An Integrative Review Synthesizing Teamwork Competency Development in Nursing Education: How Should We be Teaching Nurses Teamwork?

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Abstract

Aims. To critically review educational research describing nursing teamwork competency development and to synthesize these findings in determining what teaching-learning components best promote the evolution of competent nursing teamwork.

Background. Since the Institute of Medicine (2000) recommended enhancing coordination and communication abilities of healthcare teams, many educational initiatives targeting teamwork competency development have surfaced. *Registered nursing teams* comprise the primary human resource structure for patient care delivery, and individually nurses are central figures within interprofessional healthcare teams. Nurses heavily influence overall team coordination and outcomes, yet little is known about the team training they receive, and furthermore what key educational components best enhance teamwork performance in nursing personnel.

Design. Whittemore and Knafll's revised integrative review framework guided all stages.

Data Sources. CINAHL, Web of Science, Academic Search Complete, and ERIC were searched, and detailed inclusion-exclusion criteria applied. Studies (n=19) published (2001–2014) were selected for review.

Review Methods. Studies were appraised using established qualitative-quantitative evaluation tools. A systematic iterative approach was used to extract and filter data used for drawing conclusions related to key educational components.

Results. Nursing teamwork epistemology is derived from High Reliability Teams (HRT) theory and Crew Resource Management (CRM) training sources. The most effective pedagogical approaches incorporate constructivist methods like high fidelity simulation and reflective discussion in order for students to acquire, practice, and refine these skills. Evaluating nursing teamwork competency is a complex task involving contextually based assessments of knowledge, skills, and attitudes.

Conclusion. Future nursing teamwork competency curriculum design should emphasize leadership and skilled communication knowledge as learned, practiced, and assessed in contextually relevant, practice-based constructivist teaching environments.

Keywords. Nursing, teamwork, competency, nursing education, constructivism, leadership, simulation, integrative review

An Integrative Review Synthesizing Teamwork Competency Development in Nursing Education: How Should We be Teaching Nurses Teamwork?

It is increasingly difficult to ignore the extent to which the performance of healthcare teams affects the quality of patient care. Researchers from the Institute of Medicine (IOM) sounded a global alarm regarding patient safety with claims that errors in healthcare institutions are killing almost 100,000 Americans every year (Corrigan, Kohn, & Donaldson, 2000). Canadian statistics fare no better, where an estimated 16,000 patient deaths result in hospitals annually because of preventable adverse events (Baker et al., 2004). Many point to human factors such as dysfunctional interpersonal relations and deficient teamwork as root causes of these errors (Brock et al., 2013; Curtis, Tzannes, & Rudge, 2011; Kilner & Sheppard, 2010; McConahuey, 2008; Oriol, 2006; Reid & Bromiley, 2012). Clearly there exists a problem with teamwork in the healthcare sector, and patients are suffering as a result.

Improving teamwork competency has been marked as an international priority in discussions regarding re-structuring of nursing care provision (CNA, 2012; IOM, 2010). *Nursing teams*, as small as two shift buddies covering breaks or as large as whole nursing units, comprise the primary human resource structure for patient care delivery in hospitals. Nurses claim the most frequent and lengthy point of care contact with patients, and increased staffing ratios alone have demonstrated significant reductions in hospital morbidity-mortality (Shekelle, 2013; Kane, Shamliyan, Mueller, Duval, & Wilt, 2007). However, it is short-sighted to think that quality care can result from increased staffing levels alone without considering the relational aspects required to effectively coordinate nursing care delivery. Hospital units where nursing teamwork is rated as strong demonstrate less missed nursing care (Kalisch & Lee, 2010), fewer patient falls (Kalisch, Curley, & Stefanov, 2007), and report higher quality of work life, impacting staff recruitment

and retention (Brunetto et al., 2013). Problems specific to nursing teams are also well documented. Horizontal violence and bullying run rampant in the profession, causing nurses already in short supply to leave the profession altogether (Weaver, 2013). Although the importance of competent teamwork is not isolated to nursing, improving teamwork competency amongst nurses could have great financial and quality care implications across the healthcare sector as a whole.

The purpose of this literature review is to survey educational research describing nursing competency-based teamwork development and to synthesize these findings to determine what teaching-learning practices best inform and translate effective teamwork into practice. I first define important terms before presenting the literature review and the main themes of my findings: nursing teamwork knowledge, pedagogy, and evaluation. In the discussion section that follows, I elaborate on subthemes that emerge from the main theme findings, further identifying scholarship influences that will best enhance competent teamwork in nurses.

Definitions of Terms and Philosophical Underpinnings

What is Teamwork?

Advocates of a team approach to healthcare recognize that varied perspectives and multiple skill sets are needed to effectively support the "full diversity of health needs biological, psychological, social, and spiritual which present themselves in clinical care" (Wright & Brajtman, 2008, p.21). Consensus in the literature (education, human resources, medicine, nursing, aviation, sports) indicates that teamwork in highly reliable organizations can be defined as *two or more individuals performing interdependent tasks, openly sharing knowledge, and coordinating efforts in order to focus collaborative decision making and planned interventions*

on common goals (Baker, Day, & Salas, 2006; Nancarrow et al., 2013). While it is important to appreciate the diversity individuals bring to a team, it is critical to recognize that competent teams collaborate and communicate to coordinate this diversity efficiently towards a common end, working collectively to achieve something bigger and better than can be accomplished in isolation.

Competency-Based Education

As fundamental as nursing teamwork is to healthcare, equally important is that there exists a competency-based framework to guide teaching, learning, and evaluating it. Calls for competency-based curricula are prominent in discussions on healthcare education reform (Cronenwett et al., 2007; Frank, 2010), given widening gaps between what nurses learn, know, and do and the expectations of patients, workplace stakeholders, and licensing bodies. The Quality and Safety Education for Nurses (QSEN) regulatory education panel has now earmarked *teamwork and collaboration competency* as a core requirement of undergraduate nursing education in the United States (Cronenwett et al., 2007); however, it provides little direction on teaching nurses teamwork from this competency base. Indeed, this lack of direction stems from varied and often disputed definitions of competency found in the education literature (Frank et al., 2010).

Given these gaps, inconsistent definitions, and the aims of this review, clear assumptions about nursing competency-based educational development must be made explicit. Frank et al. (2010) contend that competency-based education involves student centered teaching-learning and curricula that are designed with utilitarian based learning outcomes benefitting the greater good of society. Delegates from the Canadian Nursing Association (CNA, 2000) also claim that nursing competency is a collective rather than individual accountability for patients' best

interests. They contend that varied stakeholders are responsible for ensuring competency development in nurses and define it as the "ongoing ability of a nurse to integrate and apply the knowledge, skill, judgment, and personal attributes required to practice safely and ethically in a designated role and setting" (p. 1). Educators need to acknowledge these important philosophical-ethical assumptions about knowledge, program outcomes, context, and stakeholders involved because these values ultimately inform curricula and every teaching-learning moment (Ramsay & Fitzgibbons, 2005). To this end, discussion of competency-based educational development in this article goes beyond behaviourist discourse narrowly focused on action alone, attempting also to highlight features like judgement, attitudes, ethics, and collective stakeholder responsibility underpinning competent nursing teamwork performance.

