

## In Search of the Holy Grail of Respiratory Care

The holy grail of health care—that which we universally seek as caregivers—is ideal care. Ideal care might be defined as care that is both efficacious and affordable and that is administered to the right patient at the right time.<sup>1-3</sup> As in *Goldilocks and the Three Bears* where the porridge is ideally neither too hot nor too cold, but just right, ideal care is neither overallocated (ie, care administered to patients not needing it or unlikely to benefit from it) nor underallocated (ie, efficacious care not given to patients both needing and likely to benefit from it). Allocation should be just right, the right treatment to the right patient at the right time.<sup>4</sup>

The need and pursuit of ideal care overlay the triple aim challenge that we face in health care today, how to provide widespread access, offer uniformly high-quality care, and how to make care affordable,<sup>4</sup> all of which have been perennial challenges in the United States, now exacerbated by the COVID-19 pandemic. The pursuit of ideal care also underpins the current intense focus on personalized medicine, or precision medicine,<sup>5</sup> which is all about characterizing those individual features of the patient that help inform and recommend the specific, ideal treatment for that patient. As an example, think of the approach to treating breast cancer and lung cancer that have been revolutionized by the molecular characterization of the tumor to define ideal treatment regimens.

What does ideal care look like in respiratory care? The pursuit of ideal allocation and of ideal care in respiratory care is both decades old and thankfully active and ongoing today. The cost of respiratory care goes to the need for skilled respiratory therapists (RTs) to administer expert care, compounding the cost of the necessary equipment (eg, ventilators, noninvasive ventilation devices, nebulizers). One long-standing example of pursuing ideal respiratory care is the assembly and dissemination of clinical practice guidelines that are based on the best available evidence and that also help to identify gaps in knowledge to frame key questions for further study.<sup>6</sup> Another example has been the development of respiratory care or RT-driven protocols,<sup>7-11</sup> pioneered by Judy Tietsort and George Burton in the 1990s<sup>7</sup> and then refined and studied by several other

groups,<sup>9-11</sup> including in 2 randomized controlled trials<sup>9,10</sup> that concordantly support the efficacy of respiratory care

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protocols in enhancing the allocation of care with an associated lower cost of care (Table 1).

The current study in this issue of *RESPIRATORY CARE* by Vines et al<sup>12</sup> continues this pursuit of the holy grail of respiratory care by exploring a tool to customize respiratory care, the so-called respiratory assessment and allocation of therapy (RAAT) tool, in ICU patients that is intended to minimize adverse outcomes. More specifically, these investigators propose to “assess the reliability and validity of the RAAT scoring tool and determine if the allocation of respiratory procedures based on RAAT scores in non-intubated ICU patients was effective.” The RAAT tool assesses 5 respiratory-related clinical findings (respiratory distress, chest x-ray findings, need for supplemental oxygen therapy, secretion clearance, and vital capacity), grading each as 0, 5, or 10 to a maximal RAAT score of 50. Pilot experience with RAAT was reportedly based on a cohort of 149 medical and surgical ICU subjects scored on the development of hospital-acquired pneumonia (HAP) or the need for positive-pressure ventilation (PPV); these findings were described in abstract form only.

The primary outcome measures in the current observational study<sup>12</sup> were HAP and the need for PPV that were retrospectively extracted from the electronic medical records of 585 surgical ICU patients. The authors constructed locally sanctioned protocols to link RAAT scores to indications for respiratory care procedures (lung expansion, airway clearance, and oxygen therapy), which were administered by RTs trained in the local protocols. Statistical resampling techniques were used to construct receiver operating characteristic curves to assess the diagnostic performance of the RAAT score in predicting the need for PPV; the area under the curve was 0.841, and the sensitivity and specificity of the RAAT score using cutoffs of  $\leq 5$  to indicate freedom from PPV and  $\geq 10$  to predict the need for PPV were 0.833 and 0.761, respectively. Additional observational analyses assessed the allocation of respiratory therapies based on the RAAT scores (as linked to the locally developed protocols)

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The author has disclosed no conflicts of interest.

