



WEANING FROM MECHANICAL VENTILATION: A SCOPING REVIEW OF QUALITATIVE STUDIES

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CNE 1.0 Hour

Notice to CNE enrollees:

A closed-book, multiple-choice examination following this article tests your understanding of the following objectives:

1. List 3 key factors that influence ventilator weaning.
2. Define a scoping review.
3. Describe the steps in conducting a scoping review.

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Background Weaning from mechanical ventilation is influenced by patient, clinician, and organizational factors.

Objective To identify factors that may influence weaning and adoption of weaning strategies and tools, clinicians' perceptions of weaning strategies, and weaning experiences of patients and patients' families.

Method A scoping review of indexed and nonindexed publications (1990-2012) was done. Qualitative studies of health care providers, patients, and patients' families involved in weaning were included. Two investigators independently screened 8350 publications and extracted data from 43 studies. Study themes were content analyzed to identify common categories and themes within the categories.

Results The study sample consisted of nurses in 15 studies, nurses and patients in 1 study, various health care providers in 11, patients in 10, and physicians in 4. Categories identified were as follows: for nurses, role or scope of practice, informing decision making, and influence on weaning outcome; for health care providers, factors influencing weaning decisions or use of protocols, role or scope of practice related to weaning, and organizational structure or practice environment; for patients, experience of mechanical ventilation and weaning, experience of the intensive care environment, psychological phenomena, and enabling success in weaning; and for physicians, tools or factors to facilitate weaning decisions and perceptions of nurses' role and scope of practice.

Conclusions Important issues identified were perceived importance of interprofessional collaboration and communication, need to combine subjective knowledge of the patient with objective clinical data, balancing of weaning systematization with individual needs, and appreciation of the physical and psychological work of weaning. (*American Journal of Critical Care*. 2014;23:e54-e71)

Weaning from mechanical ventilation is a time-sensitive and complex intervention influenced by patient, clinician, and organizational factors and by clinical interventions such as sedation management, delirium prevention, and early mobilization. Research since the early 1990s has shown that optimizing the weaning process involves 3 key ingredients, all of which should occur without unnecessary avoidable delays: recognition of weaning readiness, adjustments in mechanical ventilation to promote spontaneous breathing, and recognition of readiness for extubation and cessation of mechanical ventilation. Despite this knowledge, weaning remains suboptimal at times, and research continues to focus on ways to improve the weaning process and related outcomes for patients.¹

Most patients are easily and successfully weaned from mechanical ventilation on the first attempt.² However, even for these easy-to-wean patients, organizational and clinician factors such as staffing levels, skill mix, experience, and decision-making hierarchy influence the weaning process and can delay weaning and extubation. Such delays may result in prolonged duration of mechanical ventilation and stay in the intensive care unit (ICU) and increased costs.³ Approximately 30% of patients treated with mechanical ventilation experience difficult or prolonged weaning.⁴ For these patients, similar organizational and clinician factors influence the duration and success of weaning. Because of the risk of further prolongation of mechanical ventilation, reintubation, and increased mortality,^{5,6} identification of potentially modifiable factors that cause delays in weaning, unsuccessful weaning trials, and unsuccessful attempts in extubation is needed.

An important step in ascertaining patient, clinician, and organizational factors that influence

weaning is obtaining the views and perceptions of clinicians, patients, and patients' families who experience the process. Using qualitative study methods to examine patients' experiences in weaning can provide further understanding of the causes of unsuccessful weaning and indicate strategies to prevent unsuccessful attempts. Patients' family members, who know patients better than any health care provider does and who spend time at the bedside observing interactions between patients, the ventilator, and clinicians, can offer important insights.

Therefore, we used a rigorous scoping review to map recent publications on contextual factors (organizational, professional, behavioral, attitudinal) that influence processes related to weaning, clinicians' perceptions and attitudes toward tools to promote timely weaning, and weaning experiences of patients and patients' family members. The purpose of the review is to inform clinical practice, policy development, and future research to optimize the weaning process.

About 30% of patients using a ventilator experience difficult or prolonged weaning.

About the Authors

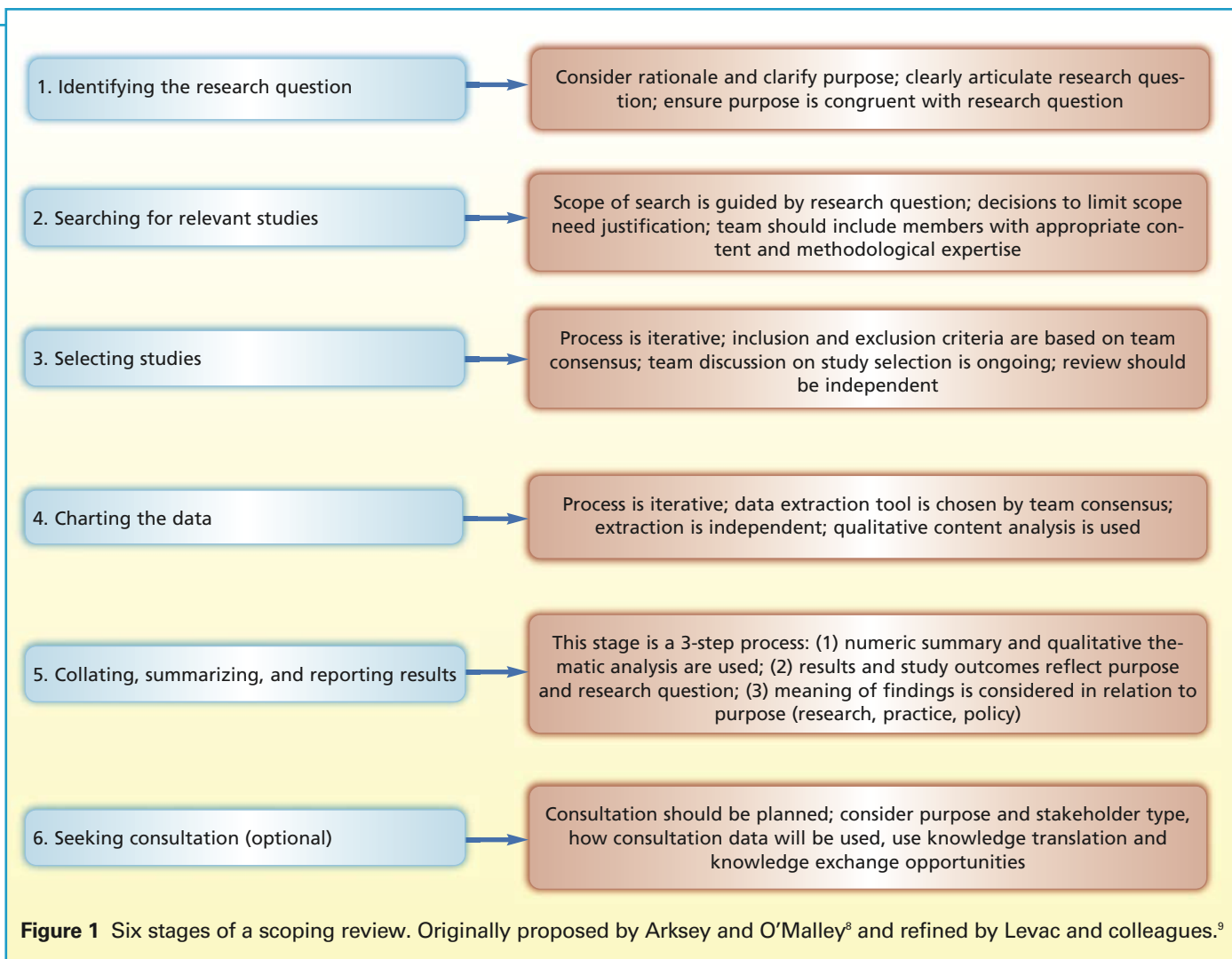
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Methods