Philosophical Underpinnings

This integrative review is conducted from a pragmatic vantage point. Researchers holding a pragmatic stance value multiple knowledge perspectives, provided these views can be constructively applied to practice (Hannes & Lockwood, 2011). Chinn and Kramer (2004) contend that nursing knowledge construction should "fully embrace(s) all patterns of knowing, where [the] emphasis shifts away from formally defined empiric theory to an emphasis on knowledge and knowing to the fullest extent possible" (p.163). Brown and Doane (2007) contend that pragmatists also appreciate the limits of objective certainty, recognizing that "all knowledge is understood to be limited…in need of continual scrutiny" (p.100). Thus those committed to pragmatic worldviews value interpretive thought and varied understandings of truth, but at the same time pay critical attention to assimilating, filtering, and determining whether these interpretations are relevant for application to our lived experience (Beatty, Leigh, & Dean, 2009; Weaver & Olsen, 2006). Therefore, applying a pragmatist's vantage point in this

review involves embracing epistemological diversity toward an end of creating new knowledge, not simply for knowledge's sake, but for its applicability and potential for use in the teaching-learning experience.

Literature Review

Aim

The aim of this integrative review is to critically review educational research describing nursing competency based teamwork development and to synthesize these findings in determining what teaching-learning considerations best enhance teamwork competency in nursing personnel.

Design

This work is guided by Whittemore and Knafl's (2005) updated method for conducting integrative review. This validated method was chosen for its comprehensiveness and ability to allow the researcher to integrate and analyse varying methodologies across empirical and theoretical forms of study. Whittemore and Knafl (2005) suggest five steps for conducting the integrative review, including "problem formulation, literature search, data evaluation, data analysis and presentation" (p. 548). These steps should be approached systematically so that bias and error are avoided. The authors identify the value of specifying a philosophic or theoretical lens to guide the report, and also list specifics to enhance rigour, including an iterative approach to analyzing data, drawing conclusions, and verifying results. Whittemore and Knafl (2005) recommend that sufficient reflexive details be provided about decisions made across all steps of the process in writing the report. The integrative review is congruent with pragmatism and a plural paradigmatic worldview in nursing.

Search Methods

Four databases were used to conduct the search: the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science, Academic Search complete, and Education Information Resource Centre (ERIC). Utilizing guidance from two librarians, a comprehensive search strategy was developed and trialed. Articles were electronically searched and selected from English peer reviewed journals dated between 2000 and 2014, a 14-year period consistent with the current trend and development of teamwork competency-based education in healthcare. An abstract search used the following key words in various Boolean phrase combinations: "nursing teamwork" OR "nursing team-training" AND "education" AND "competency." To help ensure no key sources were omitted, purposive sampling was also incorporated into the strategy. Purposive sampling involved using the researcher's own judgement in choosing articles that were deemed applicable to answering the research question. Using the above databases, the search terms "healthcare team training" and "literature review" were used, and from these results specific articles were handpicked based on abstract review. The ancestry method was incorporated within these articles selected from purposive sampling to find further team training research interventions specific to nursing.

Search Outcome

Electronic, purposive and ancestry search method results were imported into Refworks citation management software, where duplicates were removed. Abstracts were then reviewed for specific relevance to the topic of nursing teamwork competency and the educational focus of this review. Of the remaining articles, those selected for inclusion needed to:

1. Report on implementing an educational intervention aimed at building and/or evaluating measures of teamwork;
2. Report on "teamwork" as consistent with the definition provided in the introduction (communicative, collaborative, coordinative actions toward shared goals); and
3. Have registered nurses, nursing students, licensed practical nurses (LPN's) or certified nursing assistants as majority participants (> 90%) in the intervention.

One resource (Miller, Rilley, & Davis, 2009) was chosen for inclusion despite its variance from the majority nurse participant criteria, as these authors reported specifically and solely on high reliability nursing team behaviours within interdisciplinary simulations which was decided to be of value to this review.

Examples of articles excluded for review included published poster abstracts and opinion-based papers suggesting strategies for teamwork building interventions where no formative research was undertaken (McLaughlin, Pearce, & Trenoweth, 2013; Pasch, 2010) or interventions performing secondary analysis of intervention data (Garrett, MacPhee, & Jackson, 2011; Lyndon, 2006). Articles were also excluded that reported secondary measurements of nursing teamwork as influential to successful program implementation, such as diabetic/end-of-life care guidelines (Hewisson, Badger, Clifford, & Thomas, 2011; Gifford, Davies, Tourangeau, & Lefebre, 2011) or intra-interprofessional education delivery (Headrick, Barton, Odgrinc, et al., 2012; Leonard, Shuhabir, & Chen, 2011; Freeman, Miller, & Ross, 2000) rather than a primary focus on teamwork measurement itself. Although of value to designing context-specific nursing teamwork curricula, also excluded were articles reporting conceptualized constructs, perceptions, barriers or facilitators of nursing teamwork as influenced by process/organizational management concerns such as nurses' daily work realities, differing care models, shift lengths, and team size

(Atwal & Caldwell, 2006; Fernandez, Tran, Johnson, & Jones, 2010; Kalish, 2009; Kalisch & Begeny, 2005; Kalisch, Weaver & Salas, 2009). Figure 1 depicts the search and audit trail according to Moher, Liberati, Tetzlaff, and Altman's (2009) preferred method for reporting items in systematic reviews and meta-analyses. Appendix B summarizes the article exclusion audit trail and provides examples of the authors excluded and the reasons for doing so.

