Team Performance for Patient Safety

A Bibliography

Baker DP, Day R, and Salas E. Teamwork as an essential component of high-reliability organizations. **Hum Res Dev Rev**. 2005, Sep;4(3):305-34.
The purpose of this article is to present the best practices of cross-cultural training (CCT) in terms of what organizations are doing and what they should be doing. In presenting the best practices, the following questions will be investigated: (a) why is CCT an important research domain, (b) what is the general purpose of CCT, (c) how is CCT designed and delivered, (d) which CCT strategies are organizations currently implementing, (e) what guidelines can be offered to organizations offering CCT, and (f) what additional research is needed. This article contributes to existing CCT research by providing a condensed set of guidelines instructing organizations on the techniques necessary for maximizing the benefits of CCT.

Buljac-Samardzic M, Dekker-van Doorn CM, van Wijngaarden JD, et al. Interventions to improve team effectiveness: a systematic review. **Health Policy.** 2010 Mar;94(3):183-95.
OBJECTIVES: To review the literature on interventions to improve team effectiveness and identify their 'evidence based'-level. METHODS: Major data bases (PubMed, Web of Science, PsycInfo and Cochrane Library) were systematically searched for all relevant papers. Inclusion criteria were: peer-reviewed papers, published in English between January 1990 and April 2008, which present empirically based studies focusing on interventions to improve team effectiveness in health care. A data abstraction form was developed to summarize each paper. The Grading of Recommendations, Assessment, Development, and Evaluation Scale was used to assess the level of empirical evidence. RESULTS: Forty-eight papers were included in this review. Three categories of interventions were identified: training, tools, and organisational interventions. Target groups were mostly multidisciplinary teams in acute care. The majority of the studies found a positive association between the intervention and non-technical team skills. Most articles presented research with a low level of evidence. Positive results in combination with a moderate or high level of evidence were found for some specific interventions: Simulation training, Crew Resource Management training, Team-based training and projects on Continuous quality improvement. CONCLUSIONS: There are only some studies available with high quality evidence on interventions to improve team effectiveness. These studies show that team training can improve the effectiveness of multidisciplinary teams in acute (hospital) care.

Cannon-Bowers, JA, Tannenbaum ES, and Volpe, CE. Defining competencies and establishing team training requirements, in Team effectiveness and decision-making in organizations. R. A. Guzzo, E. Salas, editors. San Francisco: Jossey-Bass, 1995, p. 333.

Clancy CM. TeamSTEPPS: optimizing teamwork in the perioperative setting. **AORN J.** 2007 Jul;86(1):18-22.

Clancy CM and Tornberg DN. TeamSTEPPS: assuring optimal teamwork in clinical settings. **Am J Med Qual.** 2007, May-Jun;2293):214-7.

Clark PR. Teamwork: building healthier workplaces and providing safer patient care. **Crit Care Nurs Q.** 2009 Jul-Sep;32(3):221-31.
A changing healthcare landscape requires nurses to care for more patients with higher acuity during their shift than ever before. These more austere working conditions are leading to increased burnout. In addition, patient safety is not of the quality or level that is required. To build healthier workplaces where safe care is provided, formal teamwork training is recommended. Formal teamwork training programs, such as that provided by the MedTeams group, TeamSTEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety), or participatory action research programs such as the Healthy Workplace intervention, have

decreased errors in the workplace, increased nurse satisfaction and retention rates, and decreased staff turnover. This article includes necessary determinants of teamwork, brief overviews of team-building programs, and examples of research programs that demonstrate how teamwork brings about healthier workplaces that are safer for patients. Teamwork programs can bring about these positive results when implemented and supported by the hospital system.

Ferguson SL. TeamSTEPPS: integrating teamwork principles into adult health/medical-surgical practice. *MedSurg Nurs.* 2008 Apr;17(2):122-5.

Gillespie B and Chaboyer W. Shared mental models enhance team performance. *Nurs Crit Care* 2009, Sep-Oct;14(5):222-3.

Klimoski R and Mohammed S. Team mental model: construct or metaphor? *J Manage*. 1994;20(2):403-37.
There has been a recent resurgence of interest in group cognition in the field of organizational science. However, despite the apparent enthusiasm for the notion of the group mind in some modern guise, important conceptual work is needed to examine the concept critically. We attempt to do this in our treatment of the content, form, function, antecedents, and consequences of team mental models. In addition, we illustrate how the construct can bring explanatory power to theories of team performance and offer other implications for research and practice.