Study Design

A scoping review was used to examine the extent, range, and nature of qualitative research on patient, clinician, and organizational factors that might influence weaning. The purpose of scoping studies is "to map rapidly key concepts underpinning a research area and the main sources and types of evidence available, . . . especially where an area is complex or has not been reviewed comprehensively before."^{7(p194)} Thus, the objective was not to synthesize research findings in depth but to map the field of study to facilitate visualization of the range of material available.⁸ The results can inform future decision making on the need for a metasynthesis or



further research. The original framework put forward by Arksey and O'Malley⁸ and refined by Levac et al⁹ (Figure 1) was used for the study.

Study Questions

The 3 study questions were as follows:

1. What factors (organizational, professional, behavioral, attitudinal) influence the weaning process?
2. What are health care providers' (nurses, physicians, respiratory therapists) perceptions of and attitudes toward strategies for optimizing weaning, including adoption, implementation, and effectiveness of strategies such as weaning protocols, guidelines, and weaning teams?
3. What are the weaning experiences of patients and patients' family members?

Study Types

Qualitative studies of health care personnel who provided care during the weaning process and of patients and patients' family members who

experienced weaning in the ICU (adult and children) were included in the review. Typical of scoping reviews, the inclusion criteria were based on the relevance of the studies rather than on the quality. Empirical studies (primary studies or part of larger, mixed-method studies) were included if qualitative methods were used. Study types included participant and nonparticipant observation, interviews (1 on 1 or focus group), and case studies underpinned by theoretical frameworks such as phenomenology, ethnography, grounded theory, action, and narrative research. Quantitative surveys that included content analysis of open-ended questions were included. Studies with quantitative designs (randomized and controlled clinical trials, cohort and case-control studies), commentaries, editorials, and individual opinion papers were excluded.

Data Sources

Indexed and nonindexed publications and gray literature (material with no bibliographical information) for January 1, 1990, to August 31, 2012,

were reviewed. Studies were not excluded on the basis of language. Electronic databases included Medline, CINAHL, EMBASE, ISI Web of Science and Conference Proceedings, and PsycINFO. Gray literature sources included BIOSIS, Scirus, Scientific Web-Plus, ScienceWatch, US Department of Health and Human Services (National Guideline Clearing House, Annotated Bibliographies, Expert Commentaries, Guideline Syntheses), Google, MSN, ProQuest Dissertations and Theses, ProQuest Nursing and Allied Health Source, and ProQuest Biological Science. The website www.healthtalkonline.org was searched to identify gray literature on patients' experience. Additional sources included websites of relevant professional societies and conference abstracts from annual meetings of the Society of Critical Care Medicine, American Association of Critical-Care Nurses, Australian and New Zealand Intensive Care Society/Australian College of Critical Care Nurses, and the American Thoracic Society for January 2006 to August 2012. PubMed was used for a citation search of relevant articles, and reference lists were examined.

Selection of Studies and Data Extraction

Two of the investigators (J.J. and L.R.) independently examined titles and abstracts to identify eligible studies. Full-text articles considered potentially relevant by either investigator were obtained and examined for eligibility. Disagreements were resolved through discussion with a third investigator (B.B.).

Two investigators (K.D. and L.R.) independently extracted study data by using a standardized form and then met to achieve consensus. Data included the country where the study was performed, methodological approach, methods of data collection and analysis, phenomena of interest, setting, sample inclusion and exclusion criteria, study findings (themes and subthemes), and conclusions. Extraction of these data were deemed necessary to address the research questions, confirm study eligibility, and provide a clear summary of each study. Data extractors were not blinded to study citations.

Collation of Findings

As recommended by Levac et al,⁹ 3 steps were used to collate results. First, for *analyzing the data*, spreadsheets of descriptive characteristics were generated, including citation information; country; setting; participants; and themes, subthemes, and conclusions reported by the author or authors of each article. Studies were grouped according to type of respondent (patient, nurse, physician, health care provider) on the basis of presumed differences in the perspectives of each type of respondent. Thematic

content analysis of themes and subthemes reported by the author or authors of included studies was done to identify common categories and themes within these categories. Second, for *reporting results*, tables were generated according to the thematic analysis to provide an overview of the breadth of and commonalities within the main themes or categories of included studies and to identify gaps in evidence. Third, for *applying meaning to the results*, recommendations for practice, policy, and future research were developed on the basis of the analyses.

Results

A total of 8350 references were screened. After duplicates and obviously ineligible references were excluded, 117 full-text articles were retrieved, and 42 eligible studies were identified. An additional study was identified through reviews of conference abstracts (Figure 2).

Characteristics of Included Studies

Characteristics of included studies are shown in Table 1. The 2 studies,^{10,11} 1 of which was a secondary analysis of the first, that reported experiences of patients' family members also reported the perspectives of patients and health care providers on family presence. Only 1 study³⁰ addressed weaning of children. A range of qualitative methods was used, including ethnographic or phenomenological approaches, case study, thematic content analysis, and a qualitative exploratory design similar to qualitative descriptive analysis⁵³; however, most publications lacked detailed description of study methods. Several investigators claimed to use a grounded theory approach, although most used only constant comparative analysis techniques rather than full execution of this method (ie, theory generation).⁵⁴

The 2 most frequently described aims were understanding decision-making processes and the lived experience of patients during the weaning process from various perspectives. Other stated primary aims were to evaluate the impact of weaning protocols, technology in the weaning process, and organizational behavior related to successful implementation of weaning protocols.

Categories and Related Themes

Synthesized data from studies included in the review were grouped according to type of participant are presented in Tables 2 through 5. Column headings represent categories generated as a result

One of the goals was to understand decision-making processes and patient's experiences.

