INTRODUCTION
In the context that health care is increasingly complex—both clinically and administratively—there is an emerging appreciation that great leadership, followership, and teamwork are critically important success elements. Indeed, greater attention is being paid to teamwork and collaboration in many health care arenas, e.g., in selecting and training of physicians, cultivating a leadership talent pipeline, and executing quality and patient safety initiatives. Furthermore, an emerging literature supports the association between good teamwork and collaboration and excellent clinical outcomes in health care. Because of this growing appreciation of the value of teamwork, increasing attention has been given to teambuilding methods in health care, including courses, activity-based programs, and high-fidelity simulation-based training activities. Also, to the extent that good teamwork requires leadership, leadership development has also become a priority for successful health care organizations. The current review presents the evidence that good teamwork is associated with superior clinical outcomes. We then review strategies for building teams in health care (including specifically in respiratory care), the competencies of effective health care leaders, and programs that have been initiated to develop these competencies.

Keywords: Teamwork, teambuilding, leadership

The context that health care is increasingly complex—both clinically and administratively—there is an emerging appreciation that great leadership, followership, and teamwork are critically important success elements. Indeed, greater attention is being paid to teamwork and collaboration in many health care arenas, e.g., in selecting and training of physicians, cultivating a leadership talent pipeline, and executing quality and patient safety initiatives. Furthermore, an emerging literature supports the association between good teamwork and collaboration and excellent clinical outcomes in health care. Because of this growing appreciation of the value of teamwork, increasing attention has been given to teambuilding methods in health care, including courses, activity-based programs, and high-fidelity simulation-based training activities. Also, to the extent that good teamwork requires leadership, leadership development has also become a priority for successful health care organizations. The current review presents the evidence that good teamwork is associated with superior clinical outcomes. We then review strategies for building teams in health care (including specifically in respiratory care), the competencies of effective health care leaders, and programs that have been initiated to develop these competencies.

Keywords: Teamwork, teambuilding, leadership

INTRODUCTION
In the face of the increasing clinical and administrative complexity of health care, superb teamwork and leadership are emerging as differentiating features of the best health care and the best health care facilities [1-3]. This paper addresses the issues of teamwork, teambuilding, and leadership in health care. Specifically, we first summarize the characteristics of effective teams and of teambuilding interventions. We then review the literature supporting the value of collaboration in health care and next review recent work regarding teamwork in respiratory care. Finally, we review the characteristics of effective leaders and the specific competencies that are needed to lead effectively in health care.

Characteristics of Effective Teams and of Teambuilding
In the context that teams form to accomplish tasks that cannot be executed as well (or at all) by individuals [4,5], a team has been defined as “a small number of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable” [4]. As summarized by Parker [5], effective teams have specific, discrete characteristics, including clarity of purpose, informality and participation, listening by members with civilized disagreement when it occurs, open communication, clarity of roles and assignments, shared leadership, style diversity, and a commitment to
assess its own performance. As a subset of effective teams, high-performing teams share a keen sense of purpose, have ambitious performance goals and a well-developed sense of mutual accountability, fluid and seamless hand-offs between members, and interchangeable but complementary skills [4]. In reviewing these characteristics of high-performing teams, obvious links to health care are evident. Health care teams aspire to the high goal of restoring the patient's health, have aligned accountability to the patient, must communicate well and execute transitions of care seamlessly, and, in the multidisciplinary environment of health care, clearly have complementary skills that must be coordinated in service of the patient's well-being.

