A faint, light blue ECG (heart rate) line graphic is overlaid on the dark blue grid background, running horizontally across the page.

LONG-TERM MECHANICAL VENTILATION

Toolkit for Adult Acute Care Providers
Critical Care Services Ontario | November 2013

Developed by Critical Care Services Ontario (CCSO)

The Long-Term Mechanical Ventilation Toolkit for Adult Acute Care Providers is the result of a collaborative effort between CCSO, led by Dr. Bernard Lawless [Provincial Lead, Critical Care and Trauma], and a group of experts in the domain of long-term ventilation.

CCSO established the Long-Term Ventilation Planning Committee to identify issues and priorities related to long-term ventilation in the province. Educational and training materials were collated and curated to form this toolkit targeted to acute care providers.

How to Use This Document

There are many resources available for acute care providers. The tools included in this document have been suggested by the provincial Prolonged-ventilation Weaning and Long-Term Ventilation Centres of Excellence, and this toolkit is not meant to be exhaustive. The tools are recommended; however, CCSO is not mandating how they should be used in practice. Please be aware that the terms long-term ventilation (LTV) and long-term mechanical ventilation (LTMV) are used interchangeably throughout this document.

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CCSO is funded by the Government of Ontario

Acknowledgements

We wish to thank the following organizations for their support and guidance in the development of this toolkit.

Toronto East General Hospital

[Provincial Prolonged-ventilation Weaning Centre of Excellence]

West Park Healthcare Centre

[Long-Term Ventilation Centre of Excellence]

The Ottawa Hospital

Kingston General Hospital

Parkwood Hospital

Toronto Central Community Care Access Centre

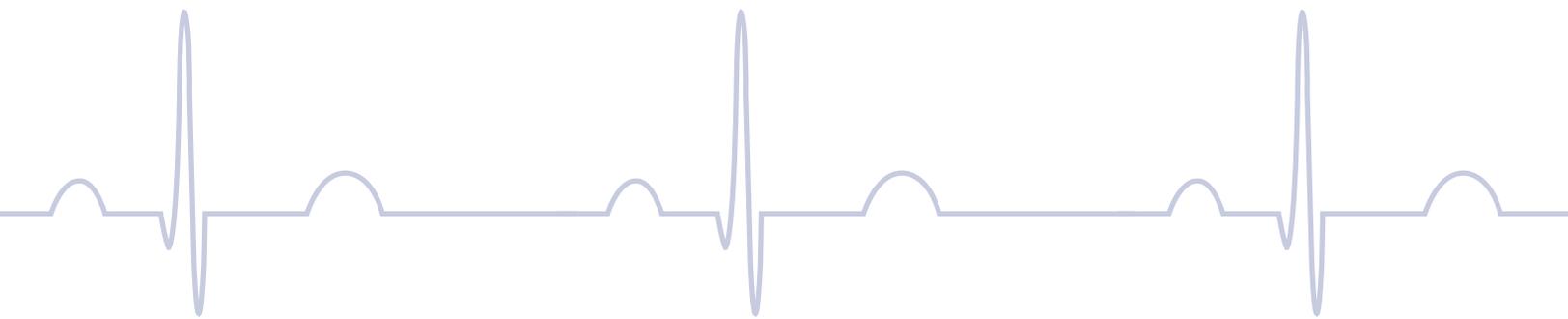
Toronto Central Local Health Integration Network

CritiCall Ontario

Ministry of Health and Long-Term Care

Please see Appendix A for a list of committee members.

Disclaimer: *The contents of this toolkit may change over time. Clinicians should use sound judgment for individual patient encounters. The provincial Prolonged-ventilation Weaning and LTV Centres of Excellence [Toronto East General Hospital and West Park Healthcare Centre] and Critical Care Services Ontario strongly recommend practices that are evidence-based. This toolkit will be updated periodically as additional evidence becomes available.*

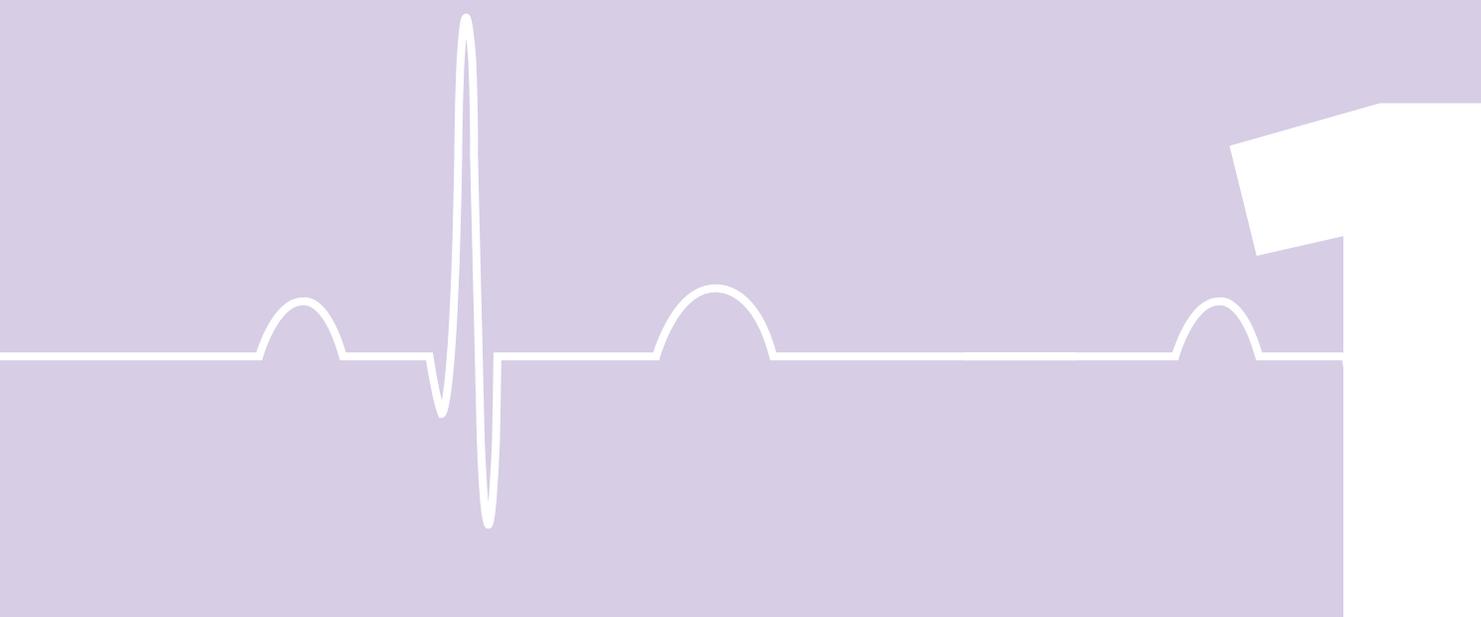


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Critical Care Services Ontario | November 2013

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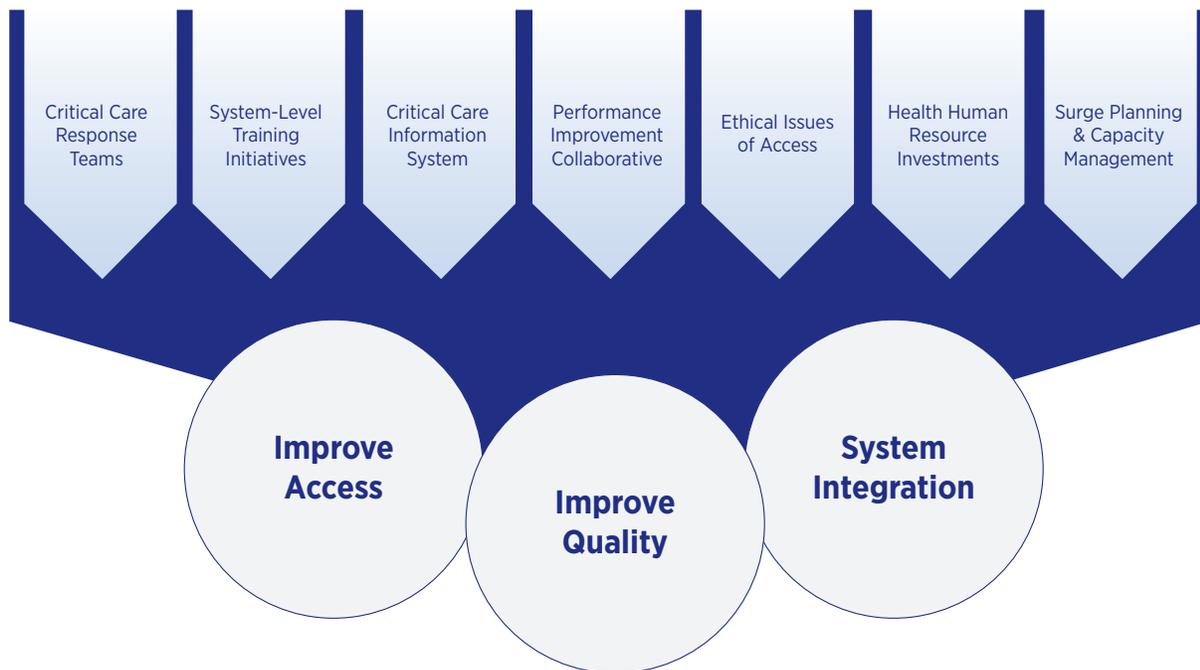


Introduction

1.1 Ontario’s Critical Care Strategy

Following Ontario’s battle with Severe Acute Respiratory Syndrome (SARS), the Ministry of Health and Long-Term Care (MOHLTC) convened a group of system leaders to conduct a comprehensive review of critical care services in the province. This process culminated in the release of the Ontario Critical Care Steering Committee’s Final Report (available at: www.criticalcareontario.ca) in March 2005 which sets out a blueprint for the transformation of Ontario’s critical care services. In January 2006, the MOHLTC announced Ontario’s Critical Care Strategy, a seven-fold strategy to improve Access, Quality and System Integration (see Figure 1). With successful implementation of strategy initiatives, work on system level coordination of services has expanded to include other program areas which rely upon access to critical care services including neurosurgery, trauma and burns, paediatric critical care and chronic ventilation. Accordingly, the Critical Care Secretariat has evolved into Critical Care Services Ontario to support this broader mandate.

Figure 1. Ontario’s Critical Care Strategy



During its research, the Ontario Critical Care Steering Committee discovered that many intensive care unit (ICU) beds were being occupied by mechanically ventilated patients who were otherwise medically stable. These patients required access to rehabilitation and community support services, rather than critical care services. Unfortunately, there appeared to be no adequate setting for these long-term ventilated (LTV) patients outside the ICU.