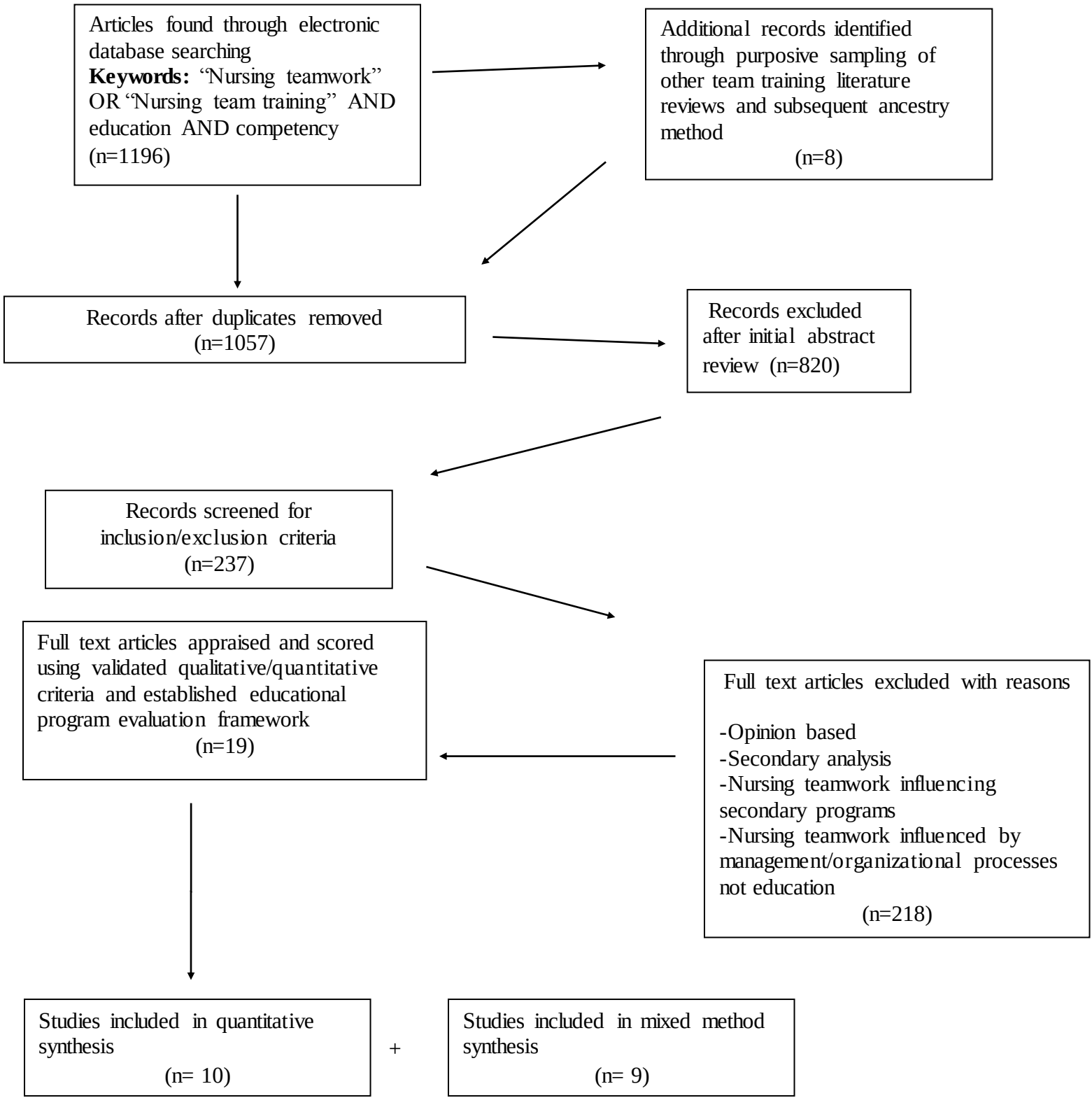

Figure 1. Flow of information. (Moher, Liberati, Tetzlaff, & Altman, 2009)

Quality appraisal

As suggested by Whittemore and Knafl (2005), two separate frameworks were used to appraise and rank research articles (mixed methods or quantitative) prior to data reduction. Methodological rigour was scored on a 3-point scale (1 = low, 2 = moderate, 3 = high) using both the extended CONSORT criteria (Zawerstein et al., 2008) for pragmatic quantitative works and the EPICURE qualitative appraisal framework (Stige, Malterud, & Midtgarden, 2009) for mixed method studies. Full points (3) were given to studies meeting six or seven appraisal criteria, with those studies meeting fewer criteria being divided by two to come to an average score (e.g. 4/7 appraisal criteria= 2/3 score) in both frameworks. Maintaining pragmatic theoretical congruence in the evaluation process, articles were also evaluated and scored on a 3-point educational merit scale (1 = low, 2 = moderate, 3 = high) as a guided by Kern, Thomas, and Hughes' (2010) framework for healthcare curriculum development. Although not a methodological appraisal tool, this widely adopted framework was chosen to consider the articles' practical educational value in the curriculum implementation process, and helped to consolidate and ensure the "authenticity, …, informational value, and representativeness" (Whittemore & Knafl, 2005, p. 550) of educational context across the diversity of sources found. To meet the criteria of the framework and the purpose of this review, the articles had to sufficiently report reflexive educational program details: learning needs assessments, objectives, content or origin of content taught, teaching/learning theories, pedagogical methods, and tools/criteria used to assess learners or programs. Scores were obtained by identifying a possible 6/6 criteria and dividing by two.

Data Abstraction and Synthesis

Data from reviewed sources were systematically organized and analysed through thoughtful reduction, display, and an iterative constant comparative strategy. Whittemore and Knafl (2005) suggest that the data analysis stage is the least developed, most challenging, and error prone aspect of integrative review, requiring meticulous organization and an unbiased, innovative approach in order to mitigate these issues. In light of this, Notar's (2011) literature review organizer method and accompanying Related Research Report Form (RRRF) (see Appendix A) was used to operationalize the data abstraction and synthesis stages of this review. Detailed notes regarding background, aims, methods, and key findings were collected into the RRRF and concurrently reviewed as each new source was read. Complementing this iterative constant comparative approach, data abstraction/analysis was applied by completing the Integration-Usefulness-Significance to Problem portions of the (RRRF) throughout the process. Completing and reviewing these sections in detail allowed the author to concurrently focus on individual-collective source applicability, integration, and transferability of source data as they pertained to each other and the research question as a whole. Data synthesis involved further use of the RRRF to apply, arrange, and display ranking systems (appraisal-educational merit scores), elicit key subject headings, and color codes. In addition, this aesthetic display and arrangement was used to compare and contrast sources for commonalities and differences in variables, methods, findings, and other specific contextual factors that influenced study results (Sandelowski, 1995). Notar's method and accompanying RRRF helped mitigate error, difficulty, and bias during the data abstraction stage in this review. The author's choice of reduction, display, organization, and synthesis scheme as influenced by the RRRF formed the basis for critical analysis, theme and sub-theme generation discussed in the remainder of this report.

Results

The Literature Sample

Study designs in the sample were labelled according to whether researchers used primarily quantitative, qualitative, or mixed methods approaches to inquiry. Given varying definitions and paradigm disputes in the literature over how mixed methods and program evaluation studies are classified (Johnson, Onwuegbuzie, & Turner, 2007), clarification of how these terms were used in this review is necessary. Researchers in the sample labelled as using a mixed methods approach incorporated a mixture of both qualitative (e.g., open questioning, narratives, video observation) and quantitative (e.g., measuring attitudes, rating behaviours) data collection into their analyses (Creswell, 2013). In addition, program evaluation studies were simply labelled as such, and the design pragmatically classified as quantitative if sole quantitative data were used for analysis and reporting. Further details of sample study designs are provided in Table 2.

The literature sample consisted of 10 quantitative and 9 mixed method studies with educational interventions varying in length from 4 hours to 3 years. The team training interventions reviewed had almost equal participant distributions between university students (9/19= 47%) and licensed nurses (10/19=53%) from acute care hospital settings. Overall the methodological quality ranking of the sample was low to moderate primarily because a majority of the studies were single site, small sample size interventions (12/19=63%) with limited validity-reliability reporting on teamwork measurement instruments used (8/19 =42%). Furthermore, of those articles reporting valid/reliable teamwork measurement instruments, data collected were frequently self-reported. Finally, only (5/19=26%) of studies reported measuring

nursing teamwork constructs specifically and as a primary outcome. Further details of the literature sample are provided in Table 2.