In this context, as important as teamwork may be in many business sectors, teamwork is especially important in health care, where achieving excellent clinical outcomes calls upon the contributions of a variety of specialized individuals and/or services that must be aligned in their commitment to the patient's welfare. Given that physicians' selection and training may conspire against their showing natural or ample collaborative instincts [6-12], cultivating teamwork in health care may be both needed and challenging [1,2]. For example, as early as 1978, Weisbord [6] commented on the challenges of fostering collaboration in health care and opined why organizational development had not yet worked in health care. He stated, "Science-based professional work differs markedly from product-based work. Health professionals learn rigorous scientific discipline as the "content" of their training. The 'process' inculcates a value for autonomous decision-making, personal achievement, and the importance of improving their own performance, rather than that of any institution." More recent observers have confirmed this impression. For example, Gawande [11] commented that "Most medicine is delivered by teams of people, with the physician, in theory, the team captain. Yet, we don't train physicians how to lead teams or be team members. This should begin in medical school." Similarly, in the same 2010 volume of the Harvard Business Review, Lee [10] pointed out that "Working in teams does not come easily to physicians who still often see themselves as heroic lone healers. Nonetheless, developing teams is a key leadership function for health care providers of all types." Importantly, these recent observations establish the ability to form effective teams as a key leadership skill, which will be discussed in the final section of this paper. Finally, Mechanic [12] also espoused the need for collaboration in health care: "Medical care has increasingly become an activity dependent on team collaboration and well-organized systems of care... More than ever, medicine needs physicians who can collaborate with each other and with other professionals. ....There is increasing understanding that quality of care is embodied in systems as well as in the efforts of conscientious and well-motivated individuals and that improving quality is a collective challenge requiring collaboration."

**Approaches to Teambuilding in Health Care**

With these features in mind, teambuilding takes on special importance as an intervention to achieve successful health care. Many interventions to enhance teamwork are available and have been described [13-22], including courses addressing team skills [13], implementation of cockpit protocols from aviation experience [13,14], simulation exercises (including clinical simulation [16,17]), sports and activity-based programs [18,19], and tactics to enhance team accountability [18].

As an example of the impact of teambuilding courses, in a collaboration between the United States Department of Defense and the Agency for Health Care Research and Quality, Morey et al. [13] designed a course called TeamSTEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety) to promote communication and teamwork among emergency room personnel. Specific team dimensions that were addressed by the course included: 1) maintaining a team structure and climate, 2) applying problem-solving strategies, 3) communication, 4) executing plans while managing workload, and 5) improving team skills [13].

The course used a variety of teaching methods, including interactive learning, coaching, and practice sessions, to develop specific competencies: leadership, mutual support, situation monitoring, and communication. More specifically [15], leadership training regards training to plan, to problem solve, and to debrief after the action to enhance team performance. Situation monitoring training encourages ensuring a shared mental model for team members and continuous awareness of the actions of other team members. Training to provide mutual support regards fostering a climate in which help is both sought and easily available, feedback is given freely and with respect and a spirit of helpfulness, and in which conflict resolution techniques are used to resolve differences. Finally, communication training regards assuring that all team members are made aware of key developments, all members check back with one another to ensure the accurate conveyance of information, and handoffs of care are performed with care and attention.

Cockpit crew resource management techniques from aviation training have also been used to develop teamwork in health care with the goals to lessen errors and enhance quality [13]. The MedTeams program, a 5-module, 8-hour course which was developed to enhance emergency room team function and clinical outcomes, was developed based on cockpit crew resource management. Altogether, 48 specific teamwork behaviors were addressed by the program. In a controlled trial of the MedTeams program among nine emergency rooms teams (comprised of 684 physicians, nurses, and technicians), the six teams who underwent team training experienced enhanced outcomes of improved team behavior, fewer observed clinical errors (30.9% to 4.4%, p = 0.039), and an increased sense of institutional support. Also, in a recent study, Neily et al. [14] reported implementing a day-long, on-site teambuilding program for surgical teams in 74 of 108 included Veterans Administration Hospitals. Elements of the teambuilding program, which was based on crew resource management techniques [14], included: training to work as a team; challenging other team members on safety; conducting checklist-guided pre- and post-operative debriefings,
and enhancing communication. Benefits associated with implementing the teambuilding program included a decrease in surgical mortality compared with hospitals not receiving the teamwork intervention (i.e., by 18% vs. 7%, p = 0.01).

Sports and activity-based programs, such as ropes courses and other outdoor experiences (e.g., wilderness, rafting, etc.) have been a time-honored approach to teambuilding and have found application in health care [17,18]. For example, as part of a teambuilding retreat to develop skills and camaraderie among rising junior residents in Internal Medicine at the Cleveland Clinic, a day-long retreat included an organized softball game as part of the program [17]. Also, at the University of Washington, a professional development program to cultivate academic leaders included a team rowing activity as a way of demonstrating the tangible value of well-coordinated, team-based activity [18].