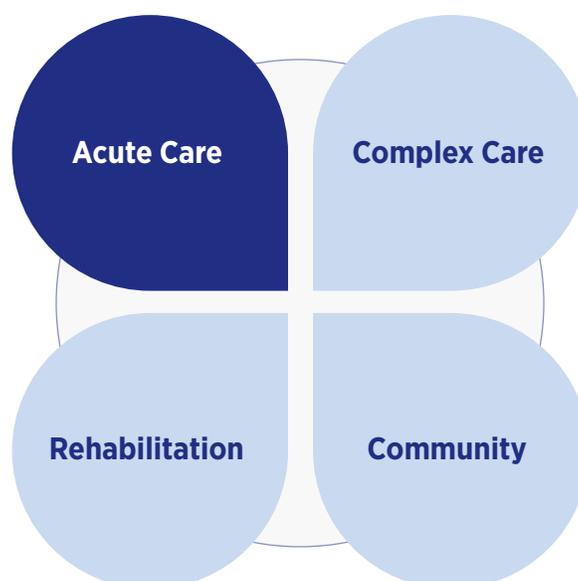
Following the acceptance of the Ontario Critical Care Steering Committee’s Final Report, the MOHLTC established the Ontario Critical Care Expert Advisory Panel to oversee all aspects of the Critical Care Strategy.

The Expert Advisory Panel established the Chronic Ventilation Strategy Task Force in order to address the issues pertaining to long-term ventilation in the province. The immediate priority was to identify effective strategies to facilitate the transfer of medically stable, mechanically ventilated patients out of ICUs and into a more appropriate care setting.

Critical Care Services Ontario remains committed to supporting LTV patients in Ontario and improving access to care.

Critical Care Services Ontario formed the Long-Term Ventilation Planning Committee in August 2012 with the initial goal of developing a Long-Term Ventilation strategy. The Long-Term Ventilation Planning Committee examined issues across the continuum of care for LTV patients, recognizing the various sectors with which this patient population may interface. It was agreed by the committee to focus initially on the acute care sector and to develop this toolkit of resources and practices to help guide Ontario’s acute care service providers in caring for mechanically ventilated patients.

The continuum of care for LTV patients is depicted below:



Long-term mechanically ventilated patients in the ICU are either (a) medically stable and awaiting transfer to an alternate care setting (outside the ICU), or (b) not medically stable and in need of critical care services.

Ultimately, the vision is to have no **stable** mechanically ventilated patients in any ICU in Ontario – only those patients who require critical care services should be there. Still, quality care must be available for all patients who are situated in the ICU.

1.2 The Unique Needs of Mechanically Ventilated Patients

There are three main categories of diagnosis for patients who become ventilator dependent:

1. Acute respiratory distress syndrome (ARDS)
2. Chronic obstructive pulmonary disease (COPD)
3. Non-obstructive ventilatory failure, which includes the following conditions:
 - a) Degenerative neuromuscular diseases (NMDs)
 - b) Thoracic cage deformities (e.g. kyphoscoliosis)
 - c) High spinal cord injury

LTV patients may require invasive or non-invasive ventilation. Some patients will require mandatory or elective ventilation. For the medically stable LTV patient, the acute care setting is usually not an appropriate environment.

1.3 Data Analysis: Mechanically Ventilated Patients in Ontario’s ICUs

Purpose: Data was obtained from the Critical Care Information System (CCIS) to inform the development of this toolkit.

Time Period: January 1, 2009 – December 31, 2012

Population: Level 3 ICU patients (adults only)

Table 1. Key Facts

This table displays the number of patients mechanically ventilated during the time period, and the total number of mechanically ventilated patient days.

Time Period	Number of Patients Age: 18-64	Number of Patients Age: 64+	Total Number of Patients	Total Number of Mechanically Ventilated Patient Days	Ratio: Average Mechanically Ventilated Days per Patient
≥1 Day	51,108	73,565	124,673	568,165	4.56
≥21 Days	1,363	2,707	4,070	141,288	34.71
≥3 Months	22	59	81	11,692	144.3
≥6 Months	5	13	18	4,646	258.1
≥1 Year	1	1	2	1,134	567

Note: In CCIS, any patient that is mechanically ventilated for <1 day will be counted as 1 day.

- As shown in the table above, **124,673 patients** were mechanically ventilated during the specified time period. Among them, **4,070 patients** were mechanically ventilated for 21 days or more.
- ≥21 days is the point at which patients are considered to be “long-term mechanically ventilated.”** Patients in this category may be (a) medically stable and awaiting transfer to an alternate care setting (outside the ICU), or (b) not medically stable and in need of critical care services.

Table 2. Duration of Mechanical Ventilation

This table focuses on patients who required short-term versus long-term mechanical ventilation in Ontario’s ICUs.

Time Period	Number of Patients Age: 18-64	Number of Patients Age: 64+	Total Number of Patients	Total Number of Mechanically Ventilated Patient Days	Ratio: Average Mechanically Ventilated Days per Patient
<21 Days	49,745	70,858	120,603	426,877	3.5
Long-Term Mechanical Ventilation					
≥21 Days	1,363	2,707	4,070	141,288	34.7
≥3 Months	22	59	81	11,692	144.3
≥6 Months	5	13	18	4,646	258.1

- Those patients who were mechanically ventilated for <21 days typically stayed in ICUs for **5.75 days** (Average Length of Stay).
- Those patients who were mechanically ventilated for ≥ 21 days (LTV patients) required a total of **141,288 days of ventilation**.
- During the time period, **81 patients** were mechanically ventilated for ≥ 3 months and required **11,692 ventilated patient days**. If these 81 patients could have been treated as short-term mechanical ventilation patients, and transferred to an alternate care setting (outside the ICU) for additional ventilation support, a minimum of **1,952 additional patient admissions** could have been facilitated to acute care units.

Note

Number of Patient Admissions =

(Total Number of Mechanically Ventilated Days for Patients who were on ventilation for ≥ 3 months) / (Average Length of Stay for Patients who were on mechanical ventilation for <21 days)

= 11,692/5.75 = 2,033

Additional Patient Admissions = 2,033 - 81 = 1,952

- During the time period, **18 patients** were mechanically ventilated for ≥ 6 months and required **4,646 ventilated patient days**. If these 18 patients could have been treated as short-term mechanical ventilation patients, and transferred to an alternate care setting (outside the ICU) for additional ventilation support, a minimum of **790 additional patient admissions** could have been facilitated to acute care units.

Note

Number of Patient Admissions =

(Total Number of Mechanically Ventilated Days for Patients who were on ventilation for ≥ 6 months) / (Average Length of Stay for Patients who were on mechanical ventilation for <21 days)

= 4,646/5.75 = 808

Additional Patient Admissions = 808 - 18 = 790

1.4 Orientation to the Toolkit

Purpose

Caring for mechanically ventilated patients is a fundamental component of clinical practice in the ICU. This toolkit summarizes resources and practices, developed by the provincial Prolonged-ventilation Weaning and LTV Centres of Excellence and other institutions, in weaning and long-term ventilation. In addition, the toolkit provides examples of successful tools and strategies to help guide Ontario’s acute care service providers in caring for mechanically ventilated patients.

Target Audience

This toolkit is intended for use by frontline healthcare providers, Unit Managers, Nursing Administrative and Medical Directors who are directly or indirectly involved with patient care in a critical care environment.

Structure of the Toolkit:

The diagram below outlines the structure of the toolkit and the topic areas that will be covered in each section.

Topics Covered in the Toolkit

Section 2: Early Identification of Patients at Risk for LTMV	Section 3: Optimizing Weaning for Patients Requiring LTMV	Section 4: Supportive Care for Medically Stable LTMV Patients
<div data-bbox="228 1079 557 1157" style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center;"> Assessment of At-Risk Patients </div>	<div data-bbox="621 1079 950 1157" style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center;"> Weaning Protocol </div>	<div data-bbox="1013 1079 1341 1157" style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center;"> Mobilization Protocol </div> <div data-bbox="1013 1184 1341 1262" style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center; margin-top: 10px;"> “De-medicalization” </div> <div data-bbox="1013 1289 1341 1367" style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center; margin-top: 10px;"> Transfer to Alternate Care Settings </div>

Key Messages of the Toolkit

Section 2: Early Identification of Patients at Risk for LTMV

- Early identification of patients for weaning can be an important mechanism for preventing long-term mechanical ventilation.

Section 3: Optimize Weaning for Patients Requiring LTMV

- A patient-focused individualized care plan should be developed which addresses specific components of a successful weaning program.

Section 4: Supportive Care for Medically Stable LTMV Patients

- Mobilization and “de-medicalization” of LTMV patients may improve their probability of successful weaning and functional recovery, helping to reduce their stay in an acute care hospital and enable transition to a more appropriate setting.

Definitions

The tables below outline the key definitions that will be used throughout the toolkit.

Please note: there are various definitions of these terms in the literature. For the purposes of this toolkit, the following definitions will be used.

1. Types of Mechanical Ventilation

Term	Definition	Source
Invasive Ventilation	Any form of invasive mechanical/assisted ventilation.	Critical Care Information System Policy Guide [version 2.0]
Non-Invasive Ventilation	Any form of non-invasive mechanical/assisted ventilation. Examples include BiPAP and CPAP.	Critical Care Information System Policy Guide [version 2.0]

2. Key Intervals for Mechanical Ventilation

Term	Definition	Source
“At Risk” Patient in the ICU	Mechanically ventilated patients in the ICU who may progress to long-term mechanical ventilation.	CCSO Advisory Committee
Long-Term Mechanical Ventilation	Ventilation for >21 days.	Critical Care Unit Balanced Scorecard Toolkit

Please note: long-term mechanical ventilation may be referred to as “chronic ventilation” or “prolonged ventilation” in the literature.

3. Processes Associated with Mechanical Ventilation

Term	Definition	Source
Weaning	Weaning refers to the liberation from mechanical ventilation with resumption of spontaneous sustainable breathing. (This may include transition from invasive mechanical ventilation to non-invasive modes of mechanical ventilation).	McConville, J.F.,Kress, J.P., “Weaning patients from the ventilator”. N Engl J Med 2012; 367:2233-2239
Mobilization	Mobilization refers to passive and active range of movement exercises, transfers, walking, and bed mobility. The benefits of early mobilization of mechanically ventilated patients have been reported in many publications.	Schweickert, W.D., Kress, J.P. “Implementing early mobilization interventions in mechanically ventilated patients in the ICU”. Chest. 2011;140(6): 1612-1617

Abbreviations

The table below outlines the main abbreviations that will be used throughout the toolkit.

Abbreviations
CCSO – Critical Care Services Ontario
ICU – Intensive Care Unit
IV – Invasive Ventilation
MOHLTC – Ministry of Health and Long-Term Care
NIV – Non-Invasive Ventilation
LTV – Long-Term Ventilation
LTMV – Long-Term Mechanical Ventilation
VEP – Ventilator Equipment Pool
ADP – Assistive Devices Program
LTVCOE – Long-Term Ventilation Centre of Excellence
SDM – Substitute Decision Maker



Early Identification of
Patients at Risk for LTMV

2. Early Identification of Patients at Risk for LTMV

Purpose of this Section

Assess ICU patients at risk for long-term mechanical ventilation in a timely and thorough manner.