Table 2

Literature Sample

Authors	Design	Sample	Data Collection Tools	Core Content/ Pedagogy	Key findings related to nursing teamwork competency and education	Overall Score
Aebersold et al. (2013)	Mixed methods (program evaluation, quantitative-qualitative data collection)	Undergrad nursing students (n=31)	Video recording, non-validated skilled communications behavior checklists, Course experience open ended questions, Likert type survey	Nursing Crew Resource Management (NCRM)-based content (communication-hierarchy focus); didactic workshop, role-play, high fidelity simulation	Course concepts/design applicable-promising knowledge translation strategy. Limited tool use/hierarchy escalation performance demonstrated in simulation	1.5/3
Ballangrud et al. (2013)	Quantitative (program evaluation, quantitative data collection design)	RN's (n= 63)	Simulation experience, practice, design scales, surveys (SLS, EPSS, SDS)	Crew Resource Management (CRM) content reinforced by didactic lecture, handouts, high fidelity simulation	RNs satisfied with simulation as valuable for team training/knowledge translation but ranked confidence in learning low	2.5/3
Birx et al. (2008)	Mixed methods (quantitative-qualitative data collection, non-equivalent group, pre-post test design,)	Undergrad nursing students (n=68)	Group Cohesion Questionnaire (GCQ), Caring Ability Instrument (CAI), Interviews	Watson's caring framework, experiential learning, Ropes' teambuilding challenge and reflective discussion groups	Qualitative analysis suggests reflective group discussion connected to building trust, communication, appreciating multiple	1.25/3

					perspectives	
Bogossian et al. (2014)	Quantitative	Undergrad nursing students (n=97)	Video recording, Team Emergency Assessment Measurement (TEAM^{TM}) score sheet Situation Awareness Global Assessment Technique (SAGAT), Objective Structured Clinical Examination (OSCE), Multiple choice questionnaire (MCQ)	*In situ* standardized patient simulation, video facilitated reflective debriefing-'photo elicitation'	Content knowledge (experience) correlated with teamwork, situational awareness, and performance. Scored poorly in majority of participants.	2/3
Castner et al. (2012)	Quantitative (program evaluation, quantitative data collection, cross sectional survey)	RN's trained (n=1204) Survey respondents (n=456)	Revised TeamSTEPPS Teamwork Perceptions Questionnaire (T-TPQ)-intervention sustainability measure	Horizontal violence, assertive communication, conflict resolution, standardized TeamSTEPPS curriculum	30% total reported leadership construct requires improvement-only significant difference between those trained and not (team structure, mutual support, situation monitoring, communication subscales positive	2.5/3
Gibson (2001)	Quantitative (program evaluation, quasi-experimental pre-post test, individual and team analysis design,	RN's (n=187)	Quality of Patient Care Scale (Qualpac), self and group efficacy Likert type surveys	Learner-centered goal setting training intervention	Intervention improved self/group efficacy-no difference in team effectiveness	2/3

	randomization					
Husebø et al. (2011)	Mixed methods (qualitative explorative/ descriptive data collection, quantitative statistics applied)	Undergrad nursing students (n=81)	Video recording, observational communication content/interaction analysis	Basic Life Support (BLS) content; high fidelity simulation	Team coordination/joint assessment/situational awareness dependent on both verbal and non-verbal communication	2.25/3
Johnson et al. (2011)	Quantitative (program evaluation, quantitative data collection	Undergrad nursing students (n=89)	Course evaluation (Likert type survey)	TEAMSTEPPS content; team-based course activities, constructivist underpinnings	Team-based, constructivist pedagogy provides teamwork practice opportunity (relationship building, leadership, communication)	1.75/3
Kalisch et al. (2014)	Quantitative (quasi-experimental design)	RN's (n=43)	TeamSTEPPS MCQ knowledge test, Nursing Teamwork Survey (NTS)-Likert type	High reliability teams framework; Salas (communication feedback focus) content reinforced through podcast (video), reflective discussion, virtual simulation scenarios	Mean teamwork scores significant effect on subscales (trust, team orientation, back-up) with non-resource intensive intervention- no change in teamwork knowledge	2.25/3
Kalisch et al. (2007)	Mixed methods (program evaluation, qualitative-quantitative data collection	RN's, LPN's CNA's (n=55)	Semi-structured interview, open ended questions, Pt. satisfaction surveys	CRM, High reliability framework, pt. safety content coaching, mentoring, repetition, role-play by practice champions	Nursing leader-follower engagement and communication-feedback loop influencing key team processes/behaviours	2/3
Kalisch et al. (2013)	Quantitative (program evaluation,	RN's, LPN's CNA's (n=242)	TeamSTEPPS adapted MCQ knowledge test,	Practice champion train-trainer (n=9) intervention-	Overall mean, satisfaction with teamwork, less	2/3

	quantitative data collection, quasi experimental pretest-post test repeated measures design)		Nursing Teamwork (NTS), Missed Nursing Care (MISSCARE) Likert type surveys	Modified High reliability, TeamSTEPPS framework-Didactic presentations, podcasts, role play based on nursing team needs assmt.	missed care improvement especially over time-significant effect on subscales (trust, team orientation, leadership)	
Kesten (2011)	Quantitative (program evaluation, quantitative data collection, randomized control design)	Undergrad nursing students (n=115)	Video recording, SBAR Knowledge instrument, SBAR observed behavior checklist tool	SBAR communication tool-lecture, handouts, Low-high fidelity simulation (role-play-mannequin), reflective debriefing	SBAR performance (skilled communication) significantly improved with role-play and didactic instruction versus didactic alone	2.5/3
McKeon et al. (2009)	Mixed methods (program evaluation, quantitative-qualitative data collection	Post RN graduate students (n=5)	TeamSTEPPS adapted MCQ knowledge test, guided debriefing discussion interview for course evaluation	CRM, TeamSTEPPS; Low fidelity simulation-role play, video guided reflective debriefs; modified checklist (anesthesia non-technical skills-ANTS) exercise	Insufficient knowledge/practice of conflict resolution, coaching, debriefing skills, Nurses value frontline leadership. Hospital error acceptance culture	2/3
Miller et al. (2009)	Mixed methods (quantitative-qualitative data collection)	Multidisciplinary health professionals (n=420) (majority specialty nursing n= not specified)	Video recording observation, 'event set' behavioral checklist	High reliability teams framework- *in situ* high fidelity simulation	Inadequate nursing education/performance in high reliability teamwork indicators (SBAR, closed loop communication)	2.25/3
Missen et al. (2013)	Mixed methods (program evaluation quantitative-qualitative data	RN's (n=44)	Video recording, sim debriefing interviews, Team Emergency Assessment	*In situ* standardized patient simulation, video facilitated debrief/reflective discussion	Teamwork ratings correlated with technical skill/knowledge. Positive attitudes about team	2/3

	collection		Measurement tool (TEAM™), Objective Structured Clinical Examination (OSCE)		simulation impacting knowledge, confidence, competence	
Rogers (2011)	Mixed methods (program evaluation, quantitative-qualitative data collection, Grounded Theory approach)	Undergrad nursing students (n=16)	Individual interviews, literature search	Constructivism, PBL, experiential, cognitive learning theory; virtual (computer based) simulation	Positive attitudes/learning benefit in VS teamwork environment (confidence, open communication, collaborative problem solving/shared decisions versus motor skill focus)	1/3
Sculli et al. (2013)	Quantitative (program evaluation, quantitative data collection)	RN's (n=368), 6 mos (n=207), 11 mos (n=189)	Course evaluation, clinical teamwork, self-efficacy for teamwork Likert type surveys	NCRM content- didactic workshops, high fidelity simulation, 1 year follow up refresher	Positive impact of program in relation to morale, unit teamwork culture, communication openness, and care quality	1.5/3
Vertino (2014)	Quantitative (program evaluation, quantitative data collection pretest-posttest repeated measures design)	RN's, LPN's, NA's (n=18)	TeamSTEPPS-Teamwork Attitude Questionaire (T-TAQ)	Needs customized TeamSTEPPS content-didactic, role-play, video narratives, Kotters change model (post coaching, mentoring site visits)	Improved attitudes over time across all teamwork constructs. No difference based on experience/ nursing designation	2.25/3
Wiggs (2011)	Mixed methods (program evaluation, quantitative-qualitative data collection, quasi-experimental design,	Undergrad nursing students (n=483)	Standardized university test scores, Likert type and open ended experience surveys	Collaborative vs. individual test taking	Collaborative testing develops cooperation, collaboration, communication and knowledge (active learning, critical thinking,	2/3

	randomization)	rationale, listening, giving feedback, information processing)

Findings

The findings of this literature review are based on a critical examination and synthesis of nursing competency-based teamwork development. In the introduction I defined teams and teamwork as *a collection of individuals interdependently cooperating, collaborating, and communicating towards the effective execution and attainment of common goals.* Curriculum considerations for nursing teamwork competency must involve more than a focus on observable behaviour. Indeed, it was noted that competency developed through education involves understanding the influence of key stakeholders and features like judgement, attitudes, and ethics, which also underpin competent nursing teamwork performance.

