mortality is better than would be predicted whereas the opposite is true for ratios greater than one.

Reasons why tele-ICU might be associated with improved ICU mortality in ICUs with high baseline O/P mortality ratios are not exactly known but likely multifactorial, according to the review team. Study ICUs realising benefit may have done so through tele-ICU mediated process improvement, care standardisation, increased nursing

support, or access to physicians. It is possible that studies without benefit were already highly effective ICUs, resulting in a low baseline O/P mortality ratio which may have reduced the likelihood of further mortality reduction.

Although having a low baseline O/P mortality ratio does not necessarily preclude a population from realising a significant benefit after tele-ICU implementation, opportunities for improvement may be fewer, the review team noted. "We suspect that the ICU mortality benefit may wane on a continuum as baseline SMRs decrease towards zero and, alternatively, increase as SMRs rise," the team wrote.

Source: [Critical Care Medicine](#)

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