Tools Included in this Section

- 2.1) Factors Associated with Ventilator Dependence
- 2.2) Prolonged/Long-Term Mechanical Ventilation ICU Checklist
- 2.3) Long-Term ICU Stay Screening Tool
- 2.4) ProVent Prediction Summary

Topics Covered in the Toolkit

Section 2: Early Identification of Patients at Risk for LTMV	Section 3: Optimizing Weaning for Patients Requiring LTMV	Section 4: Supportive Care for Medically Stable LTMV Patients
<div data-bbox="228 842 518 909" style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; text-align: center;"> Assessment of At-Risk Patients </div>	<div data-bbox="574 842 863 909" style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; text-align: center;"> Weaning Protocol </div>	<div data-bbox="927 842 1216 909" style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; text-align: center;"> Mobilization Protocol </div> <div data-bbox="927 932 1216 999" style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; text-align: center; margin-top: 10px;"> “De-medicalization” </div> <div data-bbox="927 1022 1216 1089" style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; text-align: center; margin-top: 10px;"> Transfer to Alternate Care Settings </div>

Early identification of ICU patients who are at risk for LTMV is a key step in optimizing any possibility of avoiding a need for prolonged ventilation. The tools provided in this section aim to assist acute care providers in fulfilling this objective.

“At-risk patients” are those that have not yet advanced to the stage where LTMV is required. Some of the conditions that put patients at-risk include:

- “Chronic disorders associated with recurrent respiratory failure including parenchymal lung disease, the most common being COPD, thoracic restriction (kyphoscoliosis) and non-obstructive ventilatory failure due to degenerative neuromuscular diseases.
- Repeated failure to wean following acute respiratory failure associated with critical illness. Weaning failure may be the result of acquired neuromuscular weakness and acute lung injury/ acute respiratory distress syndrome (ARDS) for patients with no previous history of respiratory disease, or in combination with previous morbidity.
- Absent or severely impaired spontaneous breathing such as obesity hypoventilation syndrome and hypoventilation due to depressed central ventilatory drive and high spinal injury.”

Source: <http://www.stmichaelshospital.com/crich/sru/sru-ventilation>

Assessment Tools at a Glance

2.1) Factors Associated with Ventilator Dependence

Name of Tool	Factors Associated with Ventilator Dependence (page 20)
Purpose of Tool	To identify factors which are potentially reversible or medically optimized and may be contributing to ventilator dependence.
Intended Use	Identifying the etiology for ventilator dependence is important in designing strategies to liberate patients from mechanical ventilation. It is evident that numerous factors contribute to ventilator dependence, and acute care professionals may use this tool to identify potentially reversible factors.
Source	MacIntyre NR, Epstein SK, Carson S, et al. Management of patients requiring prolonged mechanical ventilation: report of a NAMDRC consensus conference. Chest. 2005;128:3937-3954

2.2) Prolonged/Long-Term Mechanical Ventilation ICU Checklist

Name of Tool	Prolonged/Long-Term Mechanical Ventilation ICU Checklist (page 21)
Purpose of Tool	<ul style="list-style-type: none"> • To facilitate the early identification and assessment of at-risk patients • To optimize successful weaning • To confirm the need for long-term ventilation outside the ICU
Intended Use	This tool can be used as a weekly checklist by the ICU inter-professional team to support decision-making around high quality patient-centered care and enhance early identification, support successful weaning and consider the need for long-term ventilation outside the ICU.
Source	Provincial Prolonged-ventilation Weaning Centre of Excellence [Toronto East General Hospital]

2.3) Long-Term ICU Stay Screening Tool

Name of Tool	Long-Term ICU Stay Screening Tool (page 26)
Purpose of Tool	To identify those patients who are at risk of remaining long-term in the ICU and to prepare appropriately for their care and management.
Intended Use	This tool can be used to screen patients and identify actions or consults appropriate for those medically stable patients whose actual or anticipated ICU stay is >/21 days or those patients where need for a tracheostomy is anticipated.
Source	London Health Sciences Centre

2.4) ProVent Prediction Summary

Name of Tool	ProVent Prediction Summary (page 27)
Purpose of Tool	To identify patients requiring prolonged mechanical ventilation who are at high risk of 1-yr mortality.
Intended Use	This tool can be used on day 21 of mechanical ventilation. When paired with clinical judgment, this model may increase clinicians' ability to discuss the likely outcomes of treatment and to tailor care to achieve patient-centered goals.
Source	Carson SS, Kahn JM, Hough CL, Seeley EJ, White DB, Douglas IS, Cox CE, Caldwell E, Bangdiwala SI, Garrett JM, Rubinfeld GD; ProVent Investigators. A multicenter mortality prediction model for patients receiving prolonged mechanical ventilation. Crit Care Med. 2012 Apr; 40(4):1171-6

2.1) Factors Associated with Ventilator Dependence



Name of Tool	Factors Associated with Ventilator Dependence
Purpose of Tool	To identify factors which are potentially reversible or medically optimized and may be contributing to ventilator dependence.
Intended Use	Identifying the etiology for ventilator dependence is important in designing strategies to liberate patients from mechanical ventilation. It is evident that numerous factors contribute to ventilator dependence, and acute care professionals may use this tool to identify potentially reversible factors.
Source	MacIntyre NR, Epstein SK, Carson S, et al. Management of patients requiring prolonged mechanical ventilation: report of a NAMDRG consensus conference. Chest. 2005;128:3937-3954

Identify reversible factors guided by review of table below.

Systemic factors
<ul style="list-style-type: none"> Chronic comorbid conditions (e.g., malignancy, COPD, immunosuppression) Overall severity of illness Non-pulmonary organ failure Poor nutritional status
Mechanical factors
<ul style="list-style-type: none"> Increased work of breathing Reduced respiratory muscle capacity <ul style="list-style-type: none"> Critical illness polyneuropathy Steroid myopathy Disuse myopathy Isolated phrenic nerve/diaphragmatic injury (e.g., after surgery) Imbalance between increased work of breathing and respiratory muscle capacity Upper airway obstruction (e.g., tracheal stenosis) preventing decannulation
Iatrogenic factors
<ul style="list-style-type: none"> Failure to recognize withdrawal potential Inappropriate ventilator settings leading to excessive loads/discomfort Imposed work of breathing from tracheotomy tubes Medical errors
Complications of long-term hospital care
<ul style="list-style-type: none"> Recurrent aspiration Infection (e.g., pneumonia, sepsis) Stress ulcers Deep venous thrombosis Other medical problems developing in the PMV care venue
Psychological factors
<ul style="list-style-type: none"> Sedation Delirium Depression Anxiety Sleep deprivation
Process of care factors
<ul style="list-style-type: none"> Absence of weaning (and sedation) protocols Inadequate nursing staffing Insufficient physician experience

2.2) Prolonged/Long-Term Mechanical Ventilation ICU Checklist



Name of Tool	Prolonged/Long-Term Mechanical Ventilation ICU Checklist
Purpose of Tool	<ul style="list-style-type: none"> • To facilitate the early identification and assessment of at-risk patients • To optimize successful weaning • To confirm the need for long-term ventilation outside the ICU
Intended Use	This tool can be used as a weekly checklist by the ICU inter-professional team to support decision-making around high quality patient-centered care and enhance early identification, support successful weaning and consider the need for long-term ventilation outside the ICU.
Source	Provincial Prolonged-ventilation Weaning Centre of Excellence [Toronto East General Hospital]

The checklist on the following page covers topics which are addressed in later sections of the toolkit (i.e. weaning and transition protocols.) For assessment purposes, please focus on section 1 only.

Prolonged/Long-term Mechanical Ventilation ICU Checklist – 2013

Patient _____

Day 1 Ventilation (yy/mm/dd) // Week 2 3 4 5 6 7 8 9 10__

Inter-professional ICU team to complete weekly

1. Confirm Prolonged Mechanical Ventilation (PMV)

	Yes	No
Is the patient medically stable apart from ventilatory support? (If No, Stop here) TM	<input type="checkbox"/>	<input type="checkbox"/>
Reversible factors identified by team? (see next page)	<input type="checkbox"/>	<input type="checkbox"/>
Risk of PMV confirmed? (If No, Stop here)	<input type="checkbox"/>	<input type="checkbox"/>
Prognosis and treatment options have been shared with patient/family?	<input type="checkbox"/>	<input type="checkbox"/>
If prognosis and goals are unclear, Palliative Care has been consulted for assistance (if available)	<input type="checkbox"/>	<input type="checkbox"/>

2. Optimize Successful Weaning

	Yes	No
Transfer of care to specialized inter-professional centre/unit/team? (if feasible)	<input type="checkbox"/>	<input type="checkbox"/>
Intact bulbar function confirmed in neuromuscular disease patients?	<input type="checkbox"/>	<input type="checkbox"/>
If Yes to above, has extubation to continuous non-invasive ventilation been considered?	<input type="checkbox"/>	<input type="checkbox"/>

Individualized Care Plan charted for?

	Yes	No
Weaning	<input type="checkbox"/>	<input type="checkbox"/>
Communication with patient	<input type="checkbox"/>	<input type="checkbox"/>
Mobilization	<input type="checkbox"/>	<input type="checkbox"/>
Nutrition	<input type="checkbox"/>	<input type="checkbox"/>
Minimal Sedation	<input type="checkbox"/>	<input type="checkbox"/>
Psychological state (Anxiety, Delirium, Depression, Sleep)	<input type="checkbox"/>	<input type="checkbox"/>

Continuity of weaning plan ensured from

day to day	<input type="checkbox"/>	<input type="checkbox"/>
weekday to weekend	<input type="checkbox"/>	<input type="checkbox"/>
week to week	<input type="checkbox"/>	<input type="checkbox"/>

Over last week, on daily basis

Progress documented in weaning chart accessible to entire team?	<input type="checkbox"/>	<input type="checkbox"/>
Weaning progress towards previous day's weaning targets been reviewed every morning?	<input type="checkbox"/>	<input type="checkbox"/>
Patient progressively mobilized from passive to active movement including daily ambulation?	<input type="checkbox"/>	<input type="checkbox"/>
Reason for each failed weaning trial been documented?	<input type="checkbox"/>	<input type="checkbox"/>
Expert advice obtained from Prolonged-ventilation Weaning Centre?	<input type="checkbox"/>	<input type="checkbox"/>

3. Confirm Need for Long-term Mechanical Ventilation (LTMV)

	Yes	No
Multiple failed weaning trials with optimized care & expert advice obtained?(If No, Go to previous section)	<input type="checkbox"/>	<input type="checkbox"/>
Prognosis and treatment options have been shared with patient/family?	<input type="checkbox"/>	<input type="checkbox"/>
If prognosis and goals are unclear, Palliative Care has been consulted for assistance (if available)	<input type="checkbox"/>	<input type="checkbox"/>
If appropriate, transitioned to palliative care?	<input type="checkbox"/>	<input type="checkbox"/>
Need for LTMV outside ICU confirmed? (see definition on next page) (If No, Stop here)	<input type="checkbox"/>	<input type="checkbox"/>

Transition protocols to LTMV care been implemented for?