The question this literature review sought to answer is, "What teaching-learning considerations best enhance teamwork competency in nursing personnel?" To this end, I found that three main themes emerged from the analysis: the importance of establishing a nursing teamwork knowledge base, the effectiveness of constructivist pedagogy, and the need for validated evaluation instruments. The findings are therefore organized under these themes.

Nursing Teamwork Knowledge

For competent nursing teamwork to take place, nurses must have a knowledge base of the necessary individual-collective inputs, outputs, and processes associated with effective team performance. Analysis of the literature revealed that crew resource management (CRM) principles and Salas, Sims, and Burkes' (2005) high reliability teams (HRT) framework strongly inform the knowledge base required for nursing teamwork competency.

High reliability teams framework. This framework was mentioned in several of the sample interventions (Castner, Foltz-Ramos, Schwartz, & Ceravolo, 2012; Johnson, Hamilton, Delaney, & Pennington, 2011; Kalish et al., 2007; Kalish et al., 2013; Kalish et al., 2014;

McKeon, Cunningham, & Oswaks, 2009; Miller, Reilly, & Davis, 2009; Vertino, 2014) and is best recognized for informing the widely adopted Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) curricula developed by the U.S. Agency for Healthcare Research and Quality (AHRQ).

Breaking the HRT framework down into key components, Kalisch et al. (2014) and Miller et al. (2009) claim that nursing teamwork knowledge is rooted in (a) *Leadership*—team structure and focus enabled through dynamic relations between formal leader and supportive followers, (b) *Collective orientation*—group cohesion, valuing group success over individual needs-performance (c*) Mutual performance monitoring*—understanding roles, collective observation/awareness of, and feedback to members (d) *Backup behaviour*—helping and looking out for each other, and (e) *Adaptability*—adjustments and allocation of resources based on situational change. In addition, these same authors claim that HRT framework staples are interdependently linked and successfully operationalized within teams through (a) *Situational awareness*—conscious perception of how environmental cues impact overall circumstances, (b) *Shared mental models*—collective understanding of problems, roles, and processes required to achieve team goals, (c) *Direct-focused closed-loop communication*—active salient information exchange where the receiver confirms message receipt and the sender affirms correct message received, and (d) *Mutual trust*—the belief that members are acting and performing in the team's best interests.

The HRT framework is considered foundational knowledge for nursing teamwork competency; however, many studies highlight overall knowledge deficits in nurses related to HRT theory (Kalisch et al., 2014) and specifically translating these framework components of

leadership (Castner et al., 2012), situational awareness (Boggosian et al., 2014) and skilled communication (Kesten, 2011; McKeon al., 2009; Miller et al., 2009) into practice.

(Nursing) Crew-Crisis Resource Management (NCRM-CRM). Aviation industry leaders pioneered CRM education, aware that human factors such as poor communication, limited situational awareness, and ineffective leadership contribute to errors and poor team performance (Aebersold, Tschannen, & Sculli, 2013; McKeon et al., 2009). Data analysis in this review suggests that CRM also informs the knowledge base of nursing team competency training, in terms of collective cognition, error mitigation, standardized operating processes (e.g. communication tools), and interpersonal skills (Aebersold, Tschannen, & Sculli, 2013; Ballangrud, Hall-Lord, Hedelin, & Persenius, 2014; Kalisch, Curley, & Stefanov, 2007; Sculli et al., 2013).

Similar to the HRT framework, core CRM knowledge involves non-technical skills such as situational awareness, adaptability, leadership-followership, and communication (Aebersold et al., 2013; McKeon et al., 2009; Sculli et al., 2013). In addition to these concepts, CRM also considers how contextual factors such as mutual respect, hierarchal ranks, and conflict influence team processes such as decision-making, communication, and performance (Aebersold et al., 2013; McKeon et al., 2009; Sculli et al., 2013). Sculli and colleagues (2013) point out that CRM also involves team members using open and assertive standardized communication enabled through non-threatening leadership and supportive followership strategies. Aebersold et al. (2013) explain the concept of supportive followership as not following leaders blindly, but rather assuming shared responsibility for outcomes and taking an active role in communicating their expert judgements to decision makers. McKeon et al. (2009) found that nurses were unfamiliar with CRM communicative skills required for effective debriefing, conflict resolution, and

leadership (coaching); they recommended increased practice time and exposure to learn these skills. Several researchers indicated that experienced nurses valued CRM knowledge as applicable to their practice contexts (Aebersold et al., 2013; Ballangrud et al., 2013; McKeon et al., 2009; Sculli et al., 2013) but they lacked confidence learning these principles (Ballangrud et al., 2013), and in simulated settings only used CRM communication strategies 66% of the time (Aebersold et al., 2013).

It is safe to say that knowledge about nursing teamwork revolves around common components of both HRT theory and CRM; however, it is also evident that there exists a knowledge gap and discomfort among nurses in applying communication and leadership aspects of these frameworks in practice, which will be further explored in the discussion section.

Nurse Teamwork Pedagogy

Constructivism Influencing Competency. The studies surveyed here demonstrate that a combination of traditional and modern student centered pedagogical approaches are being used to teach nursing teamwork competency. Traditional provider centered approaches to education are grounded in beliefs that learning is a passive act in which knowledge can be deposited from an expert source and absorbed by the learner (Rogers, 2011). I found that teachers with specific expertise or "Master" training capabilities are teaching nurses teamwork and come from a variety of backgrounds including aviation, nursing, and medicine (Castner et al., 2012; McKeon, 2009; Miller et al., 2009). Traditional teaching methods were frequently noted in the analysis and included educators presenting content information in the form of didactic lectures, podcast-video presentations, handout materials, and suggested readings (Aebersold et al., 2013; Ballangrud et al., 2013; Kalisch et al., 2014; Kesten, 2011).

In contrast, modern student centered approaches to teaching are rooted in learning theories that propose that learning is an active process, in which educators facilitate engaging environments so knowledge can be internally and externally constructed in relation to past-current experiences, self-reflection, and social interaction with others (Rogers, 2011). Birx, Wagstaff, and Van Patten (2008) found that teamwork competencies such as collective trust building, open communication, active listening, and information processing were better translated into practice in student groups participating in teambuilding challenges and facilitated reflective discussion versus groups in standard clinical placement. Wiggs (2011) demonstrated that a collaborative test taking intervention facilitated team communication, critical thinking, and group decision making and resulted in higher individual test scores when compared to those writing exams alone. Johnson et al. (2011) highlight that nursing teamwork competencies such as leadership, relationship building, and communication skill were built through HRT team-based learning activities facilitated through a teacher-"coaching" model. Others also identify causal links between constructivist facilitation (teaching leadership) and nursing teamwork competency development as demonstrated by local leaders such as nurse educators and unit practice champions who role-model, mentor, and reinforce teamwork constructs (Castner et al., 2012; Kalisch et al., 2007; Kalisch et al., 2013; McKeon et al., 2009; Vertino, 2014). These findings support Castner et al's (2012) argument that future team training efforts focus on developing frontline nursing leaders, given that just under a third of study participants (30.6%) rated leadership as deficient in their population. These student centered approaches to teamwork pedagogy are based on constructivism, in which knowledge, skill, and attitude development (that is, competency development) are facilitated through conscious teaching efforts promoting active engagement, comparative sense making, and deliberate practice of new knowledge.