Legare F, Ratte S, Gravel K, et al. Barriers and facilitators to implementing shared decision-making in clinical practice: update of a systematic review of health professionals' perceptions. *Patient Educ Couns*. 2008 Dec;73(3):526-35.
OBJECTIVE: To update a systematic review on the barriers and facilitators to implementing shared decision-making in clinical practice as perceived by health professionals. METHODS: From March to December 2006, PubMed, Embase, CINHAL, PsycINFO, and Dissertation Abstracts were searched. Studies were included if they reported on health professionals' perceived barriers and facilitators to implementing shared decision-making in practice. Quality of the included studies was assessed. Content analysis was performed with a pre-established taxonomy. RESULTS: Out of 1130 titles, 10 new eligible studies were identified for a total of 38 included studies compared to 28 in the previous version. The vast majority of participants (n=3231) were physicians (89%). The three most often reported barriers were: time constraints (22/38) and lack of applicability due to patient characteristics (18/38) and the clinical situation (16/38). The three most often reported facilitators were: provider motivation (23/38) and positive impact on the clinical process (16/38) and patient outcomes (16/38). CONCLUSION: This systematic review update confirms the results of the original review. PRACTICE IMPLICATIONS: Interventions to foster implementation of shared decision-making in clinical practice will need to address a range of factors.

Mathieu JE, Heffner TS, Goodwin GF, et al. The influence of shared mental models on team process and performance. *J Appl Psychol*. 2000 Apr;85(2):273-83.
The influence of teammates' shared mental models on team processes and performance was tested using 56 undergraduate dyads who "flew" a series of missions on a personal-computer-based flight-combat simulation. The authors both conceptually and empirically distinguished between teammates' task- and team-based mental models and indexed their convergence or "sharedness" using individually completed paired-comparisons matrices analyzed using a network-based algorithm. The results illustrated that both shared-team- and task-based mental models related positively to subsequent team process and performance. Furthermore, team processes fully mediated the relationship between mental model convergence and team effectiveness. Results are discussed in terms of the role of shared cognitions in team effectiveness and the applicability of different interventions designed to achieve such convergence.

Rosen MA, Salas E, Wu TS, et al. Promoting teamwork: an event-based approach to simulation-based teamwork training for emergency medicine residents. ***Acad Emerg Med.*** 2008 Nov;15(11):1190-8.
The growing complexity of patient care requires that emergency physicians (EPs) master not only knowledge and procedural skills, but also the ability to effectively communicate with patients and other care providers and to coordinate patient care activities. EPs must become good team players, and consequently an emergency medicine (EM) residency program must systematically train these skills. However, because teamwork-related competencies are relatively new considerations in health care, there is a gap in the methods available to accomplish this goal. This article outlines how teamwork training for residents can be accomplished by employing simulation-based training (SBT) techniques and contributes tools and strategies for designing structured learning experiences and measurement tools that are explicitly linked to targeted teamwork competencies and learning objectives. An event-based method is described and illustrative examples of scenario design and measurement tools are provided.

Salas E, Burke CS, and Stagl KC. Developing teams and team leaders: strategies and principles, in Leader Development for Transforming Organizations, R. G. Demaree, S. J. Zaccaro, and S. M. Halpin, editors. Mahwah, NJ: Lawrence Erlbaum Associates, 2004.

Salas E, Cooke NJ, and Rosen MA. On teams, teamwork, and team performance: discoveries and developments. ***Hum Factors***. 2008 Jun;53(3):540-7.
OBJECTIVE: We highlight some of the key discoveries and developments in the area of team performance over the past 50 years, especially as reflected in the pages of Human Factors. BACKGROUND: Teams increasingly have become a way of life in many organizations, and research has kept up with the pace. METHOD: We have characterized progress in the field in terms of eight discoveries and five challenges. RESULTS: Discoveries pertain to the importance of shared cognition, the measurement of shared cognition, advances in team training, the use of synthetic task environments for research, factors influencing team effectiveness, models of team effectiveness, a multidisciplinary perspective, and training and technological interventions designed to improve team effectiveness. Challenges that are faced in the coming decades include an increased emphasis on team cognition; reconfigurable, adaptive teams; multicultural influences; and the need for naturalistic study and better measurement. CONCLUSION: Work in human factors has contributed significantly to the science and practice of teams, teamwork, and team performance. Future work must keep pace with the increasing use of teams in organizations. APPLICATION: The science of teams contributes to team effectiveness in the same way that the science of individual performance contributes to individual effectiveness.