Non-invasive Ventilation	<input type="checkbox"/>	<input type="checkbox"/>
Invasive LTMV in community	<input type="checkbox"/>	<input type="checkbox"/>
Institutional Invasive LTMV	<input type="checkbox"/>	<input type="checkbox"/>
Transfer of care to a LTMV specialized centre/unit/team?	<input type="checkbox"/>	<input type="checkbox"/>
Has Expert advice for LTMV been obtained?	<input type="checkbox"/>	<input type="checkbox"/>

Overview – Prolonged/Long-Term Mechanical Ventilation ICU Checklist

The Prolonged/Long-Term Mechanical Ventilation ICU Checklist was developed by the team at the Provincial Prolonged-ventilation Weaning Centre of Excellence at Toronto East General Hospital to support decision-making around high quality patient-centered care.

The checklist is designed to:

- Facilitate the early identification of patients at-risk for prolonged mechanical ventilation;
- Optimize weaning in order to minimize the need for long-term mechanical ventilation; and
- Improve patient outcomes as well as palliative end-of-life care if appropriate.

The checklist is structured for weekly completion by the inter-professional ICU team to standardize and implement best practices in care.

The checklist consists of three sequential parts:

1. Confirm Prolonged Mechanical Ventilation;
2. Optimize Successful Weaning; and
3. Confirm Need for Long-Term Mechanical Ventilation

NOTE: If the patient is acutely critically ill or palliative end-of-life care is being provided, then this should be the focus of care and the team should defer use of this checklist.

Step 1: Confirm Prolonged Mechanical Ventilation

- Before day 21 of ICU stay (often into the second week of an ICU stay), experienced clinicians should consider if the patient is at risk for prolonged mechanical ventilation. Often this is associated with the decision to perform a tracheostomy. As part of this anticipatory approach with standardized acute weaning (**see Appendix E regarding VAP/CLI Prevention**), potentially reversible factors to ventilatory dependence should be considered and managed¹ (**see Tool 2.1**). This list should be used as a guide and not as a substitute for individual clinician expertise and judgment. The screening for prolonged ventilation can also be done using another checklist (**see Tool 2.3**).
- If the patient is at high risk for prolonged mechanical ventilation by clinical judgment supplemented by a validated prognostic scale² (**see Tool 2.4**) this assessment should be documented in the medical record and shared with the patient or substitute decision maker (SDM).
- As long-term survival and decreased quality of life are very real considerations for this patient population, it is important to share these potential long-term outcomes with the patient or SDM. A discussion about long-term care goals should be documented.
- As part of the ongoing conversation with the patient or SDM, it is useful to document patient goals of care as well as whether the present treatment is likely to achieve these goals. If prognosis or goals are unclear, then palliative care consultation may be of assistance with decision-making, symptom control, and communication.

1 MacIntyre NR, Epstein SK, Carson S, et al. Management of patients requiring prolonged mechanical ventilation: report of a NAMDRG consensus conference. *Chest*. 2005;128:3937-3954

2 Carson, S. S., J. M. Kahn, et al. A multicenter mortality prediction model for patients receiving prolonged mechanical ventilation. *Critical Care Medicine* 2012;40(4): 1171-1176 <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3395423/>

Step 2: Optimize Successful Weaning

For information about weaning, please refer to Section 3: Optimize Weaning for Patients Requiring LTMV.

Step 3: Confirm Need for Long-Term Ventilation

- Before the need for long-term ventilation outside the ICU is confirmed by the care team and patient, it is essential that stability of co-morbid illnesses is established and multiple failed weaning trials with optimized care are confirmed. If there is any uncertainty about the latter, the Provincial Prolonged-ventilation Weaning Centre of Excellence at Toronto East General Hospital can be contacted for consultation.
- As the prognosis for survival may be poor or a negative impact on quality of life is possible, it is important to share these potential outcomes with the patient and family. As part of the ongoing conversation with the patient, it is also important to document the patient goals of care as well as whether the present treatment is likely to achieve these goals. If prognosis or goals are unclear, then palliative care consultation may be of assistance with decision-making, symptom control and communication.
- If long-term ventilation is the preferred option of the patient (or SDM), and the patient is medically stable (not requiring ongoing acute care in the ICU) the patient should be transferred as soon as possible to a location outside the ICU capable of ongoing care needs. Contacting local or provincial experts to facilitate this transfer should be done as soon as this is confirmed.
- Confirm the presence or absence of non-invasive ventilation prior to admission to critical care. Attempts at complete weaning will be inappropriate if nocturnal ventilation was required prior to admission.
- Transition protocols to ease the transition to non-acute care facilities or the community should be initiated in the ICU prior to transfer.

2.3) Long-Term ICU Stay Screening Tool



Name of Tool	Long-Term ICU Stay Screening Tool
Purpose of Tool	To identify those patients who are at risk of remaining long-term in the ICU and to prepare appropriately for their care and management.
Intended Use	This tool can be used to screen patients and identify actions or consults appropriate for those medically stable patients whose actual or anticipated ICU stay is >/= 21 days or those patients where need for a tracheostomy is anticipated.
Source	London Health Sciences Centre

Long Term ICU Stay Screening Tool

Screening Date: _____ (YYYY/MM/DD)		ICU Admission Date: _____ (YYYY/MM/DD)	
Hospital Admission Date: _____ (YYYY/MM/DD)		Age: _____	
Section A: Are any of the following predictors present?		Predictor Present	
<input type="checkbox"/> Actual ICU stay >/= 21 days <input type="checkbox"/> Anticipated ICU stay >/= 21 days <input type="checkbox"/> ICU tracheostomy anticipated within 7 days		<input type="checkbox"/> No	<input type="checkbox"/> Yes
Section B: Any ONE of the following disease categories present?		Morbidity Present	
Prior to Hospitalization <input type="checkbox"/> Chronic neuromuscular /spinal disease <input type="checkbox"/> Pre-hospital respiratory care <input type="checkbox"/> Non-invasive ventilation (e.g., BiPAP) <input type="checkbox"/> Invasive ventilation <input type="checkbox"/> Oxygen <input type="checkbox"/> Tracheostomy Current Hospitalization <input type="checkbox"/> Critical illness neuromyopathy (highly suspected or confirmed) <input type="checkbox"/> Spinal cord injury <input type="checkbox"/> Infusion of neuromuscular blocker > 2 days <input type="checkbox"/> Phrenic/diaphragm weakness/paralysis (highly suspected or confirmed)		<input type="checkbox"/> No	<input type="checkbox"/> Yes
Section C: Any THREE of the following disease categories present?		Morbidity Present	
<input type="checkbox"/> Chronic cognitive decline <input type="checkbox"/> Malnutrition <input type="checkbox"/> Recurrent aspirations <input type="checkbox"/> Complex wounds/open abdominal wounds <input type="checkbox"/> Congestive heart failure <input type="checkbox"/> Morbid obesity <input type="checkbox"/> CRRT/dialysis <input type="checkbox"/> COPD /emphysema <input type="checkbox"/> Failed extubation <input type="checkbox"/> Acute brain injury (e.g., SAH, stroke, encephalopathy, etc.)		<input type="checkbox"/> No	<input type="checkbox"/> Yes
Comments/Notes:			
Section D: Chronic Critically ill Determination		Action	
<input type="checkbox"/> "Yes" to Section A or B		<input type="checkbox"/> Consult required	<input type="checkbox"/> Notify Clinical Nurse Specialist ICU
<input type="checkbox"/> "Yes" to Section C only		Reassess in 7 days on Date: _____ (YYYY/MM/DD)	

2.4) ProVent Prediction Summary



Name of Tool	ProVent Prediction Summary
Purpose of Tool	To identify patients requiring prolonged mechanical ventilation who are at high risk of 1-yr mortality.
Intended Use	This tool can be used on day 21 of mechanical ventilation. When paired with clinical judgment, this model may increase clinicians' ability to discuss the likely outcomes of treatment and to tailor care to achieve patient-centered goals.
Source	Carson SS, Kahn JM, Hough CL, Seeley EJ, White DB, Douglas IS, Cox CE, Caldwell E, Bangdiwala SI, Garrett JM, Rubenfeld GD; ProVent Investigators. A multicenter mortality prediction model for patients receiving prolonged mechanical ventilation. Crit Care Med. 2012 Apr; 40(4):1171-6

ProVent Day 21 Mortality Prediction Score

Use the table below to assign point values to patients on day 21 of mechanical ventilation. For example, a patient over the age of 65 (2 points) on Vasopressors (1 point) and Hemodialysis (1 Point) will generate a total ProVent score of 4.

Scores can range from 0 – 5.

Categorical Variable	Points	On day 21 of mechanical ventilation
Age ≥ 65 years	2	
Age 50 - 65 years	1	
Platelets ≤ 150 x 10 ⁹ /L	1	
Vasopressors	1	
Hemodialysis	1	
	Total	

Once the ProVent Score is generated, use the table below to determine 1-yr mortality for patients according to their ProVent score.

ProVent Score	Number of Patients	Observed Mortality Percent (95% Confidence Interval)
0	72	20 (10-29)
1	60	36 (24-48)
2	78	56 (45-68)
3	36	81 (67 -94)
4 or 5	14	100 (77-100)

*Note: the values shown under the heading “Number of Patients” are for demonstrative purposes only.

Key Message – Section 2

Early identification of patients for weaning can be an important mechanism for preventing long-term mechanical ventilation.



Optimize Weaning for
Patients Requiring LTMV

3. Optimize Weaning for Patients Requiring LTMV

Purpose of this Section:

Optimize weaning for patients who require long-term mechanical ventilation in the acute care setting.

Tools Included in this Section:

- 3.1) Weaning Protocols
- 3.2) Weaning Chart

Topics Covered in the Toolkit

Section 2: Early Identification of Patients at Risk for LTMV	Section 3: Optimizing Weaning for Patients Requiring LTMV	Section 4: Supportive Care for Medically Stable LTMV Patients
<div style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; text-align: center; width: fit-content; margin: 10px auto;">Assessment of At-Risk Patients</div>	<div style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; text-align: center; width: fit-content; margin: 10px auto;">Weaning Protocol</div>	<div style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; text-align: center; width: fit-content; margin: 10px auto;">Mobilization Protocol</div> <div style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; text-align: center; width: fit-content; margin: 10px auto;">“De-medicalization”</div> <div style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; text-align: center; width: fit-content; margin: 10px auto;">Transfer to Alternate Care Settings</div>

Optimizing Successful Weaning:

- Successful weaning is more likely if treatment of any co-morbid illnesses or factors contributing to the need for prolonged ventilation are optimized.
- Although the evidence is unclear, it is reasonable to transfer the patient’s care to a different setting where the primary focus is on successful weaning and rehabilitation. As local circumstances dictate, this could mean transfer of care to: (1) a specialized inter-professional weaning centre located outside of the primary institution; (2) a specialized team within the same ICU; or (3) a unit within the same institution.
- The website of the Provincial Prolonged-ventilation Weaning Centre of Excellence (www.tegh.on.ca) provides useful material for clinical care and clinical research including a pre-assessment referral form, admission criteria, admission application form and transfer safety checklist. Since family engagement often contributes to successful outcomes in this patient population, the admission family questionnaire and meeting note record (with acknowledgement to work of the London Health Sciences ICU team) is also available (see **Appendix B**).