Simulation activities have also been used to enhance teamwork in health care. For example, Stoller et al. described use of a simulated emergency scenario (e.g., Subarctic Survival, Human Synergistics, Detroit, Michigan) during a retreat of rising junior residents in an Internal Medicine training program to enhance their teamwork and leadership skills [17]. Also, clinical simulation using high-fidelity mannequins in simulation centers has been used to enhance clinical performance of teams, e.g., during cardiopulmonary resuscitation [16].

Finally, in the specific context of respiratory care, Stoller et al. [19] observed that instituting a business review process among four disparate respiratory therapy groups was associated with enhanced teamwork. Convening the four groups to review progress toward specific, mutually agreed upon targets had the favorable, albeit slightly unexpected effect, of enhanced sharing and collaboration among the groups. Evident benefits of the enhanced collaboration included greater sharing of resources, more personnel sharing (e.g., cross-staffing), and enhanced performance for all groups individually and collectively.

Taken together, the aforementioned body of research and experience supports the value of teambuilding in health care as an important strategy to enhance clinical and organizational performance.

**Evidence that Collaboration Enhances Outcomes in Health Care**

Going beyond methods of teambuilding in health care, an emerging literature focuses on evidence that teamwork and collaboration can enhance outcomes in health care. Though the issue is incompletely studied, the weight of evidence, as summarized in Table 1, supports the benefits of good teamwork.

In an early study, Knaus et al. [20] assessed ICU processes and actual vs. expected mortality rates in 13 different intensive care units (ICUs). The ICU with the best actual/expected mortality ratio (0.59) was characterized by excellent teamwork among the physicians and nurses, with carefully designed protocols and excellent, ongoing communication between the physicians and nurses. In contrast, the ICU with the worst mortality ratio (1.58) was characterized by poor teamwork, e.g., with poor physician-nurse communication and no policy for routine discussion of patient treatment. Though not establishing causality, these results are consistent with the notion that good teamwork enhances survival in the ICU.

Collaborative interaction has also been shown to enhance the accurate interpretation of diagnostic tests. For example, in a study of individual vs. joint viewing and interpretation of computed tomographic (CT) images of the chest, O’Donovan et al. [21] assessed the diagnostic accuracy of a pulmonologist and chest radiologist when they tried to differentiate between rounded atelectasis vs. look-alike neoplasms. Based on an analysis of the area under the ROC (receiver operating characteristic) curves, correct identification of rounded atelectasis was more likely when the two observers read the films together rather than when each read the films individually (AUC 0.95 [together] vs. 0.91 and 0.74 [read separately by the individuals]). These results support the value of close teamwork in interpreting CT scans.

Furthermore, in an ICU intervention study in which outcomes were assessed before vs. after a teamwork intervention, Clemmer et al. [22] implemented a joint program with physicians and nurses to foster cooperation. The program focused on developing a shared purpose among the health care providers, creating an open and safe environment for disagreement, inclusion and encouragement of diverse views, effective negotiation, and fairness as a guiding principle in applying rules. Resultant improvements in practice were associated with a 30% reduction in the costs of ICU care and a 19% reduction in total hospital costs for ICU patients.

In what is, to our knowledge, the only randomized controlled trial that regards teamwork in health care, Hunziker et al. [16] used simulation technology to compare the impact of developing “preformed” teams on the performance of cardiopulmonary resuscitation (CPR) vs. having teams form in the moment at the time of the code (called “ad hoc” teams). Preformed teams had significantly more time actually performing CPR during the first 3 minutes of resuscitation (mean 124 vs. 93 seconds, p < 0.0001) and initiated the first defibrillation sooner than did ad hoc teams (at mean 67 vs. 107 seconds, p < 0.00001), supporting the value of building and sustaining teams in emergency care.

In another controlled trial of teambuilding, Neily et al. [14] reported that a teambuilding intervention for surgical teams in Veterans Administration hospitals was associated with a greater decrease in surgical mortality than that observed for surgical teams not receiving the intervention (18% vs. 7% decrease, p = 0.01). Furthermore, the magnitude of decrease in surgical mortality was strongly associated with the number of quarters over which the teambuilding program was associated.