Simulation pedagogy also provides this engagement, comparative sense making, and deliberate practice of teamwork knowledge. The simulation approach to teaching nurses teamwork competency is well represented in the literature sample, where 79% (15/19) of studies reviewed incorporated at least one simulation activity into intervention design, with others using this approach exclusively (Bogossian et al., 2014; Missen et al., 2013; Rogers, 2011). This study reveals that a variety of simulation modalities are being used, including low fidelity role-play (Aebersold et al., 2013; Kalisch et al., 2007; Kalisch et al., 2013; Kesten, 2011; McKeon et al., 2009; Vertino, 2014), high fidelity mannequin-based simulation (Aebersold et al., 2013; Ballangrud et al., 2013; Husebø et al., 2011; Miller et al., 2009; Sculli et al., 2013), *in situ* simulation with standardized patient actors (Bogossian et al., 2014; Missen et al., 2013) and virtual reality computer-based simulations (Kalisch et al., 2014; Rogers, 2011).

Simulation methods are described as fun and generally well liked by nursing participants (Aebersold et al., 2013; Ballangrud et al., 2013; Rogers, 2011), who also self-reported the approach as face valid for teaching and translating teamwork knowledge (Aebersold et al., 2013; Ballangrud et al., 2013), particularly because of its realistic practice applicability and the learning benefits derived through debriefing (Ballangrud et al., 2013). However, many reports cited significant resource use (equipment cost, space, scheduling/time constraints, specific teaching expertise), low overall realism, and emphasis on technical motor skills (Kalisch et al., 2014; Missen et al., 2013; Rogers, 2011; Vertino, 2014) as significant drawbacks to using simulation pedagogy. Researchers tackled some of these barriers by using cost-effective, low physical realism simulation strategies (avatars/participants/computers versus real patients/hospital rooms) in the form of computer-based virtual-worlds or role-play (Aebersold et al., 2013; Kalisch et al., 2014; Kesten, 2011; Rogers, 2011; Vertino, 2014).

A common element shared in these studies was that although simulations lacked physical realism, scenarios were designed considering contextual-situational details relevant to nursing teamwork, making them practice relevant and cognitively realistic. Participants involved in such simulation designs post-intervention reported significant HRT improvement in overall teamwork and subscales of leadership, trust, team orientation, and backup behavior (Kalisch et al., 2014; Vertino, 2014). Kesten (2011) found his role-play intervention translated skilled team communication tool (SBAR) use better in nursing students than a control group receiving didactic teaching alone. Aebersold et al. (2013) reported similar findings of role-play leading to improved nursing communication; however, they also noted that 33% of participants refused to use CRM assertive escalation techniques with physician actors despite the health and safety of the patient situation requiring it. Unlike the sporadic and unpredictable experiential learning that takes place in real working environments, thoughtful simulation design can target and repeatedly elicit specific teamwork competency objectives (Ballangrud et al., 2013) to be learned, practiced and consciously reflected on by participants.

Several researchers in the sample highlighted this consciousness-raising through debriefing methods as essential for teaching and learning competent nursing teamwork (Aebersold et al., 2013; Ballangrud et al., 2013; Bogossian et al., 2014; Kalisch et al., 2014; McKeon et al., 2009). Learner debriefing is defined in the literature sample as a knowledge synthesis strategy extrapolated through self-reflective summaries of situational thoughts-feelings-actions-events brought forward through observation, guided questioning, and facilitated discussion (Ballangrud et al., 2013; Boggosian et al., 2014; Kalisch et al., 2014; Missen et al., 2013). Some interventions incorporated checklist exercises (Kalisch et al., 2014; Kalisch et al., 2013; McKeon et al., 2009) into group debriefing after watching videos or hearing real stories

about teamwork affecting adverse patient events (Kalisch et al., 2014; Kalisch et al., 2013; McKeon et al., 2009; Vertino; 2014). Others also used video recordings to assist debriefing of simulation scenarios, claiming "photo elicitation" (p. 188) as a powerful observational tool providing teacher-learner insight into past and future behavior (Missen et al., 2013). Video debriefing involved pausing recordings and asking participants to comment on performance or answer open ended questions meant to elicit and clarify what they were thinking-feeling-doing during particular moments in scenarios (Boggosian et al., 2014; Missen et al., 2013). Debriefing and facilitated discussion were reported as valuable to nursing teamwork pedagogy, as these practices allow for participant reflection on learning experiences rather than mere exposure to them.

In summary, the pedagogies associated with nursing teamwork competency that involve simulation and facilitated discussion (debriefing) based on constructivism and principles of adult learning are effective at teaching nurses competent teamwork. However, further discussion is needed on the educator's expertise and the requirements necessary to create optimum content and properly facilitate teaching-learning environments that best enhance the teamwork competency of nurses. These issues will be addressed in the discussion section.

Nursing Teamwork Competency Evaluation

Evaluating individual nursing teamwork competencies includes assessing the triad of knowledge, skills, and attitudes required for optimal performance. HRT theoretical components (Salas et al., 2005) inform the teamwork knowledge base tested in nursing participants; this knowledge base was frequently assessed using multiple choice-type testing measures reported as valid and reliable. These tests varied in length depending on intervention from 8-20 questions derived from the TeamSTEPPS instructor manual (Kalisch et al., 2014; Kalisch et al., 2013;

McKeon et al., 2009). Knowledge about nursing teamwork is currently tested at a rote level, or in other words, someone's ability to remember it. Furthermore, although crew resource management also informs the teamwork knowledge base in many interventions, I found no such testing of the CRM knowledge base in this sample.

Real-time assessment of nursing teamwork *skills* and *behaviours* associated with them are also being analysed and measured with video recorded simulation scenarios. Husebø et al. (2011) used video to evaluate communicative coordinating behaviors in nursing teams, finding that coordination, joint assessment, and situational awareness were dependent on both verbal and non-verbal forms of communication. Some researchers chose non-validated instruments to measure isolated skills such as assertive (Aebersold et al., 2013) and SBAR (Kesten, 2011) communication tool use, while others examined teamwork measures like situational awareness, shared mental models, and closed loop communication collectively (Miller et al., 2009). Other global teamwork skill appraisal tools reported as valid and reliable (Bogossian et al., 2014; Missen et al., 2013) included the Team Emergency Assessment Measurement (TEAM^{TM}) score sheet (leadership [2 items]; teamwork [6 items]; overall global assessment [1 item]; and task management [2 items]) and the Situation Awareness Global Assessment Technique (SAGAT) (Bogossian et al., 2014) with the latter involving rapid fire verbal questioning post-simulation to assess constructs of situational awareness in team leaders. It should be mentioned that although these two tools are validated and determined capable of measuring teamwork skill performance, the instruments were designed to measure these skills within interdisciplinary team critical care settings.