- In patients with neuromuscular disease and intact bulbar function, an alternative weaning strategy to be considered is extubation to continuous non-invasive ventilation.³ The CANVent program at the University of Ottawa has extensive experience with this approach.
- A carefully documented patient-focused individualized care plan should be developed which addresses specific components of a successful weaning program, including not only weaning strategies but also communication, mobilization, nutrition, minimal sedation and management of the patient's psychological state (i.e. anxiety, delirium, depression, sleep). New evidence now suggests tracheostomy mask weaning as opposed to pressure support weaning may reduce the duration of ventilation for this sub-population of patients.⁴ Examples of weaning and mobilization protocols from the Provincial Prolonged-ventilation Weaning Centre of Excellence are provided in Sections 3 and 4 (**see Tools 3.1 and 4.1**).
- The ventilator associated pneumonia (VAP) and central line infection (CLI) toolkit (**see Appendix E for further information**) provides a summary of patient safety interventions that should be continued in this group of patients.
- In keeping with the recommendations for a daily ICU checklist, setting of daily targets and ongoing documentation of weaning progress that is accessible to the inter-professional team ensures continuity of approach and readily identifies changes in patient status. This may involve the use of a whiteboard, weaning graphic chart (**see Tool 3.2**) or electronic health record equivalent. Early morning daily review of progress towards the previous day's targets for weaning and mobilization will also optimize weaning.
- Documentation of reasons for failed weaning trials will identify reversible factors, prevent repetition of unsuccessful strategies and support determination of prognosis. No evidence supports the number of failed optimized weaning trials that predicts the inability to wean, although an increasing number of failed trials indicates potential unweanability.
- If you have any questions about optimizing weaning or facilitating transfer to a specialized centre, you can obtain expert advice from the Provincial Prolonged-ventilation Weaning Centre of Excellence (416-469-6580 x 6841, fax 416-469-6611, email: pwc@tegh.on.ca, website: www.tegh.on.ca)
- The purpose of the Mobilization Protocol (**see Tool 4.1**) is to safely mobilize patients requiring ventilation to their maximum capacity, in order to improve their probability of successful weaning and functional recovery, helping to reduce their stay in an acute care hospital.

3 Bach JR, Goncalves MR, Hamdani I MD, Joao Carlos Winck JC Extubation of patients with neuromuscular weakness: a new management paradigm, Chest 2010 137(5):1033-9

4 Jubran A, Grant BJB, Duffner LA, Collins EG, Lanuza DM, Hoffman LA, Tobin MJ Effect of Pressure Support vs Breathing Through a Tracheostomy Collar on Weaning Duration in Patients Requiring Prolonged Mechanical Ventilation: A Randomized Trial JAMA 2013; 309(7):doi:10.1001/jama.2013.159

Weaning Tools at a Glance

3.1) Weaning Protocols

Name of Tool	Weaning Protocols (page 33)
Purpose of Tool	To detail a sequence of steps and strategies to reduce the duration of mechanical ventilation for patients.
Intended Use	These protocols are intended to provide clinicians with guidance on steps to follow in the process of discontinuing mechanical ventilation and giving a patient a chance to demonstrate they can breathe on their own.
Source	Provincial Prolonged-ventilation Weaning Centre of Excellence (Toronto East General Hospital)

3.2) Weaning Chart

Name of Tool	Weaning Chart (page 36)
Purpose of Tool	To chart progress of patient during weaning.
Intended Use	The chart may be used by clinicians to document daily evaluation of readiness to reduce the duration of mechanical ventilation.
Source	Provincial Prolonged-ventilation Weaning Centre of Excellence (Toronto East General Hospital)

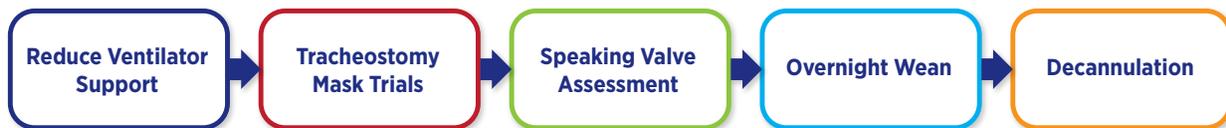
3.1) Weaning Protocols



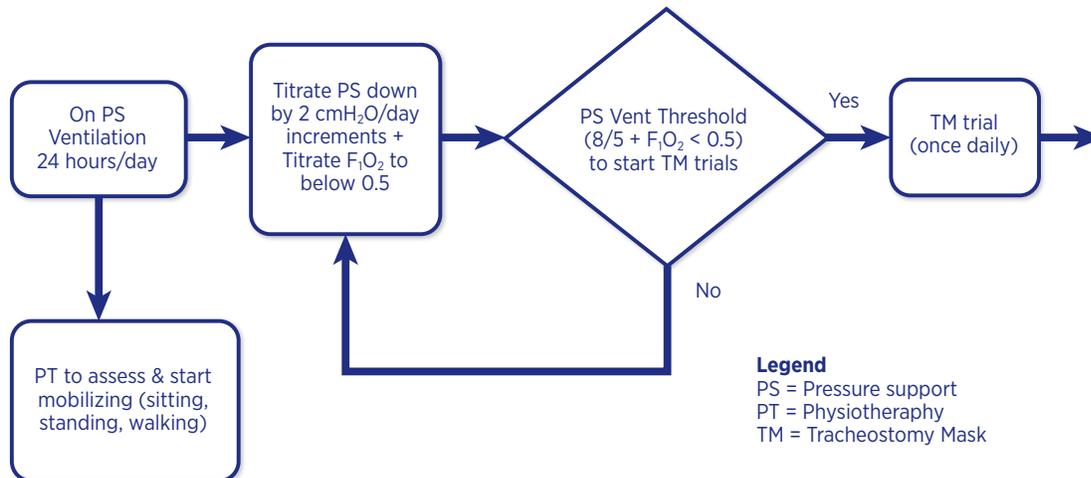
Name of Tool	Weaning Protocols
Purpose of Tool	To detail a sequence of steps and strategies to reduce the duration of mechanical ventilation for patients.
Intended Use	These protocols are intended to provide clinicians with guidance on steps to follow in the process of discontinuing mechanical ventilation and giving a patient a chance to demonstrate they can breathe on their own.
Source	Provincial Prolonged-ventilation Weaning Centre of Excellence (Toronto East General Hospital)

Please see Appendix D – The Role of Tracheostomy.

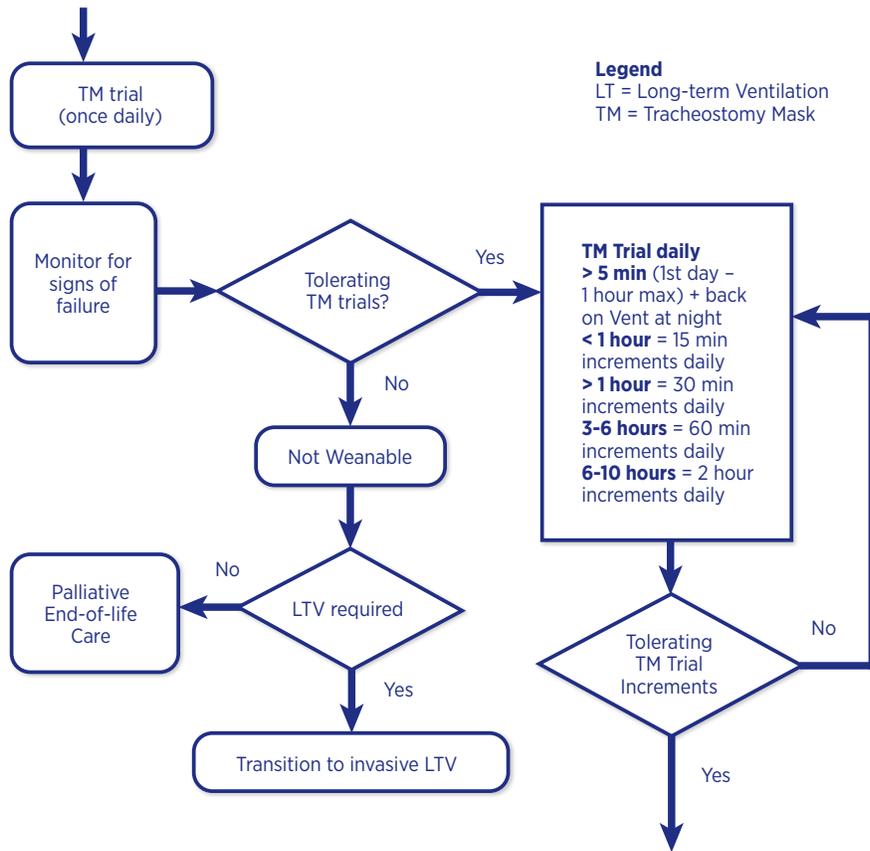
Weaning Protocol (via Tracheostomy Mask)