Salas, E., DiazGranados, D., Klein, C., et al. Does team training improve team performance? A meta-analysis. ***Hum Factors.*** 2008 Dec;50(6); 903-33.
OBJECTIVE: This research effort leveraged the science of training to guide a taxonomic integration and a series of meta-analyses to gauge the effectiveness and boundary conditions of team training interventions for enhancing team outcomes. BACKGROUND: Disparate effect sizes across primary studies have made it difficult to determine the true strength of the relationships between team training techniques and team outcomes. METHOD: Several meta-analytic integrations were conducted to examine the relationships between team training interventions and team functioning. Specifically, we assessed the relative effectiveness of these interventions on team cognitive, affective, process, and performance outcomes. Training content, team membership stability, and team size were investigated as potential moderators of the relationship between team training and outcomes. In total, the database consisted of 93 effect sizes representing 2650 teams. RESULTS: The results suggested that moderate, positive relationships exist between team training interventions and each of the outcome types. The findings of moderator analyses indicated that training content, team membership stability, and team size moderate the effectiveness of these interventions. CONCLUSION: Our findings suggest that team training interventions are a viable approach organizations can take in order to enhance team outcomes. They are useful for improving cognitive outcomes, affective outcomes, teamwork processes, and performance outcomes. Moreover, results suggest that training content, team

membership stability, and team size moderate the effectiveness of team training interventions. APPLICATION: Applications of the results from this research are numerous. Those who design and administer training can benefit from these findings in order to improve the effectiveness of their team training interventions.

Salas E, DiazGranados D, Weaver SJ, King H. Does team training improve team performance? A meta-analysis. *Acad Emerg Med.* 2008 Nov;15(11):1002-9.
Teamwork is integral to a working environment conducive to patient safety and care. Team training is one methodology designed to equip team members with the competencies necessary for optimizing teamwork. There is evidence of team training's effectiveness in highly complex and dynamic work environments, such as aviation and health care. However, most quantitative evaluations of training do not offer any insight into the actual reasons why, how, and when team training is effective. To address this gap in understanding, and to provide guidance for members of the health care community interested in implementing team training programs, this article presents both quantitative results and a specific qualitative review and content analysis of team training implemented in health care. Based on this review, we offer eight evidence-based principles for effective planning, implementation, and evaluation of team training programs specific to health care.

Salas E, Wilson KA, Murphy CE, et al. Communicating, coordinating and cooperating when life of others depends on it: tips for teamwork. *Jt Comm J Qual Patient Saf.* 2008 Jun;34(6):333-41.
BACKGROUND: In health care, others' lives depend on the team operating at a level beyond the sum of its individual parts. A framework (a heuristic) represents a three-pronged approach to teamwork in health care that entails communication, coordination, and cooperation. These fundamental requirements of teamwork represent the constant interaction that team members undertake to become an effective team. Guidelines, tips, and examples show how the framework can be applied to establishing and enabling teams to provide safe, reliable care. GUIDELINES: The guidelines are as follows: (1) Support precise and accurate communication through a closed-loop communication protocol; (2) diagnose communication errors as you would any illness-- Examine the team and look for symptoms, then treat the symptoms through team learning and self-correction; (3) recognize functional expertise by identifying and publicizing topical experts to evenly distribute work load and increase accuracy; (4) institute frequent practice opportunities to keep team skills in good shape because poorly honed skills will limit performance; (5) refine the team's shared mental models (SMMs) by pre-planning to build its implicit coordination skills, adaptability, and flexibility; (6) shape adaptive expertise by fostering a deep understanding of the task to increase team effectiveness; (7) build team orientation by taking steps to increase trust and cohesion to lower stress levels and increase satisfaction, commitment, and collective efficacy; and (8) prepare the team by providing learning opportunities for new competencies that will expose members to feedback and increase the team's overall efficacy. CONCLUSION: Although not a comprehensive list, the guidelines and tips represent the most essential requirements for effective teamwork.

Stead K, Kumar S, Schultz, TJ, et al. Teams communicating through STEPPS. *Med J Aust.* 2009 Jun 1;190 (11 Suppl):S128-32.
OBJECTIVE: To evaluate the effectiveness of the implementation of a TeamSTEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety) program at an Australian mental health facility. DESIGN, SETTING AND PARTICIPANTS: TeamSTEPPS is an evidence-based teamwork training system developed in the United States. Five health care sites in South Australia implemented TeamSTEPPS using a train-the-trainer model over an 8-month intervention period commencing January 2008 and concluding September 2008. A team of senior clinical staff was formed at each site to drive the improvement process. Independent researchers used direct observation and questionnaire surveys to evaluate the effectiveness of the implementation in three outcome areas: observed team behaviours; staff attitudes and opinions; and clinical performance and outcome. The results reported here focus on one site, an inpatient mental health facility. MAIN OUTCOME MEASURES: Team knowledge, skills and attitudes; patient safety culture; incident reporting rates; seclusion rates; observation for the frequency of