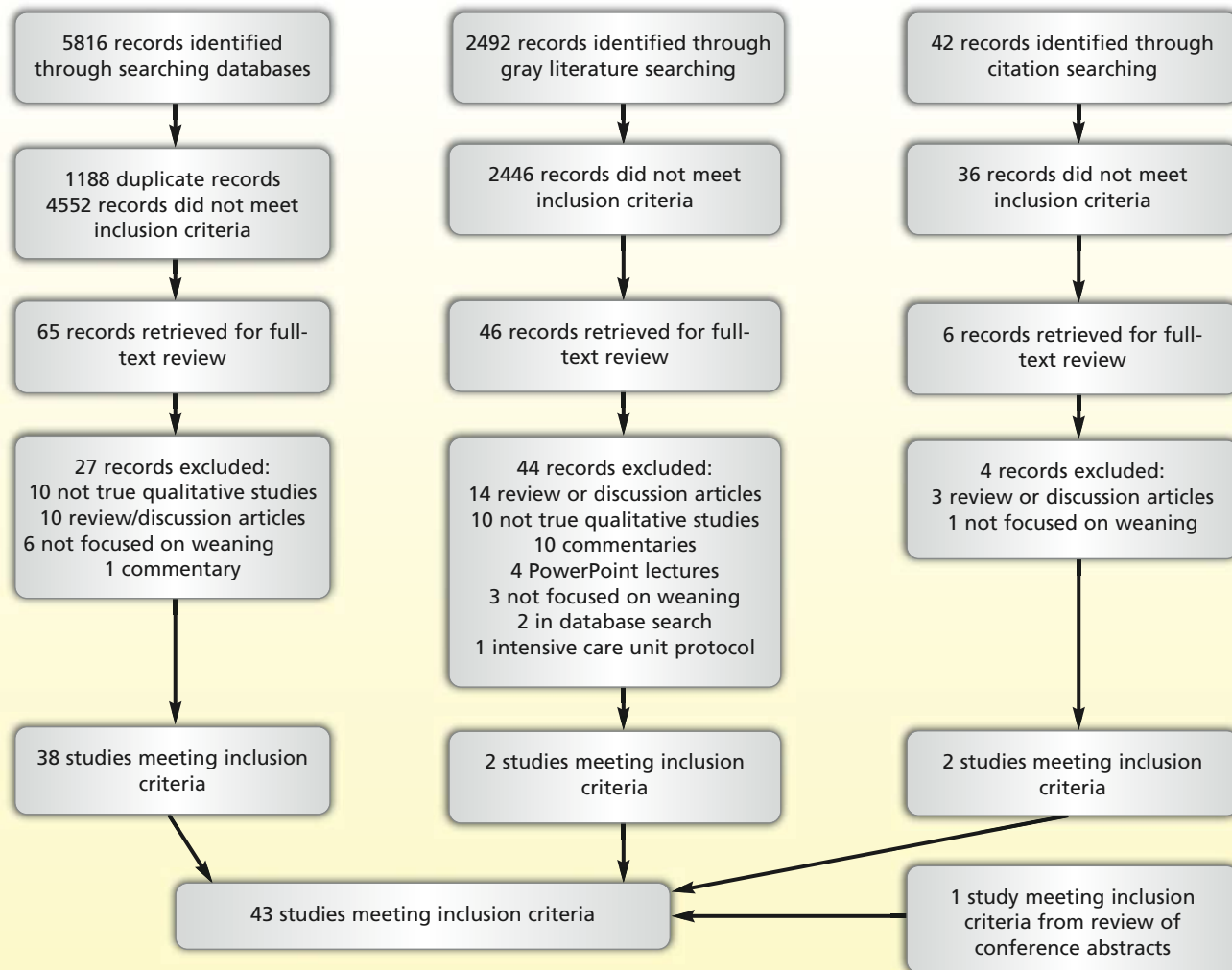


Figure 2 Search flow diagram. Studies that did not use a theoretical framework to guide study design and data evaluation, did not provide interpretation of data, or used qualitative methods but analyzed data quantitatively were excluded.

of thematic analysis. Data described in cells are the themes and subthemes identified by the authors of the included studies.

Question 1: Factors Influencing the Weaning Process. For studies in which only nurses were included in the study sample, themes identified by the author or authors or the studies were grouped into 3 categories: nurses' role or scope of practice, informing decision making, and influence on weaning outcome (Table 2). For nurses' role and scope of practice, the themes identified were issues of credibility, accountability, and autonomy within a team and unwritten rules and boundaries that influence nurses' role and scope of practice. Nurses' role and scope of practice were explored from various perspectives, including the advantages and stressors of assuming a role in weaning management, the influence of technology, and weaning-related decision making. For the category informing decision making, 3 themes were identified:

objective information, subjective information, and decision-making tools related to weaning. For the category influence on weaning outcome, 4 themes were identified: nurse-patient relationship, understanding the work of weaning, patients' role in weaning, and role of the interprofessional team in weaning.

For studies that integrated perspectives from various health care providers, themes identified by the author or authors of the articles were grouped into 3 categories: role or scope related to weaning, factors that influence weaning decisions or use of protocols, and organizational structure or practice environment (Table 3). Lack or presence of understanding and respect for interprofessional roles and the respective impact of this lack or presence on weaning outcomes was the theme ascribed to role or scope related to weaning. For factors that influence weaning decisions or use of protocols, 3 themes were identified: knowledge, experience, or interpretation and the

influence on competency and autonomy within the team; context of the decision; and the need to combine and/or balance subjective and objective information for decision making. Lack or presence of consistency, collaboration, communication, and organizational support and influence of the lack or presence on weaning outcomes was the theme identified for organizational structure or practice environment.

Themes identified by the author or authors of studies of physician respondents consisted of 2 categories: physicians' perceptions of nurses' role or scope of practice and tools or factors to facilitate weaning decisions (Table 4). Themes for physicians' perceptions of nurses' role or scope of practice were nurses' competence, nurses' experience, and interaction with nurses. Themes for tools or factors to facilitate weaning decisions included protocol- or tool-related issues, objective and subjective information, timing of weaning, and teamwork or team interaction.

Question 2: Perceptions of Weaning Strategies. Data from studies of nurse respondents specific to weaning protocols indicated that perceived usefulness of the protocols was influenced by nurses' level of experience and type of patient and that protocols should be used in conjunction with experiential knowledge and understanding of patients' experiences. Studies of health care providers that addressed implementation of weaning protocols indicated that protocols were perceived to provide a framework that increased nurses' participation, promoted interprofessional communication, standardized the weaning process, and legitimized nurses' role. Negative perceptions focused on inconsistent adherence, protocol rigidity and relevance, and apathy. In 2 studies,^{46,47} the investigators examined physicians' perceptions specific to weaning protocols and found both favorable and unfavorable perceptions. Diversity of opinion was expressed about whether protocols served as a prompt or decreased physicians' focus on weaning. Issues of rigidity and difficulty with application in a heterogeneous population of patients were raised.

Although studies that provided content analysis of open-ended questions within quantitative surveys were excluded from the thematic grid, similar issues were detected in terms of role and scope of practice, collaboration, the need for systematic processes as well as individualization, potential influences on weaning outcome, patient data used to inform decision making and factors influencing use of protocols.