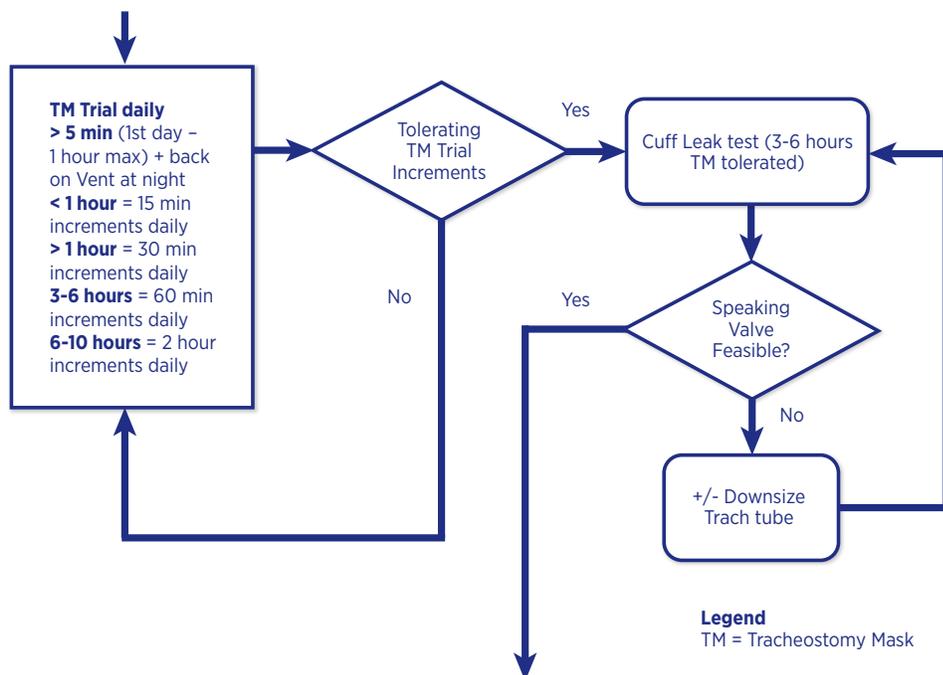
Step 1: Reduce Ventilator Support



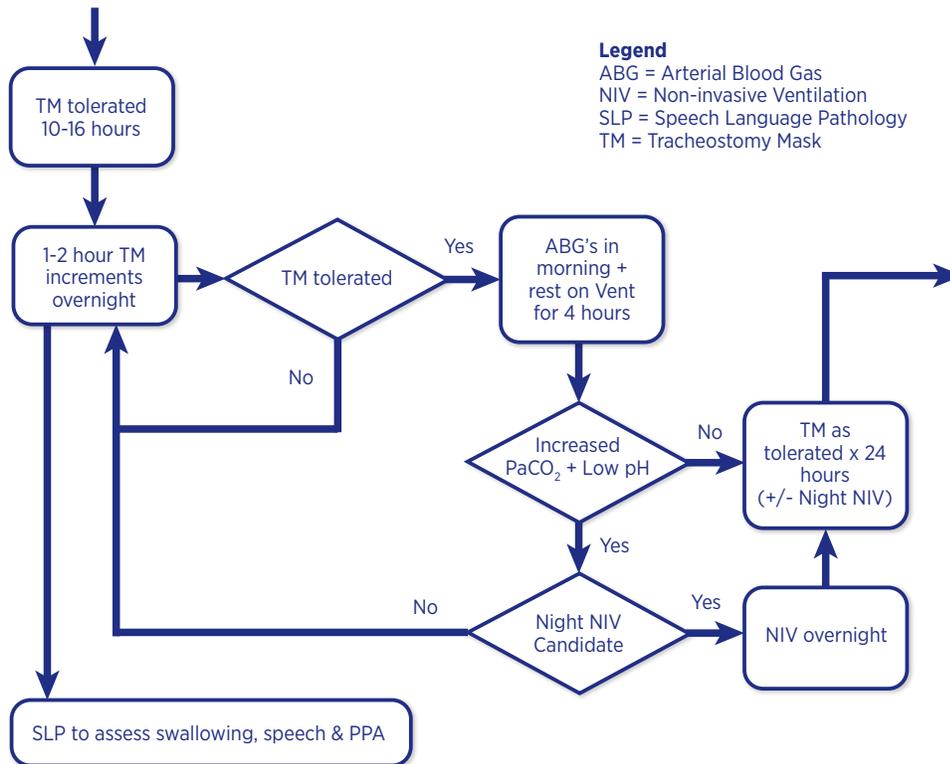
Step 2: Tracheostomy Mask Trials



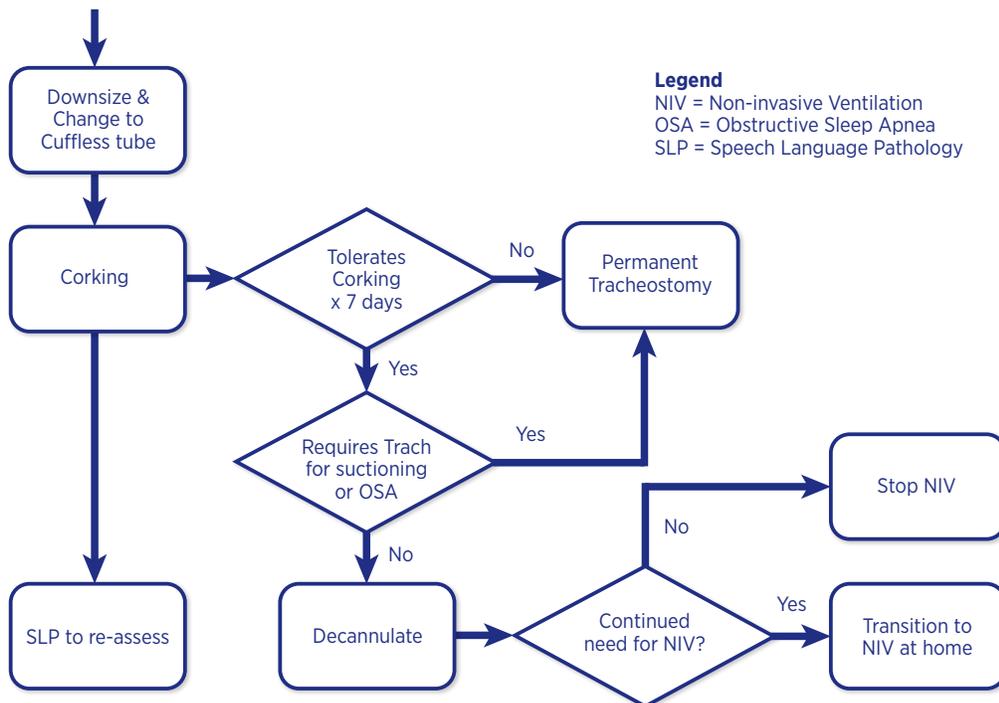
Step 3: Speaking Valve Assessment



Step 4: Overnight Wean



Step 5: Decannulation



3.2) Weaning Chart



Name of Tool	Weaning Chart
Purpose of Tool	To chart progress of patient during weaning.
Intended Use	The chart may be used by clinicians to document daily evaluation of readiness to reduce the duration of mechanical ventilation.
Source	Provincial Prolonged-ventilation Weaning Centre of Excellence (Toronto East General Hospital)

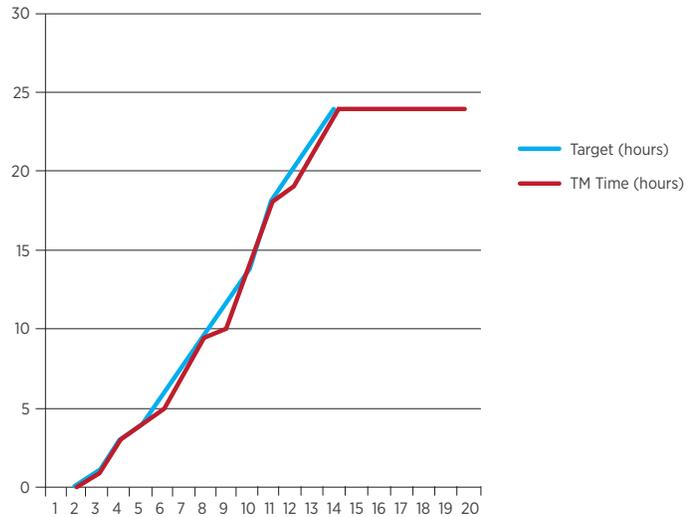
Day	Target (hours)	TM Time (hours)	Comments
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			

Example of Weaning Chart and Linear Graph Drawn for an LTV Patient

PWC Weaning Chart

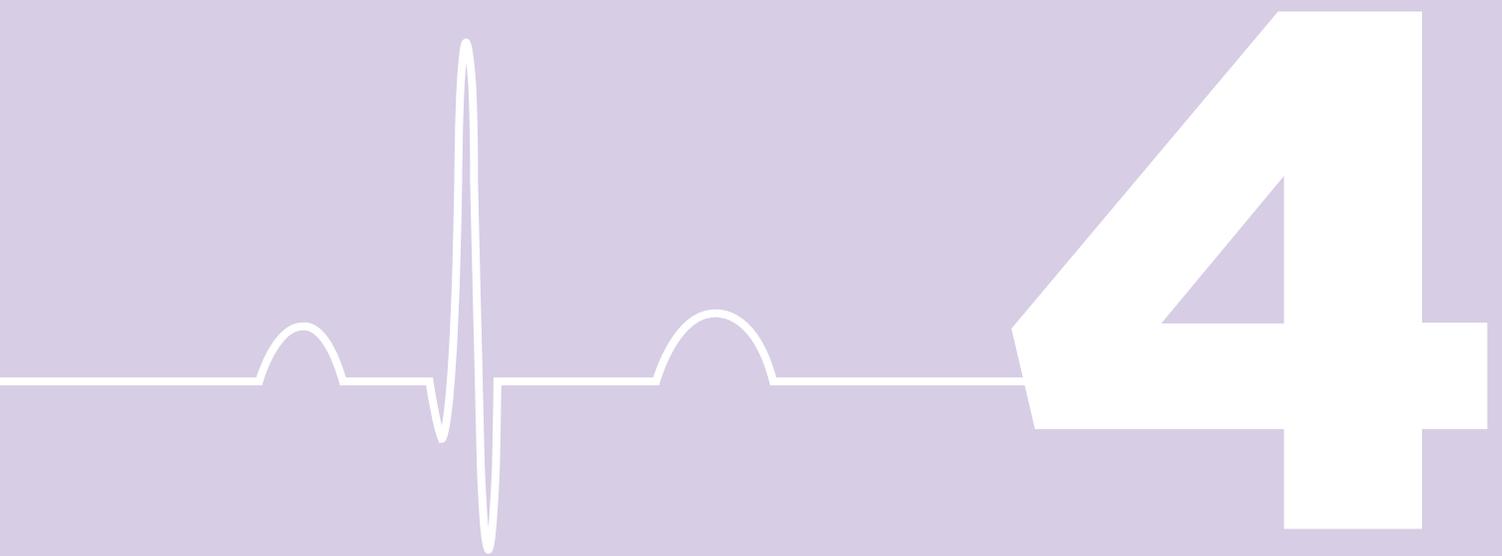
Example of Weaning Chart and linear graph drawn for a typical PWC patients.

Day	Target (hours)	TM Time (hours)	Comments
1	0	0	
2	1	1	
3	3	3	
4	4	4	
5	6	5	
6	8	7.5	
7	10	9.5	
8	12	10	
9	14	14	
10	18	18	
11	20	19	
12	22	21.5	
13	24	24	
14	24	24	
15	24	24	
16	24	24	
17	24	24	
18	24	24	
19	24	24	Weaning after 7 days



Key Message – Section 3

A patient-focused individualized care plan should be developed which addresses specific components of a successful weaning program.



Supportive Care for
Medically Stable LTMV Patients

4. Supportive Care for Medically Stable LTMV Patients

Purpose of this Section

Implement best practices in care for LTMV patients and consider transition to an alternate care setting.

Tools Included in this Section

- 4.1) Mobilization Protocol
- 4.2) Guidelines to Decrease Hemodynamic Monitoring
- 4.3) Guidelines to Re-focus the Treatment Plan
- 4.4) LTV/Chronically Critically Ill Intervention Checklist

Topics Covered in the Toolkit

Section 2: Early Identification of Patients at Risk for LTMV	Section 3: Optimizing Weaning for Patients Requiring LTMV	Section 4: Supportive Care for Medically Stable LTMV Patients
<div data-bbox="233 863 558 940" style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; text-align: center;"> Assessment of At-Risk Patients </div>	<div data-bbox="621 863 946 940" style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; text-align: center;"> Weaning Protocol </div>	<div data-bbox="1013 863 1338 940" style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; text-align: center; margin-bottom: 10px;"> Mobilization Protocol </div> <div data-bbox="1013 968 1338 1045" style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; text-align: center; margin-bottom: 10px;"> “De-medicalization” </div> <div data-bbox="1013 1073 1338 1150" style="border: 1px solid #ccc; border-radius: 10px; padding: 5px; text-align: center;"> Transfer to Alternate Care Settings </div>

Transition

For most LTMV patients, the ICU should not be the end point in their continuum of care. There are many examples of successfully transitioned patients who are enjoying improved quality of life in alternate care settings. It is important to have meaningful engagement of the patient and family regarding potential next steps.