Participant attitudes about teamwork or their experiences learning it were frequently measured using invalidated self-reported surveys or questionnaires (Birx et al., 2008; Johnson et

al., 2011; Rogers, 2011; Wiggs, 2011). Instruments reported to be based on the Salas HRT framework that had also undergone extensive validity and reliability testing included the TeamSTEPPS Teamwork Perceptions Questionnaire (Brief T-TPQ) (Castner et. al, 2012) and also the TeamSTEPPS Teamwork Attitude Questionnaire (T-TAQ) (Vertino, 2014). One instrument found in the research sample was the Nursing Teamwork Survey (NTS) (Kalisch et al., 2014; Kalisch et al., 2013), notable in that it was the only one to have been specifically and rigorously adapted for capturing attitudes about HRT based nursing teamwork.

In summary, this preliminary analysis of evaluation and nursing teamwork competency suggests that knowledge, skills, and attitudes are more feasibly measured as individual competency constructs rather than in dynamic coalition. Further discussion is required as to how and why evaluating the whole of nursing teamwork competency in real time benefits the learning associated with competency development.

Discussion

To further evaluate and synthesize these findings, this discussion section builds from the main theme findings. In the discussion I synthesize the strengths, gaps, and inconsistencies identified through main theme analysis, providing further insight into teaching-learning influences that best enhance nursing teamwork competency development. Appendix C provides a visual representation of main theme findings, the curriculum influences, and future implications for best enhancing nursing teamwork competency through education.

In this integrative review 19 studies examining the knowledge content, pedagogy, and evaluation of nurse teamwork training were identified, reviewed, critiqued and synthesized to inform competency-based teaching and learning. Preliminary findings suggest that a solid

foundational framework has already been laid, evidenced by a knowledge base of CRM and HRT theory content, constructivist teaching methods, and a variety of competency-based measurements to evaluate learners. However, the analysis also revealed gaps and inconsistent findings in research and in the programs themselves requiring further examination and discussion. The following sections address these curriculum considerations in terms of nursing teamwork knowledge, pedagogy, and evaluation, in order to deepen understanding of what teaching-learning components would best enhance teamwork competency development in nurses.

Nursing Teamwork Knowledge

Recognizing Non Formal Nursing Leadership. Leadership was identified as a component of competent nursing teamwork and also as a catalyst for sustainability and effectiveness of team training programs. Nursing "leaders," those who take active roles in coaching, mentoring and supporting learners, were able to help learners successfully translate knowledge to practice (Castner et al., 2012; Kalisch et al., 2007; Kalisch et al., 2013; McKeon et al., 2009; Vertino, 2014). Castner et al. (2012) highlight TeamSTEPPS successes at improving most HRT framework constructs but also identify nursing leadership deficiencies as a target area for program improvement. These authors go on to suggest that future programs more heavily involve formal leaders such as charge nurses to improve leadership training results. This point is well taken; however, it devalues the necessity of developing nursing leadership at the point of care and underestimates the influence of *frontline* nursing leadership contributing to successful HRT framework implementation. McKeon et al. (2009) illustrate team members' common respect of frontline leaders with participant comments about lower ranking flight crew members who provided CRM training: "They are leaders without the management stripes; one of the

reasons they are effective as leaders is their technical proficiency; they already have proved their muster" (p. 80). Similarly, the ability of frontline nurses to lead teams is crucial. For example, a nurse responsible for a fresh post-operative admission in a busy unit cannot effectively and safely implement the plan of care without leading the assistance of several colleagues. These frontline leaders need to orchestrate many nursing HRT constructs in this pivotal first hour of admission. They must accurately collect, process, and relay pertinent information such as pain and vital sign status to colleagues (situational awareness-communication), then prioritize (adaptability) and delegate aspects of immediate patient care required (trust-communication-sharing mental model). The nurse must follow up with teammates to ensure the required tasks have been performed (communication-mutual performance monitoring) and reassess based on situation and patient response (situational awareness-adaptability). Failing to recognize non-formal nursing leadership as influential and essential to teamwork competency development, as Castner et al. (2012) appear to do, is to severely limit nurses' potential for applying and integrating these teamwork contributions into the profession's mainstream.

Communication Competency and Ethics. Analysis also revealed that nurses struggled with several communication skills required for competent high reliability teamwork performance. Sample findings of no CRM knowledge testing, low nursing confidence in learning CRM, and reluctance to use assertive communication tools with physician actors could suggest that these concepts are new to nurses or possibly not commonplace findings in current team-working environments. Oriol (2006) contends that CRM training teaches more than good teamwork; it also serves to "create an organizational environment where specific communicative and cooperative behaviours are defined" (p. 402). Thus to develop teamwork competency in nurses, they must not only possess knowledge and skill but must also be supported in using CRM

skills in practice. Encouraging nurses to contribute a skilled and assertive advocacy voice to inform team decision-making will require ethical commitment, patience, and practice. As findings suggest, this active voice or supportive followership behaviour is enabled through team leadership styles that encourage such open communication in teams. Physicians, as authority stakeholders in the healthcare decision-making hierarchy, must be ethically aware of how their leadership can positively or negatively affect skilled nursing communication required for competent teamwork. In turn, nurses need to support team decision-makers with this communication knowledge and skill, assuming their fair share of ethical responsibility for outcomes and overall teamwork performance.

Pedagogy: Valuing and Developing Constructivist Teaching Expertise

Findings suggest that pedagogical methods such as simulation and facilitated discussion (debriefing) based on constructivism and principles of adult learning are effectively being used to teach nurses competent teamwork. As discussed previously, constructivist pedagogy aims to facilitate active learning through engaged social environments where knowledge presented is compared to previous assumptions in order for new understandings to emerge (Saylor, 2010). Furthermore, in order for these new understandings to affect behavioural change, internally motivated adults need to establish why these new concepts are relevant and how they apply to their lived experience (Knowles, Holton, & Swanson, 2012; Saylor, 2010). In simulations, nurses are not only able to practice integrating teamwork knowledge but afterwards are also able to reflect on situational judgements, personal attributes, and performance of everyone in the scenario. Educators who introduce role-play and facilitate group debriefings and team-based learning activities create a perfect marriage between social learning about teamwork and developing collective competency with it.

The analysis also indicates the ways adult learning principles and constructivism inform the teamwork knowledge content created and presented by educators. The literature revealed that engaging learners with content that was nursing practice-based, or in other words situationally and contextually relevant, resulted in the best competency outcomes (overall teamwork constructs) (Kalisch, 2014; Kalisch, 2013; Vertino, 2014). After watching videos of teamwork effects on patient safety, nurses were guided through discussions that allowed them to reflect on how their new knowledge would directly apply to them and their patients (Kalisch, 2014; Kalisch, 2013; Vertino, 2014). Furthermore, it was suggested that limits to physical realism, as seen in computer-based virtual simulation, were not as significant as cognitive realism (situational-content relevance) for translating teamwork knowledge (Kalisch, 2014; Kesten, 2009). These findings suggest that educators teaching teamwork competency should create simulation content and experiences that nurses can personally relate to and that target and elicit teamwork-based objectives rather than psychomotor skills. Many studies also discuss the importance of debriefing sessions after simulations using video or otherwise as an important pedagogical tool for teamwork competency development (Ballangrud et al., 2013; Kalisch, 2013; McKeon et al., 2009; Missen et al., 2013). Researchers also mention details such as using open-ended questioning to elicit participant feedback; however, there is no mention of any guiding frameworks or other teaching tips on facilitating discussion. Established debriefing techniques such as the advocacy-inquiry method (Rudolph et al., 2007) or other tools for giving learner feedback would prove useful for enhancing nursing teamwork competency development.