Question 3: Patients' and Patients' Family Members' Experience of Weaning. Themes identified by the author or authors of studies of patients' experience were grouped into 4 categories: experience of

Table 1
Characteristics of the 43 studies included

Characteristic	No. (%) ^a
Participants	
Nurses only ¹⁰⁻²⁴	15 (35)
Range of health care professionals ²⁵⁻³⁵	11 (26)
Patients only ³⁶⁻⁴⁵	10 (23)
Physicians only (intensivists or anesthesiologists working in intensive care units) ⁴⁶⁻⁴⁹	4 (9)
Patients' family members ^{50,51}	2 (5)
Patients and nurses ⁵²	1 (2)
Study country	
United Kingdom ^{10,12,13,15,25,28,31,34,42,45}	10 (23)
United States ^{11,27,32,33,35,38,44,49-51}	10 (23)
Scandinavia (Denmark, Norway, Sweden)	9 (21)
Canada ^{17-19,21,39,41,52}	7 (16)
Australia ^{22,30,48}	3 (7)
Ireland, Italy, Taiwan, and South Africa ^{20,24,36,40}	4 (9)
Study design	
Participant interviews only ^{14,16-21,24,25,29,30,34-39,41,42,44-48,50,52}	25 (58)
Participant interviews and observation ^{12,13,27,28,31-33,40}	8 (19)
Open-ended questions within surveys ^{10,11,15,23,26,49}	6 (14)
Secondary data analysis ^{22,40,51}	3 (7)
Case study ⁴³	1 (2)
Method	
Thematic content analysis ^{10,11,16,20,22,25,27,29,30,37,44-46,48,52}	15 (35)
Phenomenological method ^{14,15,23,35,36,38,40,43,47,51}	10 (23)
Ethnography ^{12,13,24,28,31,32,49,50}	8 (19)
Grounded theory ^{17-19,21,34,39,41}	7 (16)
Case study ^{26,42}	2 (5)
Unclear ³³	1 (2)

^a Because of rounding, not all percentages total 100.

mechanical ventilation and weaning, experience of the ICU environment, psychological phenomena, and enablers of weaning success (Table 5). Themes for experience of mechanical ventilation and weaning were physical discomfort, impaired communication, and patient work. Negative aspects of both the physical environment and staff interaction were themes under the category experience of the ICU environment. Themes for psychological phenomena were fear, lack of control, realization of death, and concepts of self (ie, the effect on a patient's sense of identity). Themes for enablers of weaning success included the role of health care providers, patients' family members, self (ie, the patient), and faith. For the 2 studies (1 primary⁴⁹ and 1 secondary⁵⁰ analysis of the first study) that included members of a patient's family, 1 category was detected: duality of the positive and negative influence of family presence and surveillance on weaning success and anxiety management.

Discussion

Most reviews of weaning from mechanical ventilation have examined only quantitative data

Table 2
Weaning from the perspective of nurses^a

Study ^b	Nurses' role or scope of practice	Informing decision making	Influence on weaning outcome
Carasa, ⁵¹ 2003	<ol style="list-style-type: none"> 1. <i>Role advantages</i> (learning [interactions with interprofessional team], being a team, earning own space, helping patients) 2. <i>Role stressors</i> (creating own space, caring for patients and their families, perceiving ventilator paradox [prolonging life or suffering], end-of-life issues) 	—	<ol style="list-style-type: none"> 1. <i>Knowing the patient</i> (coordinating self-care, leading, being led, perceiving nurse practitioner-patient as human connection)
Crocker and Scholes, ¹² 2009	—	<ol style="list-style-type: none"> 1. <i>Knowing the patient</i> (individualized care) 	<ol style="list-style-type: none"> 1. <i>Continuity of care</i> (weaning often delayed due to lack of continuity) 2. <i>Role of the patient in weaning</i> (little partnership between patient and staff)
Crocker and Timmons, ¹³ 2009	<ol style="list-style-type: none"> 1. <i>Nursing-technology relation: definition of technology</i> (how equipment used, who had jurisdiction, level of illness and geographical place) 2. <i>Nursing-technology relation in weaning: a technology transferred</i> (doctor to nurse; intensive care unit [ICU] to high-dependency unit, junior to senior nurse) 3. <i>The nursing-technology relation in weaning: a technology transformed</i> (technology to improve care/patient outcomes as opposed to just as medical technology transferred to them) 	—	
Eckerblad et al, ¹⁴ 2009	—	<ol style="list-style-type: none"> 1. <i>The intuitive and interpretive strategy</i> (autonomy, accommodation, distraction [instantaneous planning, intuitive acting, superiority of patient, physical and emotional presence]) 2. <i>The instrumental strategy</i> (mechanical-technical strategy, physiological evaluation [protocol-driven planning, medical knowledge, physical presence, emotional distance, information]) 	<ol style="list-style-type: none"> 1. <i>The cooperative strategy</i> (teamwork, relationships, nursing plan, internal relations, interpersonal approach, dialogue)
Gelsthorpe and Crocker, ¹⁵ 2004	<ol style="list-style-type: none"> 1. <i>Decision making</i> (professional accountability, experience, justification for decision, protocol vs professional judgment) 	<ol style="list-style-type: none"> 1. <i>Pathophysiological factors</i> (time of day; changes in physical parameters; improvement in organ function; comorbidity; preparation for weaning) 	<ol style="list-style-type: none"> 1. <i>Multidisciplinary working</i> (support)
Hansen and Severinsson, ¹⁶ 2007	—	<ol style="list-style-type: none"> 1. <i>Usefulness of weaning protocols</i> (provided continuity, saved time, enhanced feelings of safety and, when prescribed, represented a goal that motivated staff) 2. <i>Barriers to protocol use</i> (lack of interest, continuity, collaboration, and information) 3. <i>Approaches to barriers</i> (action, waiting, low priority) 	
Hurlock-Chorostecki, ¹⁷ 2002	<ol style="list-style-type: none"> 1. <i>Nurses' roles in weaning</i> (soldier nurse, nurse advocate) 	<ol style="list-style-type: none"> 1. <i>The weaning puzzle</i> (technical survey, contemplating big picture) 	<ol style="list-style-type: none"> 1. <i>Managing comfort and weaning</i> (steps toward extubation, anything for success)