A medically stable, ventilator-dependent patient can be transitioned successfully from the ICU to home, supportive housing or a long-term health care facility. At this stage in the patient’s care, there is a need to ensure that the patient and caregivers are comfortable with leaving the ICU and that there are appropriate rehabilitation services to accept these patients. A successful transition requires careful planning, and plenty of patient and family education.

Supportive Care Tools at a Glance

4.1) Mobilization Protocol

Name of Tool	Mobilization Protocol (page 42)
Purpose of Tool	The purpose of the Mobilization Protocol is to safely mobilize patients, requiring ventilation, to their maximum capacity, in order to improve their probability of successful weaning and functional recovery, helping to reduce their stay in an acute care hospital.
Intended Use	This protocol may be used by clinicians to: identify considerations prior to mobilization; and to describe a pathway for the mobilization of a ventilated patient.
Source	Provincial Prolonged-ventilation Weaning Centre of Excellence (Toronto East General Hospital)

4.2) Guidelines to Decrease Hemodynamic Monitoring

Name of Tool	Guidelines to Decrease Hemodynamic Monitoring (page 44)
Purpose of Tool	The purpose of this tool is to provide guidance on the decrease of invasive & continuous hemodynamic monitoring, with a view to reminding ICU teams to initiate “de-medicalizing” the patient once they are medically stable.
Intended Use	The guidelines should be followed once the patient is deemed medically stable. The applicability of the guidelines ought to be reassessed with any changes in the patient’s medical status.
Source	LTV Centre of Excellence West Park Healthcare Centre

4.3) Guidelines to Re-Focus the Treatment Plan

Name of Tool	Guidelines to Re-Focus the Treatment Plan (page 45)
Purpose of Tool	Modifications to the treatment plan that include enabling speech, increasing sitting tolerance, initiating a wheelchair prescription and establishment of regular routines can encourage independence and foster a rehabilitation focus. Whenever possible, family involvement should be supported and actively encouraged. These elements, when combined, may serve to motivate both the patient and family in regards to discharge planning.
Intended Use	This tool offers guidance to ICU teams that are preparing patients to transition to alternate settings.
Source	LTV Centre of Excellence West Park Healthcare Centre

4.4) LTV/Chronically Critically Ill Intervention Checklist

Name of Tool	LTV/Chronically Critically Ill Intervention Checklist (page 46)
Purpose of Tool	To support the ICU team to consider all aspects of care for the LTV patient.
Intended Use	This tool may be used by clinicians to ensure they are considering all aspects of care for the LTV patient, as well as transition of the patient to an alternate care setting.
Source	London Health Sciences Centre

4.1) Mobilization Protocol



Name of Tool	Mobilization Protocol
Purpose of Tool	The purpose of the Mobilization Protocol is to safely mobilize patients, requiring ventilation, to their maximum capacity, in order to improve their probability of successful weaning and functional recovery, helping to reduce their stay in an acute care hospital.
Intended Use	This protocol may be used by clinicians to: identify considerations prior to mobilization; and to describe a pathway for the mobilization of a ventilated patient.
Source	Provincial Prolonged-ventilation Weaning Centre of Excellence (Toronto East General Hospital)

Factors to Consider Prior to Initializing Mobilization Program or Protocol (daily assessment)

Physician should be consulted before starting mobilization if any of the following conditions exist

1. CNS impairment
 - Unarousable, no response to voice or physical stimulation
 - Deep sedation, no response to voice, but movement or eye opening to physical stimulation
 - Pulls or removes tube(s) or catheters; aggressive
 - Combative, violent, danger to staff
2. Poor Oxygenation
 - SaO₂ < 88%
 - FIO₂ > 0.6 & PEEP > 10 cm H₂O
3. Tachypnea
 - Respiratory Rate > 40 per minute
4. Acidemia
 - Most recent Arterial pH < 7.25
5. Hypotension
 - Mean Arterial Pressure < 55 mmHg [MAP = diastolic + 1/3(systolic-diastolic)]
6. Hypertension
 - Mean Arterial Pressure > 140 mm Hg [MAP = diastolic + 1/3(systolic-diastolic)]
7. New Venothromboembolic Disease (Deep Venous Thrombosis or Pulmonary Embolism) with duration of anticoagulation less than 36 hours (applies to rehabilitation of affected limb and ambulation)

Key Factors for Maximizing Mobilization of the Ventilated Patient

Please note: patients require additional ventilator support during mobilization.

	Phase 1	Phase 2	Phase 3	Phase 4
Education	Importance of positioning, exercise program & early mobility	Importance of gradual increase in time sitting out of bed	Importance of progressive mobilization	Discharge planning, family training on mobility, home exercise program
Positioning	Prevent pressure ulcers	Same as phase 1	No concern	No concern
Bed Mobility training	Turning side to side Bridging Supine-sit Dangling	Same as phase 1	Gradual withdrawal of assistance Promote independence	Promote independence or family training on selected issues as appropriate
Transfer training	Supine-sit Sit-stand With assistance	Use walker to transfer Bed-chair Bed-commode	Gradual withdrawal of assistance during transfers with staff and/or family assistance	Promote independence or family training if appropriate
Walking program	Stand with walker Attempt pre-gait activities	Initiation of walking reeducation with walker and assistance	Gradual increase in distance & endurance, gradual withdrawal of assistive device if appropriate	Gradual withdrawal of assistive device is appropriate Wheelchair mobility training if still unable to walk
Exercises	PROM * AAROM * AROM * Resistive exercises Breathing exercises	Same as phase 1	Same as phase 1	Stairs training if required Strengthening and endurance exercises as appropriate

*PROM – Passive Range of Motion

*AAROM – Active Assistive Range of Motion

*AROM – Active Range of Motion

4.2) Guidelines to Decrease Hemodynamic Monitoring



Name of Tool	Guidelines to Decrease Hemodynamic Monitoring
Purpose of Tool	The purpose of this tool is to provide guidance on the decrease of invasive & continuous hemodynamic monitoring, with a view to reminding ICU teams to initiate “de-medicalizing” the patient once they are medically stable.
Intended Use	The guidelines should be followed once the patient is deemed medically stable. The applicability of the guidelines ought to be reassessed with any changes in the patient’s medical status.
Source	LTV Centre of Excellence West Park Healthcare Centre

- Remove arterial lines, nasogastric tube and other invasive lines/tubes. If patient cannot have oral intake, switch NG tube to G-tube or J-tube
- Cap or remove PICC lines (if appropriate)
- Reduce blood work frequency
- Decrease PEEP to lowest level
- Decrease oxygen to lowest level
- Try to avoid using continuous monitoring including pulse oximetry once arterial blood gases and oximetry have established oxygen requirements. Use periodic non-invasive assessments of SpO₂ and CO₂ (techniques such as end-tidal or transcutaneous CO₂ monitoring)
- If weaning is considered an option, consult/refer to **Toronto East General Hospital Provincial Prolonged-ventilation Weaning Centre of Excellence** as any ventilator free time increases patient’s safety in case of accidental disconnection from ventilator as well as it increases patient’s sense of independence and decreases caregiver anxiety

4.3) Guidelines to Re-Focus the Treatment Plan



Name of Tool	Guidelines to Re-Focus the Treatment Plan
Purpose of Tool	Modifications to the treatment plan that include enabling speech, increasing sitting tolerance, initiating a wheelchair prescription and establishment of regular routines can encourage independence and foster a rehabilitation focus. Whenever possible, family involvement should be supported and actively encouraged. These elements, when combined, may serve to motivate both the patient and family in regards to discharge planning.
Intended Use	This tool offers guidance to ICU teams that are preparing patients to transition to alternate settings.
Source	LTV Centre of Excellence West Park Healthcare Centre

If appropriate, consider the following interventions:

- Decrease tracheostomy tube size to assist with speech and weaning
- Consult with Speech Language for the following interventions:
 - Cuff deflation and speech, consider a change to a cuffless or tight-to-the-shaft tracheostomy tube to assist with speech and weaning
 - Swallowing assessment
- Switch patient to chronic care ventilator; contact the Ventilator Equipment Pool at 1-800-633-8977 to discuss available ventilator models.
- Move patient to area with less activity such as a step-down unit
- Encourage the use of a call bell, consider modifications if necessary
- Have patient direct his/her own care
- Get patient up in chair daily and extend length of time
- Have patient dress in their own clothing rather than hospital gowns
- Establish a routine for bowel/bladder, plan of care, regular day/night routine
- Have Physiotherapy consult for range of motion and ambulation
- Consider taking the patient out of the ICU for short periods of time with staff and/or family
- Have Occupational Therapy consult for initiation of wheel chair prescription (if appropriate)
- Initiate ADP/VEP forms to expedite Ministry funded equipment (once discharge plan is developed) see link below to search for forms: http://www.health.gov.on.ca/en/public/forms/adp_fm.aspx
- Investigate private insurance coverage and capacity for private caregiver support
- Encourage family and caregivers to review LTVCOE e-learning modules (www.ltvcoe.com). It is important to note that the e-learning modules are teaching aids and do not replace the education provided by the healthcare professional.
- Educate the family/caregivers on “bagging”, suctioning and trouble shooting. Involve the patient as much as possible, have the caregivers demonstrate these skills with the support of the healthcare professional (http://www.ltvcoe.com/training_oelib_home.html)
- Provide the patient with a written copy of the prescribed ventilator settings, including alarm and FiO2 setting. For prescribed ventilator settings “templates”, see the Ventilator Equipment Pool website (<http://www.ontvep.ca>)
- Provide the patient with a written care plan including a list of emergency contact name and telephone numbers.