Finally, Pisano et al. [23] showed that good teamwork was associated with enhanced surgical outcomes in the acquisition of new cardiac surgical skills. Specifically, in a prospective longitudinal study of 16 cardiac surgical teams...
newly learning minimally invasive cardiac surgery [23], the teams were observed to acquire speed and facility in the procedure at different rates. Those teams which performed the procedure most quickly after 40 consecutive cases demonstrated more attention to teamwork than those teams that were slower after 40 cases. Specifically, in the ultimately faster teams, the surgeon hand-picked the team and emphasized the importance of team learning, and the teams met before and after the case to plan and debrief on the operation. In contrast, for the slower teams at the 40th case milestone, teams were picked by convenience and availability and no pre- or post-operative meetings were held. Also, in the teams which performed best after 40 cases, the teams insisted on staying intact for their early learning experience vs. more haphazard scheduling and no consistent staffing in slower teams. Overall, Pisano et al. suggested that the difference between high vs. low performing surgical teams relates to the increased emphasis given to teambuilding and to teamwork. Indeed, this observation endorses the current practice of having "team huddles" before surgical procedures to 1) assure clarity of purpose and 2) develop mutual understanding before undertaking the case, both important characteristics of successful teams.

Taken together, the available literature strongly supports the value of collaboration and teamwork among health care providers in effecting good clinical outcomes.

**Essential Leadership Competencies for Health Care**

Because one of the characteristics of an effective team is excellent and fluid leadership, a discussion of great teamwork invites consideration of developing leadership skills. Indeed, characteristics of great leadership have been the subject of extensive study and writing. As an example, in their book "The Leadership Challenge," Kouzes and Posner [24] suggest five leadership traits that are characterize great leaders and which are deemed essential features of great leaders. These features include:

- **"Challenging the process, i.e., by searching out challenging opportunities to change, grow, innovate, and improve, and experimenting, taking risks, and learning from the accompanying mistakes,"**
- **"Inspiring a shared vision, i.e., by envisioning an uplifting and ennobling future and enlisting others in a common vision by appealing to their values, interests, hopes, and dreams,**
- **"Enabling others to act, i.e., by fostering collaboration through promoting cooperative goals and building trust, and strengthening people by giving power away, providing choice, developing competence, assigning critical tasks, and offering visible support,**
- **"Modeling the way, i.e., by setting the example by behaving in ways that are consistent with shared values, and achieving small wins that promote consistent progress and build commitment, and**
- **"Encouraging the heart, i.e., by recognizing individual contributions to the success of every project, and by celebrating team accomplishments regularly."**

Going beyond the requisite features of great leaders in general, significant attention has been given to the specific competencies needed to be a great leader in health care [24-39]. In one recent synthesis of these essential competencies for health care leaders, Stoller [25] has proposed 6 domains and 17 sub-domains of leadership skills (Table 2). The major domains include emotional intelligence, knowledge and technical skills (e.g., of operations, finance and accounting, reimbursement strategies, quality assessment and management, etc.), problem-solving skills and change management expertise, communication (e.g., in change management, negotiation, and conflict resolution), and a commitment to lifelong learning.

In the gap between the need for great leadership in health care and the existing pipeline [6-11, 25, 26], there is a clear need and an opportunity to develop health care leaders. As evidence of the relevance of this issue, current trainees are aware of this gap as they seek to prepare themselves for their careers. For example, in a survey of 23 Baylor surgical residents [28], more than 75% reported a lack of knowledge of leadership theory and a deficiency in specific leadership skills (e.g., conflict resolution); over half reported at most average competence in other skills (e.g., challenging the status quo, inspiring others, helping others optimize performance, etc.). Based on this growing perceived need, increasing attention is being given to developing clinician-leaders by hospitals, academic institutions, and by various medical societies [27, 32-35, 38-40] Such programs include offerings by health care executive associations (e.g., the American College of Physician Executives, the American College of Healthcare Executives, the American Medical Group Association, and the Medical Group Management Association [30]), specialty societies, and health care organizations (e.g., the Cleveland Clinic [32, 40], the Mayo Clinic [27], the University of Kentucky [39], and the Medical College of Wisconsin [35]). For example, at the Cleveland Clinic, a health care leadership development program was launched in the mid-1990’s and has evolved into the current Cleveland Clinic Academy [32], which offers both cohort-based series and “a la carte” courses directed to health care providers in service of the institution’s commitment to develop a talent pipeline for its future leadership needs. The substantial growth and participation in the program has also prompted strategic partnerships with academic institutions to offer masters level training (e.g., Masters in Business Administration) to interested emerging leaders. The newest development is the offering of an executive education course called the Samson Global Leadership Academy for Health care Leadership [41] that is directed to visiting physicians, allied health providers, nurses, and health care administrators to enhance their leadership competencies.