Continued

Table 2
Continued

Study ^b	Nurses' role or scope of practice	Informing decision making	Influence on weaning outcome
Jenny and Logan, ¹⁸ 1992	—	<ol style="list-style-type: none"> 1. <i>Context and causal conditions leading to knowing the patient</i> (ability to perform work of weaning [degree of ventilator dependence and effect on capacity to work, willingness to collaborate, preparation for working], weaning as collaborative venture with clearly identified patient functions: communicating self-status, participating in treatment decisions, cooperating with treatment plan, and regulating breathing efforts) 2. <i>Intervening conditions affecting knowing the patient</i> (patients' attributes, time spent with patient, nurses' professional expertise/empathy) 3. <i>Consequences</i> (situational control; authority for nurses' judgment, decisions, and actions) 4. <i>Patient resources</i> (needed for work of weaning [level of motivation to wean, personal preferences, style of coping, and habitual stressors]) 5. <i>Patient readiness</i> (physical and emotional components [patients' comfort/willingness to work]) 6. <i>Patient work</i> (tolerance for work/need for rest) 	<ol style="list-style-type: none"> 1. Strategies for knowing the patient (perceiving and envisioning, communicating, self-presentation, showing concern)
Jenny and Logan, ¹⁹ 1994	—	<ol style="list-style-type: none"> 1. <i>Knowing the patient</i> (assessment of current status, prediction of patient responses, gaining trust) 	<ol style="list-style-type: none"> 1. <i>Understanding the work of weaning</i> (patient readiness, comfort vs fatigue, successful weaning) 2. <i>Managing patient energy</i> (ensuring energy resources, reducing energy demands, directing energy expenditure)
Lavelle and Dowling, ²⁰ 2011	<ol style="list-style-type: none"> 1. <i>Nurses' experience, confidence, education</i> (experience, confidence, education and knowledge, scope of practice, intuition) 2. <i>The ICU working environment</i> (medical colleagues, nature of ICU nursing) 	<ol style="list-style-type: none"> 1. <i>Physiological influences</i> (patient assessment, oxygen, ventilator settings, use of diagnostic tests) 2. <i>Clinical reassessment and decision making</i> (arterial blood gas values, respiratory distress, cardiovascular system and the patient) 3. <i>Medical history and current mechanical ventilation</i> (medical history, the "patient themselves," psychological factors) 4. <i>Using a weaning protocol</i> (helpful to junior staff, hinders more experienced staff, need for individualization, waste of time for easy-to-wean patients) 	—
Logan and Jenny, ²¹ 1990	—	<ol style="list-style-type: none"> 1. <i>Comfort</i> (baseline state from which nurses judge patients' ability to continue with weaning) 2. <i>Readiness</i> (recognition of readiness to wean) 	<ol style="list-style-type: none"> 1. <i>Work of weaning</i> (efforts of patient to communicate, collaborate, and cooperate) 2. <i>Rest</i> (providing, conserving, or restoring patient energy levels to the point where work of weaning could resume) 3. <i>Energy utilization</i> (role of nurse and patient in managing energy supply and demand collaborative and reciprocal) 4. <i>Failure</i> (influence of failure on future weaning attempts [diminished trust in nurses and their judgments, reluctance to try to wean again, depression, increased anxiety in general, increased demand for nurse's presence])

Continued

Table 2
Continued

Study ^b	Nurses' role or scope of practice	Informing decision making	Influence on weaning outcome
Vaerland and Kristoffersen, ²³ 2011	—	<ol style="list-style-type: none"> 1. <i>Weaning and protocol</i> (use in combination with other knowledge, needs to include patients' experience) 2. <i>Weaning and nursing</i> (cooperation with patient, reassuring patient, "knowing the patient," touching) 3. <i>Weaning and experience</i> (experience, judgment, expertise) 4. <i>Weaning and collaboration</i> (joint point of departure for how weaning should be handled) 	—
Villa et al, ²⁴ 2012	<ol style="list-style-type: none"> 1. <i>Collect data and suggest a decision</i> (stable patients: nurses make recommendations to doctor to start weaning according to certain clinical criteria, wait for approval, then manage weaning and extubation process; unstable patients: doctor makes decision and manages weaning and extubation process directly) 2. <i>Standardize competence</i> (ability to propose a decision in accordance with clinical data and context of rules considered essential) 3. <i>Maintain adherence to unwritten rules</i> (process of identifying eligible patients, data collection, and responsibilities expected of each role [novice nurse, expert nurse, and doctor] based on unwritten rules stabilized over time) 	—	—

^a Themes/categories/clusters as named by the authors of the articles are in italics; information in parentheses is either subthemes or theme description. Dashes = not applicable.

^b Studies by Blackwood and Wilson-Barnett,¹⁰ Clochesy et al,¹¹ and Rose et al²² were excluded from the thematic grid. These studies were surveys that incorporated comments from open-ended questions that were not developed into themes or categories.

describing efficacy of spontaneous breathing trials, weaning modes, and care based on protocols^{2,55} to identify clinical strategies that enable successful weaning. Our objective was to assess the range of qualitative literature that includes contextual issues, clinicians' perceptions of tools to promote timely weaning, and psychosocial aspects such as the experiences of patients and patients' family members. We found several studies (n = 43); however, research objectives and perspectives were disparate. We identified only 1 study of weaning in children, so our findings primarily relate to weaning of adult ICU patients. Studies were divided between those that identified factors important to individualized care and experience and those that investigated methods of standardizing care, such as objective parameters

for decision making or use of weaning protocols and guidelines. This characteristic made interpretive synthesis difficult, and thus we opted to generate a narrative summary to comprehensively map knowledge provided by the included studies.

We found several key themes across studies. The critical role of subjective knowledge, (knowing the patient) in association with objective clinical data was reported in several studies, highlighting the need to individualize the weaning process. Ethnographic studies indicated that weaning decision making is a social interactive process between health care providers and patients that involves assimilation of objective and subjective data influenced by context. Although the importance of this subjective knowledge and social interaction, primarily acknowledged

Table 3
Weaning from the perspective of various health care providers^a

Study ^b	Factors influencing weaning decisions and use of protocols	Role or scope related to weaning	Organizational structure and practice environment
Egerod, ²⁶ 2003	1. <i>Contextual factors influencing nurses' participation</i> (education and experience, collaboration, tradition and values, degree of change, complexity of change, risk to nurse and patient; equipment)	1. <i>Complexity of nurses' independent decisions</i> (assumption that nurses performed least complex and doctors most complex ventilator alterations, nurses made more ventilator changes than doctors perceived, boundaries for nurses' informal range of authority were self-imposed because independent interventions were not formally prescribed)	—
Hancock and Easen, ²⁸ 2006	1. <i>Nurses' knowledge of criteria for weaning and extubation</i> (clinical assessment skills beyond tangible physiological assessment, knowledge differences based on experience) 2. <i>Education</i> (systematic, scientific knowledge given privileged status, focus on instrumental learning or task-oriented problem solving, questions and enquiry discouraged)	—	1. <i>Compliance with unit-based practice</i> (unable to question, challenge, or change practice; socialization through mentoring) 2. <i>Culture, power, leadership, responsibility</i> (collaboration only surface level, hierarchy of decision making; subthemes: nurse grade, experience, willingness to take responsibility, ability to take responsibility, patient's condition, resources)
Hansen and Severinsson, ²⁹ 2009	—	—	1. <i>Need for strategies aimed at improving quality of care (core theme)</i> (interprofessional learning: perform weaning and learning together; quality control of care; team discussion, written documentation, and standardized methods, continuity needed for improving quality of care; unclear understanding of responsibility; teamwork and communication: lack of interprofessional collaboration incorporating time for discussing, reflecting on, measuring, and reporting weaning outcomes rare or nonexistent)
Keogh, ³⁰ 2004 (pediatric)	1. <i>Practice (weaning) framework provided by weaning protocol</i> 2. <i>Practice development</i> (increased nurse input into care and level of confidence and autonomy as result of protocol) 3. <i>Practice interaction</i> (communication both within and between disciplines) 4. <i>Practice challenges</i> (resistance to change, blind following)	—	—

Continued

by nurses, may affect the outcome of weaning, quantifying or determining the impact is difficult. As a result, subjective knowledge is devalued in decisions about weaning interventions, which are more commonly based solely on objective criteria.