Evaluation: Feedback and Teamwork Competency Development

Evaluating teamwork and providing results of this information to learners is crucial for competency development. Sample analysis suggests that the nursing teamwork measurement

tools supported by the highest levels of evidence are capable of measuring rote knowledge and cultural attitudes associated with competency. The Nursing Teamwork Survey (NTS), specifically designed to benchmark all nursing teamwork constructs, is the most notable for measuring these attitudes. Measuring attitudes about teamwork culture especially over time is important for providing face valid determinations of competency development and overall success of programs. However, measurements are not only necessary for determining program success; they are also required for providing timely performance feedback to learners (Levine, 2013). Learners need teacher feedback to understand which areas require improvement but also to build confidence and self-efficacy in knowing which behavioural skills have been mastered (Gibson, 2001). Tools such as the TEAM™ checklist used to measure timely global constructs of teamwork are notable but are speciality area-specific and potentially not a reliable measure of nursing teamwork. An analysis of the many considerations required for designing a feasible and reliable tool for measuring overall nursing teamwork competency performance is beyond the scope of this review; however, the face valid learning benefits derived from teaching with such a tool cannot be understated.

Review Limitations

Although every attempt was made in this literature synthesis to adhere to established methodological frameworks and appraisal criteria, the study also has several limitations impacting the pragmatic applicability of conclusions drawn and the overall generalizability of findings. First, the often ambiguous and frequently disputed definitions of *teamwork* and *competency* led to difficulties focusing the search phase and determining an appropriate article retrieval strategy, evidenced by primary Google scholar searches of these two terms alone yielding over 82,000 results. Secondly, healthcare team training research is a newer paradigm

dominated by medical and interprofessional teamwork discourses with little primary research using large sample, multisite trials and quantitative methods. This made finding, filtering, and evaluating quality reports specific to nursing teamwork competency development a challenge. This quest for specificity limited the comprehensiveness and richness of findings that would have resulted from adding interdisciplinary team training interventions into the sample. Lastly, this review was conducted by a sole researcher who needed to manage and distill large and diverse volumes of articles for topic relevance and quality. Combining several reviewers with varied educational, research, and practice expertise in the process would have provided for different vantage points and opinions on appraisal, data analysis, and evaluation contributing to a richer end product.

Conclusion

This present work contributes to a body of knowledge that is relatively new, yet salient, in modern day healthcare discourses of patient safety and quality care improvement. This integrative review also makes an important contribution to the literature given that I was able to locate only a handful of reviews examining healthcare team training, and none specifically focussed on nursing teamwork and the concept of competency based education. Other systematic reviews of healthcare team training literature have demonstrated a need to focus research efforts on unknowns in the field such as mono disciplinary teamwork and the detailed features of team training educational design and process (Buljac-Samardzic et al., 2010; Manser, 2009; Weaver, 2010). Although only a small sample of 19 articles was chosen for analysis, this review heeds these calls by providing an improved understanding and pragmatic focus on the teaching-learning components of current educational initiatives used in nursing teamwork competency

training. In a final summary I provide implications for researchers and educators aiming to further expand the knowledge base required for advancing nursing teamwork competency scholarship.

Implications for Nursing Educators

Nurse educators teaching teamwork from a competency base will require several skill sets involving innovative student centered educational approaches, communication expertise, and leadership. Given that teaching and learning competent teamwork go hand-in-hand, thoughtful constructivist considerations that involve team-based learning modalities will be key to building teamwork competency in nurses. Simulation pedagogy seems a promising method to assist learners in processing, applying, and retaining teamwork knowledge according to meanings that are derived from this experience. However, this study revealed the specific expertise necessary and many challenges associated with rigorously using simulation modalities to benefit overall learning. Educators require increased professional development to overcome these challenges. Developing this teaching mastery will ensure simulation scenarios contain relevant nursing practice content and appropriate teamwork objectives. Professional development will also benefit the communication ability of educators who require expertise in effectively using established debriefing frameworks and facilitated discussion techniques. Skillfully facilitating open yet goal directed dialogue will ultimately help learners to identify assumptions, generate meaning, and uncover the bigger teamwork competency issues at hand. Coordinating and disseminating these collaborative learning approaches also requires professional development strategies that promote educator leadership. Leadership from nursing educators is required not only to coach or mentor those developing teamwork competency on the frontlines but also to coordinate and support local

educator teams looking to move teamwork training initiatives forward and sustain the effects of these programs.

Implications for Research

There is a clear need to establish the evidence base for a feasible measurement tool that evaluates the competence of nursing teamwork at the point of action. Learner assessment instruments such as the ANTS, or not previously mentioned Ottawa GRS (Global Rating Scale) (Kim et al., 2009) are established measurement devices created from melding CRM-HRT related competencies and binding them to acute healthcare practice contexts.

Combining such instruments with evaluative devices such as Kalisch's (2013; 2014) (NTS) could prove promising for validating a comprehensive, real-time, teamwork measurement instrument for nurses. Such measurement instruments are necessary for promoting performance standards and evaluating the effectiveness of educational interventions, but most importantly for providing nurses at any level of competency with an opportunity to reflect on their learning progress and development.

Conflict of Interest

No conflict of interest has been declared by the author.

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Appendix A
Adapted Related Research Report Form (RRRF)

Source: APA reference	
Group Headings: Quant./Qualitative/Mixed Cooperation/Cord/Communication Knowledge/Skills/Attitudes Kern Merit Score: Appraisal Score: Avg. Weight:	
Problem/Scope:	
Methods/ Procedures/Intervention	
Learner assessment (L.A) Teamwork measurement tool (T.M.T) Secondary measures (S.M.)	
Analysis/Findings//Results and Discussion:	
Relatedness/Significance to Problem:	
Integration to Problem:	
Usefulness to Problem:	

Appendix B
Example Articles Excluded and Reasons

Authors	Reason Excluded
Atwal & Caldwell (2010)	Conceptualized constructs, perceptions, barriers or facilitators of nursing teamwork as influenced by process/organizational management concerns
Kalisch & Begeny (2005)	Conceptualized constructs, perceptions, barriers or facilitators of nursing teamwork as influenced by process/organizational management concerns
Kalisch et al. (2009)	Conceptualized constructs, perceptions, barriers or facilitators of nursing teamwork as influenced by process/organizational management concerns
Fernandez et al. (2010)	Conceptualized constructs, perceptions, barriers or facilitators of nursing teamwork as influenced by process/organizational management concerns
Freeman et al. (2000)	Intra-interprofessional education delivery
Garret et al. (2011)	Secondary analysis of intervention data
Gifford et al. (2011)	Secondary measurements of nursing teamwork as influential to successful program implementation
Headrick et al. (2012)	Intra-interprofessional education delivery
Hewison et al. (2009)	Secondary measurements of nursing teamwork as influential to successful program implementation
Leonard et al. (2010)	Intra-interprofessional education delivery
Lyndon (2006)	Secondary analysis of intervention data
McLaughlin et al. (2013)	No formative research undertaken
Pasch et al. (2010)	No formative research undertaken

Appendix C
Main Themes, Subthemes, Future Implications for
Enhancing Nursing Teamwork Competency Development