In summary, substantial emerging evidence suggests that great teamwork and collaboration are associated with enhanced quality and outcomes in health care in general and specifically in respiratory care. In this context, successful health care organizations are now appropriately beginning to offer leadership development and teambuilding in order to cultivate a pipeline of effective health care leaders and to ensure excellent and sustainable quality.
TABLE 1  Studies Assessing the Impact of Teamwork and Communication in Healthcare

<table>
<thead>
<tr>
<th>Authors (Reference)</th>
<th>Publication Year</th>
<th>Main Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knaus et al. (20)</td>
<td>1986</td>
<td>Better than expected ICU survival was associated with enhanced communication and teamwork among ICU physicians and nurses.</td>
</tr>
<tr>
<td>O'Donovan PB et al. (21)</td>
<td>1997</td>
<td>Team reading of chest CT scans was associated with more accurate interpretation than individual readings by a chest radiologist and pulmonologist alone.</td>
</tr>
<tr>
<td>Morey JC et al. (13)</td>
<td>2002</td>
<td>Participation in a course on emergency team coordination was associated with a lower rate of observed errors in Emergency Room care, enhanced attitudes toward teamwork, and enhanced perceptions of institutional support.</td>
</tr>
<tr>
<td>Clemmer T et al. (22)</td>
<td>1998</td>
<td>A programmed intervention to foster cooperation among ICU providers was associated with preserved, excellent clinical outcomes, and enhanced financial performance of the ICU.</td>
</tr>
<tr>
<td>Hunziker et al. (16)</td>
<td>2009</td>
<td>In performing cardiopulmonary resuscitation, teambuilding before the code was associated with better resuscitation technique (more time actually performing resuscitation and sooner defibrillation).</td>
</tr>
<tr>
<td>Pisano GP et al. (23)</td>
<td>2001</td>
<td>In a study of surgical teams in 16 different hospitals, enhanced collaborative, teambuilding behaviors were associated with shorter surgical times in performing minimally invasive cardiac surgery.</td>
</tr>
<tr>
<td>Neily J et al. (14)</td>
<td>2010</td>
<td>Implementation of a crew resource management-based team training program for surgical teams was associated with decreased surgical mortality (by 18%, p = 0.01).</td>
</tr>
</tbody>
</table>

TABLE 2  Proposed Essential Competencies to Lead in Health Care

<table>
<thead>
<tr>
<th>Domain (The Effective Healthcare Leader Must Have…)</th>
<th>Subdomains</th>
</tr>
</thead>
</table>
| 1. Technical knowledge and skills                  | a. Operations  
b. Finance and accounting  
c. Information technology and systems  
d. Human resources, including diversity  
e. Strategic planning  
f. Public policy  
g. Legal issues |
| 2. Knowledge of health care                         | a. Reimbursement strategies  
b. Legislation and regulation  
c. Quality assessment and management |
| 3. Problem-solving skills                           | a. Organizational strategy  
b. Project management |
| 4. Emotional intelligence                           |            |
| 5. Communication                                    | a. Leading change  
b. Negotiation  
c. Conflict resolution |
| 6. Commitment to lifelong learning                  |            |

From Reference 25, with permission from author
REFERENCES

11. Gawande A. Harvard Business Review 2010 (April);
35. Kochar MS, Robertson RG, Mone MA. A faculty leadership development program at the Medical College of Wisconsin. WMJ 2003; 102: 24-28.