Another key theme was the influence of interprofessional collaboration, professional boundaries, roles, practice scope, and teamwork on weaning success. International variation exists in ICU organizations and philosophies of interprofessional

Table 3
Continued

Study ^b	Factors influencing weaning decisions and use of protocols	Role or scope related to weaning	Organizational structure and practice environment
Kydonaki, ³¹ 2011	<ol style="list-style-type: none"> 1. <i>Weaning assessment and management</i> (knowing the patient, gas exchange, work of breathing, level of consciousness, physiological attributes, signs of infection, weanable patient, accuracy in assessing weaning patients) 2. <i>Wean as able</i> (decisions that depended on nurse's interpretation of medical instruction "wean as able" and level of competency/ and autonomy for initiating weaning, adjusting ventilatory support, sustaining a spontaneous breathing trial [SBT], extubating, establishing a tracheostomy) 3. Maintaining a balance (managing sedation, physiotherapy, psychological support) 4. Documentation and use of protocols (guideline, standardized care, legal cover to base decisions) 	—	<ol style="list-style-type: none"> 1. <i>Organizational structure</i> (shift structure; workforce and staff allocation system) 2. <i>Interprofessional relationships</i> (collaborative and antagonistic pairings, support in decision making, authority in decision making)
McLean et al, ⁵² 2006	<ol style="list-style-type: none"> 1. <i>Awareness</i> (aware, not aware, aware via study, aware but not seen in practice) 2. <i>Strengths</i> (direction, accessibility, evidence-based practice, autonomy, improved communication) 3. <i>Limitations</i> (rigidity, inconsistent adherence, becomes outdated, induces apathy) 4. <i>Suggestions for improvement</i> (simple, clear, and user friendly; accessible and visible; initiate on admission; suit heterogeneous population; provide education on use; clarify SBT means low-level pressure support, does not require a physician's order) 	—	—
Myneni et al, ³² 2011	<ol style="list-style-type: none"> 1. <i>Misinterpretation of sedation scale</i> (when making weaning decisions) 2. <i>Lack of cognitive support/ knowledge issues with protocol mechanisms</i> 3. <i>Problems with on-time data delivery</i> 4. <i>Lack of adherence to computerized weaning protocol</i> 	—	—

Continued

collaboration. For example, differences exist in nurse and physician staffing models, specialty education for nurses, decision-making hierarchy, and assignment of roles and responsibilities for weaning.^{56,57} Perceptions of nurses' experience and competence were key themes related to physicians' perspectives

of nurses' role, the impact of the perceptions on weaning success, and the usefulness of weaning protocols. Physicians often defined or limited nurses' scope of practice in relation to weaning on the basis of these perceptions rather than using interprofessional collaborative discussion to define this.

Table 3
Continued

Study ^b	Factors influencing weaning decisions and use of protocols	Role or scope related to weaning	Organizational structure and practice environment
O'Bryan et al, ³³ 2002	—	1. <i>Multidisciplinary model</i> (comprising experienced, highly skilled, and knowledgeable individuals; mutual respect across disciplines; multidisciplinary philosophy—all patients challenged physically and psychologically early in hospitalization to improve weaning success; each discipline clearly understood roles of all team members)	1. <i>Consistent management practices</i> (consistent approach following specific sequence of events driven by patient physiology; all hospitals had weaning criteria, policies, and procedures but not consistently used; consistency related to collaboration of experienced multidisciplinary team) 2. <i>Communication and collaboration</i> (among all disciplines via daily or weekly informal or formal mechanisms such as multidisciplinary care conferences with documentation of plans) 3. <i>Organizational support</i> (administrators committed to retention of experienced staff, personal and regular contact with all levels of staff, administrators actively involved in daily hospital activities and successes)
Taylor, ³⁴ 2006	1. <i>Decision-making techniques</i> (hypothetico-deductive, concept of balance, pattern matching, trial and error) 2. <i>Treatment</i> (optimizing patient, returning to previous norm, treatment alongside weaning) 3. <i>Balance</i> (physiological margin, work and rest, compensation) 4. <i>Making progress</i> (assessing, changing, reassessing; maintaining progress achieved; gradualism) 5. <i>The individual</i> (patients' responses, medical history, working with patient)	—	—

^a Themes/categories/clusters as named by the authors of the articles are in italics; information in parentheses is either subthemes or theme description. Dashes = not applicable.

^b Studies by Bruton et al²⁵ and Ely et al²⁷ were excluded from the thematic grid. These studies were surveys that incorporated comments from open-ended questions that were not developed into themes or categories.

Most studies with a focus on patients were appropriately phenomenological, and the focus was lived experience of being weaned from mechanical ventilation. These studies elucidated the extreme physical and psychological challenges of weaning and underscored how horrible the experience can be for patients, regardless of how well weaning proceeds clinically. As well, a description of the roles of patients' family members and health care providers from the patients' perspectives provides insight into the influence of clinicians' behaviors and organizational structure on the weaning process. These data provide a strong reminder to clinicians and researchers that understanding and considering the experiences of patients

and patients' family members are crucial to development of interventions aimed at weaning success.

Studies that included health care providers were more diverse than studies that included patients and patients' family members. Studies that included physicians were clinically oriented and primarily sought opinions on procedures and decision making for weaning readiness. Studies that included interviews of nurses and other health care providers focused on experiential understanding of the weaning process. This focus may reflect differences in underlying care philosophies or role expectations of the various professions but also indicates the need for investigations with reverse aims, for example,

Table 4
Weaning from the perspective of physicians^a

Study ^b	Physicians' perception of nurses' role or scope of practice	Tools and factors to facilitate weaning decisions
Blackwood et al, ⁴⁵ 2004	1. <i>Professional boundaries</i> (education, experience, and control)	1. <i>Information required for weaning decisions and clinical judgment</i> (empirical objective information, empirical subjective information, and abstract information) 2. <i>Protocol issues</i> (good guidelines, prompted review for weaning, issues of rigidity, heterogeneity of patient population) 3. <i>Timing of weaning</i> (when to wean, speed of weaning, timing of decision to extubate, and organizational management issues)
Hansen and Severinsson, ⁴⁶ 2009	1. <i>Ambivalence</i> (directing—giving orders, doctor collaborates with nurse) 2. <i>Continuity and professional competence</i> (rotation between units, experienced nurses more competent)	1. <i>Acceptance</i> [of protocolized weaning] (effective, prompt, common understanding and language) 2. <i>Indignant responses</i> [to protocolized weaning] (decreased focus on weaning, doctors use because nurses like it, own understanding, weaning cannot be generalized)
Pettersson et al, ⁴⁷ 2012	1. <i>Structural strategy</i> (competence = good skills and work experience for nurses and anesthesiologists; organization = anesthesiologists' perceptions of responsibility distinguished them from each other; nurses' responsibility to implement plan and manage collaboration; more knowledgeable and experienced nurses able to work more independently)	1. <i>Instrumental strategy</i> (optimization of patients' physiological function by nursing intervention, medication, and technical tools) 2. <i>Interacting strategy</i> (physician's interaction with patient and patients' family members, psychological support, teamwork) 3. <i>Process-oriented strategy</i> (goal-related = individual weaning goals for patients; progress monitored, evaluated, and reassessed during daily rounds; individual adjustment = not possible to have single strategy for each individual)