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Table 1. Summary of Available Randomized Controlled Trials of Respiratory Care Protocol Programs

Author (Year)	Study Design	Subjects Studied, <i>N</i>	Findings
Stoller et al <sup>10</sup> (1998)	Randomized controlled trial	145	Respiratory Therapy Consult Service was associated with enhanced allocation of respiratory care services, lower actual costs, and no adverse effects.
Kollef et al <sup>9</sup> (2000)	Quasi-randomized controlled trial	694	Respiratory therapist-initiated treatment protocols were associated with fewer orders discordant with guidelines and with lower charges.

and showed that serial RAAT scores and vital capacity nominally improved over time in subjects receiving the RAAT-associated care protocols. Finally, in subjects needing PPV, serial RAAT scores widened significantly more than in subjects not needing PPV.

Taken together, the study offers a useful observational experience regarding protocol-administered care using a novel respiratory care triage tool. RAAT is, of course, a newly introduced instrument, though the pursuit of a useful triage tool by which to allocate respiratory care is time-honored.<sup>13,14</sup> As with earlier studies implementing RT protocols or respiratory care consult services,<sup>9,10</sup> the RAAT tool, its linked protocols, and the RT training to assure standard scoring and allocation of respiratory care using the RAAT score offer benefits of enhancing the uniformity of respiratory care delivery. As with respiratory care protocol programs in general, the RAAT tool offers an important common language by which respiratory care can be allocated, escalated, or de-escalated as appropriate.

In the context of these contributions, the corollary question is how does this study advance the pursuit of the holy grail of ideal respiratory care? Certainly in the observations of these subjects in this single-hospital care for this group of highly competent RAAT-trained RTs, the RAAT program (ie, the RAAT tool and its linked protocols) for administering care showed great promise. At the same time, like all good studies, these findings pose opportunities and invite further questions. First, as the authors point out, the study reports a single-center experience, prompting the question whether these findings generalize to other settings with other patients in other hospitals cared for by other RTs. Generalizability and replicability of results are the cornerstones of robustness in science, so the study naturally invites further studies of RAAT and the linked protocols in other populations in other hospitals. Yet to be determined, of course, the replication of these results in others' hands will strengthen the findings reported in the current paper.

More importantly, as was undertaken in prior randomized controlled trials<sup>9,10</sup> of respiratory care protocols (Table 1), confirmation of the effectiveness of the RAAT program also requires a randomized controlled trial. Such a trial would compare outcomes in subjects randomly allocated to

either the RAAT program or to otherwise usual, best respiratory care practice. Of course, an architecturally sound randomized trial that is free from confounding biases would be required. One of the challenges of such a trial will be that many of the same respiratory care modalities will likely be deployed in the RAAT program as in the usual care control group, thereby potentially diluting any advantages conferred by the RAAT program (sometimes called contamination bias). Furthermore, with varying protocols now available, head-to-head trials comparing the efficacy of different protocol programs,<sup>9,10</sup> including RAAT, would be useful to help identify the preferred program(s). Given the head start and extensive experience with the RAAT program that its originators naturally enjoy, Vines et al are uniquely positioned to conduct such a trial, which would, if confirmatory of benefit, also greatly strengthen the authors' message in this paper.<sup>12</sup>

Like the real Holy Grail, achieving the holy grail in respiratory care is, by its very nature, daunting and elusive. Indeed, the Holy Grail has been elusive since the origins of the concept in 13th century tales of knighthood in King Arthur's reign. Later iterations of the search for the cup from which Christ was said to have drunk at the Last Supper have served to heighten the splendor, mystique, and value of its pursuit. Studies in pursuit of ideal care, much like that of Vines et al<sup>12</sup> here, underscore the challenges of identifying what ideal care is and demonstrating that care satisfies the criteria for being ideal. Demonstrating that respiratory care of any type is efficacious, affordable, and optimally allocated will require multiple studies in multiple settings by multiple investigators. Like so many others in pursuit of the holy grail, these authors are commended for undertaking the journey.

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