use of TeamSTEPPS tools. RESULTS: Outcomes included restructuring of multidisciplinary meetings and the introduction of structured communication tools. The evaluation of patient safety culture and of staff knowledge, skills and attitudes (KSA) to teamwork and communication indicated a significant improvement in two dimensions of patient safety culture (frequency of event reporting, and organisational learning) and a 6.8% increase in the total KSA score. Clinical outcomes included reduced rates of seclusion. CONCLUSION: TeamSTEPPS implementation had a substantial impact on patient safety culture, teamwork and communication at an Australian mental health facility. It encouraged a culture of learning from patient safety incidents and making continuous improvements.

Riesenberg LA, Leitzsch J, Massucci JL, et al. Residents' and attending physicians' handoffs: a systematic review of the literature. *Acad Med*. 2009 Dec;84(12):1775-87.
PURPOSE: Effective communication is central to patient safety. There is abundant evidence of negative consequences of poor communication and inadequate handoffs. The purpose of the current study was to conduct a systematic review of articles focused on physicians' handoffs, conduct a qualitative review of barriers and strategies, and identify features of structured handoffs that have been effective. METHOD: The authors conducted a thorough, systematic review of English-language articles, indexed in PubMed, published between 1987 and June 2008, and focused on physicians' handoffs in the United States. The search strategy yielded 2,590 articles. After title review, 401 were obtained for further review by trained abstractors. RESULTS: Forty-six articles met inclusion criteria, 33 (71.7%) of which were published between 2005 and 2008. Content analysis yielded 91 handoffs barriers in eight major categories and 140 handoffs strategies in seven major categories. Eighteen articles involved research on handoffs. Quality assessment scores for research studies ranged from 1 to 13 (possible range 1-16). One third of the reviewed research studies obtained quality scores at or below 8, and only one achieved a score of 13. Only six studies included any measure of handoff effectiveness. CONCLUSIONS: Despite the negative consequences of inadequate physicians' handoffs, very little research has been done to identify best practices. Many of the existing peer-reviewed studies had design or reporting flaws. There is remarkable consistency in the anecdotally suggested strategies; however, there remains a paucity of evidence to support these strategies. Overall, there is a great need for high-quality handoff outcomes studies focused on systems factors, human performance, and the effectiveness of structured protocols and interventions. [References: 91]

Stout RJ, Cannon-Bowers JA, and Salas E. The role of shared mental models in developing team situational awareness: implications for team training. *Training Resource J*. 1996;2:85-116.

Weaver SJ, Rosen MA, DiazGranados D, et al. Does teamwork improve performance in the operating room? A multilevel evaluation. *Jt Comm J Qual Patient Saf.* 2010, Mar;36(3):133-42.
BACKGROUND: Medical care is a team effort, especially as patient cases are more complex. Communication, cooperation, and coordination are vital to effective care, especially in complex service lines such as the operating room (OR). Team training, specifically the TeamSTEPPS training program, has been touted as one methodology for optimizing teamwork among providers and increasing patient safety. Although such team-training programs have transformed the culture and outcomes of other dynamic, high-risk industries such as aviation and nuclear power, evidence of team training effectiveness in health care is still evolving. Although providers tend to react positively to many training programs, evidence that training contributes to important behavioral and patient safety outcomes is lacking. METHOD: A multilevel evaluation of the TeamSTEPPS training program was conducted within the OR service line with a control location. The evaluation was a mixed-model design with one between-groups factor (TeamSTEPPS training versus no training) and two within-groups factors (time period, team). The groups were located at separate campuses to minimize treatment diffusion. Trainee reactions, learning, behaviors in the OR, and proxy outcome measures such as the Hospital Survey on Patient Safety Culture (HSOPS) and Operating Room Management Attitudes Questionnaire (ORMAQ) were collected. RESULTS: All levels of evaluation demonstrated positive results. The trained group demonstrated significant increases in the quantity and quality of presurgical procedure briefings and the use of quality teamwork behaviors during cases. Increases were also found in

perceptions of patient safety culture and teamwork attitudes. DISCUSSION: The hospital system has integrated elements of TeamSTEPPS into orientation training provided to all incoming hospital employees, including nonclinical staff.