^a Themes/categories/clusters as named by the authors of the articles are in italics; information in parentheses is either subthemes or theme description.
^b The study by Rose and Presnell⁴⁸ was excluded from the thematic grid. This study was a survey that incorporated comments from open-ended questions that were not developed into themes or categories.

how physicians experience the weaning process or interact with patients undergoing weaning.

Recommendations for Practice, Policy, and Future Research

We have several recommendations. Interprofessional collaboration, team communication that includes patients and patients' family members, and care continuity should be prioritized to promote successful weaning. Systematic approaches that enable timely assessment of readiness for weaning and extubation and of the progression of weaning should be adaptable to individual needs and responses of patients. Clinicians and policy makers should consider the physical and psychological effect of prolonged weaning and promote patient- and family-centered strategies that incorporate collaborative goal setting and consider the role of therapeutic family presence. The usefulness of strategies such as weaning protocols should be evaluated in light of the existing organizational structure and clinical environment before widespread adoption is mandated.

A scoping review provides a map not only of existing literature but also of gaps in knowledge. We detected a need for improved understanding from

physicians' perspective because studies identified tensions associated with roles and scope of practice that may adversely influence weaning. Because weaning is a complex intervention influenced by various factors, well-designed qualitative studies to explore organizational factors such as interprofessional collaboration conducted alongside studies to examine effectiveness or implementation of strategies to optimize weaning are needed to evaluate the process of delivery and the effect on success.

Strengths, Weaknesses, and Challenges

On the basis of our review, we mapped existing qualitative literature, providing enhanced understanding of weaning from the perspectives of multiple key stakeholders and direction for clinical care, policy, and research. Strengths of our review are the application of highly systematic search methods, including an extensive search of gray literature with no language exclusions, and data extraction and mapping according to established methods for scoping reviews^{8,9} with input from authors with method and content expertise.

As in any review, we may have missed a small percentage of relevant studies. However, because of

Table 5
Weaning from the perspective of patients^a

Study ^b	Experience of mechanical ventilation and weaning	Experience of the intensive care unit	Psychological phenomena	Enablers of weaning success
Arslanian-Engoren and Scott, ³⁵ 2003	—	—	1. Endures traumatic experience (emotions ranging from scared, frightened to being angry)	1. <i>Relies on self-determination</i> 2. <i>Credits support and devotion of family</i> 3. <i>Finds comfort through religion or prayer</i> 4. <i>Praises health care providers</i> 5. <i>Derives reassurance from angelic encounters</i>
Carasa, ⁵¹ 2003	1. <i>Self-care work</i> (perceiving weaning as hard work, seeing ventilator as polarized, hoping and despairing)	—	1. <i>Fear</i> (inability to breathe during weaning process)	1. <i>Finding meaning</i> (depending on families, trusting caregivers; coping with the experience) 2. <i>Making a difference</i> (understanding nurse practitioner qualities, being the patient's voice)
Chen et al, ³⁶ 2009	1. <i>Dealing with unfamiliar contexts of weaning program</i> (feeling like a bystander, concern with disease severity and safety, clarification of questions) 2. <i>Release from self-breathing</i> (can breathe on one's own, relief from heavy burden)	—	1. <i>Experiencing various psychological responses and ambiguity of self-endurance</i> (breathlessness; fatigue [expenditure of mental and physical energy], sleeplessness [due to worry about weaning], feeling "out of control") 2. <i>Being tortured by helplessness</i> (withstanding stress, distress, frustration)	1. <i>Wondering whether to continue or give up</i> (health care providers' efforts, family members' expectations)
Engström, ³⁷ 2013	—	1. Being delivered into the hands of others (feeling vulnerable and dependent; struggling to communicate; feeling safe with staff; being cared for in an unknown environment)	—	1. That the unlikely was reality (relatives there and taken care of; memories/perception of time varied; appreciating diary/follow-up visit)
Jablonski, ³⁸ 1994	1. <i>Events preceding mechanical ventilation</i> 2. <i>Realization of respirator</i> 3. <i>Responses to endotracheal tube/tracheostomy (ETT/TT)</i> 4. <i>Physical care and therapies experienced</i> 5. <i>Communication</i> 6. <i>Role of significant others</i> 7. <i>Ventilation mishaps</i> 8. <i>Interactions between patients and health care providers</i> 9. <i>Process of weaning</i> 10. <i>Extubation and cessation of mechanical ventilation</i> 11. <i>Aftereffects of mechanical ventilation</i> 12. <i>Recommendations from patients</i>	—	1. <i>Proximity of death</i> 2. <i>Patients' responses to treatment</i> 3. <i>Effect of mechanical ventilation on senses</i>	—

Continued

Table 5
Continued

Study ^b	Experience of mechanical ventilation and weaning	Experience of the intensive care unit	Psychological phenomena	Enablers of weaning success
Jenny and Logan, ³⁹ 1996	<ol style="list-style-type: none"> 1. <i>Physical discomfort</i> (pain and discomfort of ETT/TT, prolonged immobility) 2. <i>Patient work</i> (weaning and recovery, managing breathing and emotions, enduring, coping) 	—	<ol style="list-style-type: none"> 1. <i>Altered self</i> (not usual self, alienation, displacement, disorientation, fear, far from daily routine) 	<ol style="list-style-type: none"> 1. <i>Nurse caring</i> (positive images of nurses' caring to enhance patients' comfort)
Jordan et al, ⁴⁰ 2002	<ol style="list-style-type: none"> 1. <i>Experiences of patients related to process of mechanical ventilation itself</i> (physical discomfort of being intubated [pain and discomfort, thirst], inability to communicate effectively, having suctioning during mechanical ventilation, process of weaning, various emotions experienced while receiving mechanical ventilation [helplessness and dependency], awareness of own mortality) 	<ol style="list-style-type: none"> 1. <i>Experiences of environment while receiving mechanical ventilation</i> (staff caring for them, physical environment [noise, lighting, machinery, and equipment, ward rounds, other patients, sleep deprivation]) 	—	—
Logan and Jenny, ⁴¹ 1997	<ol style="list-style-type: none"> 1. <i>Sense making</i> (cognitive activities related to self-orientation, threat perception, and understanding the situation) 	—	<ol style="list-style-type: none"> 1. <i>Enduring</i> (physical, cognitive, and emotional activities involved in tolerating painful or frightening situations persisting over time) 2. <i>Preserving self</i> (cognitive and emotional activities aimed at sustaining personal integrity and overcoming feelings of alienation) 	<ol style="list-style-type: none"> 1. <i>Controlling responses</i> (conscious efforts to cooperate with treatment and achieve weaning goals, to control breathing, and to resist succumbing to negative emotions)
Schou and Egerod, ⁴³ 2008	<ol style="list-style-type: none"> 1. <i>General phenomena</i> (discomfort, impaired communication) 	<ol style="list-style-type: none"> 1. <i>Existential phenomena</i> (temporality, human interaction) 	<ol style="list-style-type: none"> 1. <i>Psychological phenomena</i> (loss of control, loneliness) 	—
Wunderlich et al, ⁴⁴ 1999	<ol style="list-style-type: none"> 1. <i>Discomfort</i> (endotracheal tube, restraints) 2. <i>Inability to communicate</i> (frustration, need for better 2-way communication, more consideration of individual's needs) 	—	<ol style="list-style-type: none"> 1. <i>Feeling afraid</i> (lack of information, never having treatment with mechanical ventilation stop) 	—

^a Themes, categories, and clusters as named by the authors of the articles are in italics; information in parentheses is either subthemes or theme description. Dashes = not applicable.

^b The study by Pattison and Watson⁴² was excluded from the thematic grid because it was a case study without developed themes or categories.

our extensive search strategy guided by librarian expertise, we think it unlikely that we missed important data. Scoping reviews differ from other types of systematic reviews in that they are designed to map existing literature without quality assessment or

extensive data synthesis. To this end, we chose to synthesize only major themes of included studies to enable data presentation rather than impose our own analysis. This synthesis might have misrepresented or oversimplified the original interpretation

of the data. Metasynthesis of qualitative data pertaining to each of our 3 research questions will further extend our understanding of current evidence. As an extension of this scoping review, we are now completing a metasynthesis of studies specific to weaning protocols.⁵⁸

Conclusion

This review highlights various subjective and contextual influences that influence the weaning process. Consistent themes included the importance of interprofessional collaboration and communication, need for subjective knowledge of the patient involved combined with objective clinical data, need to balance systematic processes that reduce weaning delays with the individual needs of patients and patients' family members, and appreciation of the physical and psychological work of patients. Although these themes may be considered predictable and well recognized, often they are ignored in the design and evaluation of strategies to improve weaning outcomes. Gaps in knowledge included better understanding of physicians' perspectives and the influence of interprofessional relationships and ICU context on weaning outcomes and the experiences of patients and patients' families.

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CNE Test Test ID A142305: Weaning From Mechanical Ventilation: A Scoping Review of Qualitative Studies

Learning objectives: 1. List 3 key factors that influence ventilator weaning. 2. Define a scoping review. 3. Describe the steps in conducting a scoping review.

1. How is using a scoping review helpful in evaluating research?

- a. Scoping reviews allow rapid mapping of key concepts underpinning a research area.
- b. Scoping reviews allow the researchers to synthesize quantitative data effectively.
- c. Scoping reviews are more in-depth than a metasynthesis.
- d. Scoping reviews are useful in examining the comprehensive data available in simple studies.

2. Which of the following types of studies were included in the scoping review?

- a. High quality randomized-controlled trials
- b. Empirical studies that used quantitative methods
- c. Commentaries and individual opinion papers
- d. Participant and nonparticipant observations and interviews

3. Which of the following types of data were excluded from the study?

- a. Gray literature
- b. Studies not written in English
- c. Conference abstracts from professional societies
- d. Quantitative studies with no content analysis of open-ended questions

4. Which of the following statements regarding the selection of studies is true?

- a. Both investigators had to agree that an article was relevant before obtaining the full-text study.
- b. Disagreements on study eligibility were discussed with a third investigator to achieve consensus.
- c. Data extraction was performed by 2 investigators working together.
- d. Data extractors were blinded to the study citations.

5. The investigators followed Levac's 3 steps of data collation. Which of the following occurred in step 2 of the investigative process?

- a. Tables were created to assist in identifying commonalities of themes.
- b. Recommendations for practice were identified according to subthemes of the studies.
- c. Spreadsheets were reviewed to determine themes, subthemes, and conclusions.
- d. Gaps in practice were outlined in the tables.

6. Once the results were tabulated, the most commonly described aims of the studies included which of the following?

- a. Studies involving weaning tolerance of children
- b. Discussing the impact of technology in weaning
- c. Describing the patient's experiences during weaning
- d. Organizational behavior in implementation of weaning protocols

7. Which of the following were common themes identified in studies that related to only nursing as well as studies related to integrated perspectives from various health care providers?

- a. Influence of technology
- b. Role and scope of practice
- c. Consistency in protocol application
- d. Competencies for weaning

8. In studies examining perceptions of weaning strategies, which of the following were associated with negative perceptions?

- a. Consistent adherence to protocols
- b. Increased participation by the staff
- c. Rigidity in protocol applications
- d. Interpersonal communication increases

9. Which of the following themes were associated with enabled weaning success by patients and families?

- a. The role of the patient, the patient's family, and faith in the process
- b. The role of fear and lack of control by the patient
- c. The concept of identity and death
- d. The presence of family during weaning

10. Which of the following is a consistent theme discovered through the scoping review?

- a. The lack of importance of interprofessional collaboration and communication
- b. The importance of rigid adherence to the weaning protocols
- c. The need to incorporate subjective knowledge over objective clinical findings
- d. The appreciation of the physical and psychological work done by patients during weaning

11. Which of the following countries conducted most of the studies reviewed?

- a. The United States and the United Kingdom
- b. The United Kingdom and Canada
- c. Scandinavia and Canada
- d. The United States and Australia

12. In conducting the scoping review, which stage is an iterative process that uses qualitative content analysis?

- a. Selecting the studies
- b. Charting the data
- c. Collating, summarizing, and reporting results
- d. Seeking consultation

13. Which of the studies in the review identified professional boundaries of the staff as a theme?

- a. Hansen and Severinsson, 2009
- b. O'Bryan et al, 2002
- c. Taylor, 2006
- d. Blackwood et al, 2004

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Objective 2 was met	<input type="checkbox"/>	<input type="checkbox"/>
Objective 3 was met	<input type="checkbox"/>	<input type="checkbox"/>
Content was relevant to my nursing practice	<input type="checkbox"/>	<input type="checkbox"/>
My expectations were met	<input type="checkbox"/>	<input type="checkbox"/>
This method of CE is effective for this content	<input type="checkbox"/>	<input type="checkbox"/>
The level of difficulty of this test was:		
<input type="checkbox"/> easy <input type="checkbox"/> medium <input type="checkbox"/> difficult		
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