4.4) LTV/Chronically Critically Ill Intervention Checklist



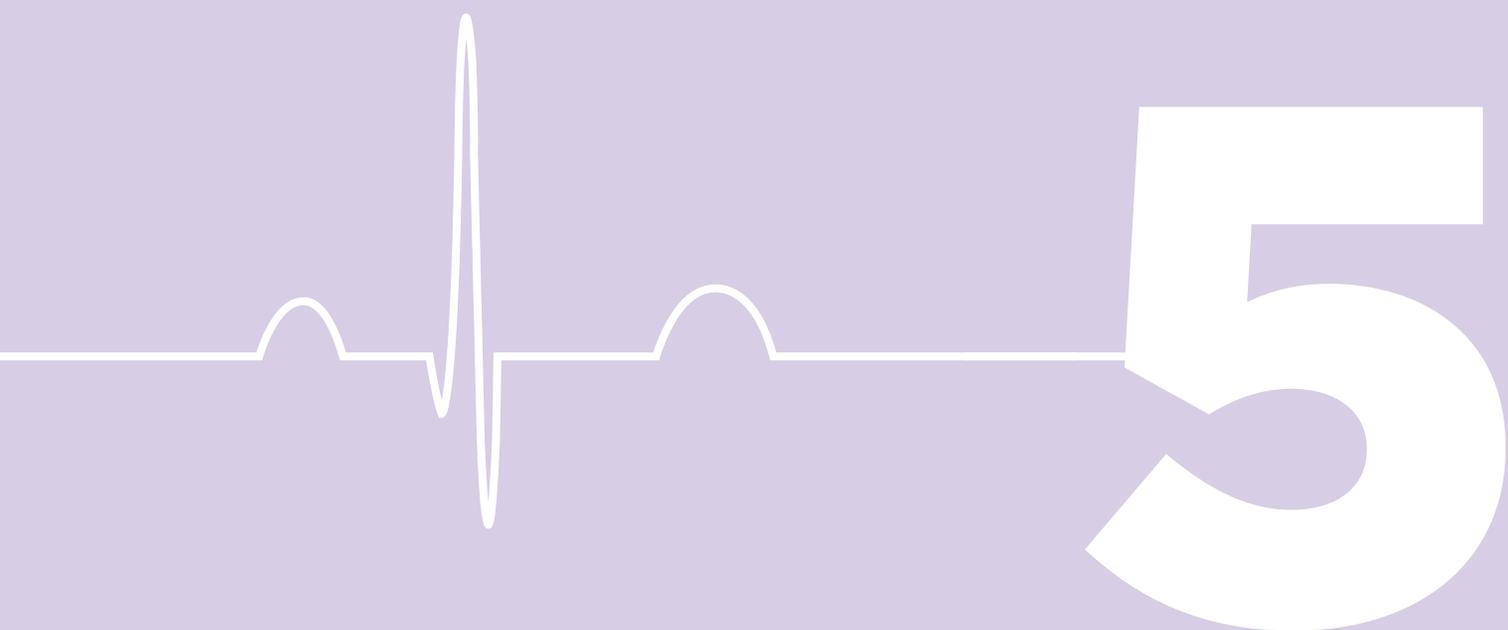
Name of Tool	LTV/Chronically Critically Ill Intervention Checklist
Purpose of Tool	To support the ICU team to consider all aspects of care for the LTV patient.
Intended Use	This tool may be used by clinicians to ensure they are considering all aspects of care for the LTV patient, as well as transition of the patient to an alternate care setting.
Source	London Health Sciences Centre

LTV/Chronically Critically Ill Intervention Checklist				
Indicate date Checklist Initiated: Date (YYYY/MM/DD): _____				
Have we addressed...	Goal	Goal Achieved		Add details
		Yes	yyyy, mm, dd	
Patient/SDM wishes regarding LTV/level of care?	Patient/Family wishes have been reviewed and documented on ICU Family Meeting Record, Resuscitation /EOL Plan.	<input type="checkbox"/>		<ul style="list-style-type: none"> Goals of care documented, reviewed regularly, or at times of physiologic change Provide CCI family brochure See EOL/Advance Directive pocket card
An acceptable respiratory care plan that is reviewed weekly?	Written and posted short-term respiratory care plan at patient's bedside.	<input type="checkbox"/>		<ul style="list-style-type: none"> Weaning history summarized & documented e.g., failures in modes, length of TMT, etc. Weaning progress documented on flow sheet Goals of weaning plan & indicators of failure developed by team Review thyroid function
	Staff acceptance/ accountability to posted respiratory care plan.	<input type="checkbox"/>		
	Patient/family acceptance to posted plan.	<input type="checkbox"/>		
Symptom Assessment e.g., sleep, delirium, anxiety & pain?	Patient lifestyle prior to hospital clearly described e.g., sleep patterns, etc.	<input type="checkbox"/>		<ul style="list-style-type: none"> Family to complete lifestyle survey Pharmacist to review meds ICDSD tracked q 12; if > 4, initiate delirium protocol Establish sleep history, & track ongoing sleep patterns/ medications Ensure sensory aids at bedside (e.g., glasses, hearing aids, etc.)
	ICDSC < 4; Sleeps 6 hrs/nightly.	<input type="checkbox"/>		
Family/Patient support & education?	Emotional needs identified.	<input type="checkbox"/>		<ul style="list-style-type: none"> Family complete lifestyle survey Access to education material (e.g., websites, brochures, etc.) Care plan shared with family
	Learning needs identified.	<input type="checkbox"/>		
	Regular family meetings scheduled.	<input type="checkbox"/>		

Mobility & physiotherapy plan?	Daily physiotherapy roles for PT, RN, & RRT/ventilation documented & posted.	<input type="checkbox"/>		<ul style="list-style-type: none"> • Assessment of pt functional status prior to admission • Document current mobility status • Mobilize as per protocol • Mobility plan posted in room for pt, family and team
	Patient response (i.e., progression) to plan is documented and posted.	<input type="checkbox"/>		
	Patient/family participation in ADLs?	<input type="checkbox"/>		
Nutritional needs?	Enteral feeds maximized & tolerated.	<input type="checkbox"/>		<ul style="list-style-type: none"> • Document pt nutritional status prior to admission e.g., intake, weight, bowel routines, etc. • Lab work: pre-albumin, iron and vitamin B profile, zinc, protoporphyrin
	Prealbumin > ____?	<input type="checkbox"/>		
Swallowing & communication?	SLP consult & assessment completed.	<input type="checkbox"/>		<ul style="list-style-type: none"> • Establish consistent communication methods, post strategies in pt room; consult SLP PRN • Consult SLP as per weaning algorithm e.g., TMT with speaking valve tolerated X 2 hours
	Clear, consistent method of patient communication devised.	<input type="checkbox"/>		
Other	e.g., skin/wound care			
Health Professionals Completing Checklist: _____ Name/Title: _____				

Key Message – Section 4

Mobilization and “de-medicalization” of LTMV patients may improve their probability of successful weaning and functional recovery, helping to reduce their stay in an acute care hospital and enable transition to a more appropriate setting.



Conclusion

5. Conclusion

According to demographic data, the number of patients at risk for, or requiring, LTMV is expected to increase, placing a burden on existing resources that are already constrained. Available resources must be used appropriately and strategically to offer the greatest benefit to this vulnerable patient population.

The resources provided in this toolkit can help acute care providers to implement best practices in care for mechanically ventilated patients in three areas:

- Early identification of patients at risk for LTMV;
- Optimize weaning for patients requiring LTMV; and
- Supportive care for medically stable LTMV patients.

Critical Care Services Ontario will continue to provide support to acute care providers caring for this population. As the toolkit is targeted to the acute care sector, there is also a need to address other sectors across the continuum of care. CCSO will continue working with our partners to optimize care for LTMV patients.



Bibliography

6. Bibliography

Section 2: Early Identification of Patients at Risk for LTMV

Tools included in this section:

2.1) Factors Associated with Ventilator Dependence

MacIntyre NR, Epstein SK, Carson S, et al. Management of patients requiring prolonged mechanical ventilation: report of a NAMDRRC consensus conference. *Chest*. 2005;128:3937–3954

2.2) Prolonged/Long-Term Mechanical Ventilation ICU Checklist

Provided by: Provincial Prolonged-ventilation Weaning Centre of Excellence [Toronto East General Hospital]

2.3) Long-Term ICU Stay Screening Tool

Provided by: London Health Sciences Centre

2.4) ProVent Prediction Summary

Carson, S. S., J. M. Kahn, et al. A multicenter mortality prediction model for patients receiving prolonged mechanical ventilation. *Critical Care Medicine* 2012;40(4): 1171-1176 <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3395423/>

Other resources included in this section:

Rose, L., et al. Understanding Prolonged and Long-Term Mechanical Ventilation in Canada: 2012. Retrieved from: <http://www.stmichaelshospital.com/crich/sru/sru-ventilation/>

Section 3: Optimize Weaning for Patients Requiring LTMV

Tools included in this section:

3.1) Weaning Protocols

Provided by: Provincial Prolonged-ventilation Weaning Centre of Excellence [Toronto East General Hospital]

3.2) Weaning Chart

Provided by: Provincial Prolonged-ventilation Weaning Centre of Excellence [Toronto East General Hospital]

Other resources included in this section:

Bach JR, Gonçalves MR, Hamdani I, et al. Extubation of Patients with Neuromuscular Weakness. A New Management Paradigm. *Chest* 2010; 137(5):1033–103

Jubran A, Grant BJB, Duffner LA, Collins EG, Lanuza DM, Hoffman LA, Tobin MJ. Effect of Pressure Support vs Breathing Through a Tracheostomy Collar on Weaning Duration in Patients Requiring Prolonged Mechanical Ventilation: A Randomized Trial. *JAMA* 2013; 309(7):doi:10.1001/jama.2013.159

Section 4: Supportive Care for Medically Stable LTMV Patients

Tools included in this section:

4.1) Mobilization Protocol

Provided by: Provincial Prolonged-ventilation Weaning Centre of Excellence [Toronto East General Hospital]

4.2) Guidelines to Decrease Hemodynamic Monitoring

Provided by: LTV Centre of Excellence [West Park Healthcare Centre]

4.3) Guidelines to Re-Focus the Treatment Plan

Provided by: LTV Centre of Excellence [West Park Healthcare Centre]

4.4) LTV/Chronically Critically Ill Intervention Checklist

Provided by: London Health Sciences Centre

Appendix B: Family Questionnaire and Meeting Note Record

Provided by: Provincial Prolonged-ventilation Weaning Centre of Excellence [Toronto East General Hospital]

Appendix C: LTV Patient Flow

Source: Long-Term Ventilation Service Inventory Program. Final Summary Report: July 31st, 2008.

Appendix D: The Role of Tracheostomy

Bickenbach, J, M Fries, et al. Impact of early vs. late tracheostomy on weaning: a retrospective analysis. *Minerva Anestesiologica*. 2011;77(12): 1176-83.

Combes A, Luyt CE, Nieszkowska A, Trouillet JL, Gibert C, Chastre J. Is tracheostomy associated with better outcomes for patients requiring long-term mechanical ventilation? *Critical Care Medicine*. 2007; 35:802–7.

Griffiths J, Barber VS, Morgan L, Young JD. Systematic review and meta-analysis of studies of the timing of tracheostomy in adult patients undergoing artificial ventilation. *BMJ*. 2005;330:1243–7.

Young D, Harrison DA, Cuthbertson BH, Rowan K, et al. Effect of Early vs Late Tracheostomy Placement on Survival in Patients Receiving Mechanical Ventilation: The TracMan Randomized Trial. *JAMA*. 2013;309(20):2121-2129.



Appendices

7. Appendices

Appendix A: LTV Planning Committee Membership

LTV Planning Committee Members
<p>Dr. Ian Fraser Toronto East General Hospital [Provincial Prolonged-ventilation Weaning Centre of Excellence]</p>
<p>Donna Renzetti West Park Healthcare Centre [Long-Term Ventilation Centre of Excellence]</p>
<p>Dr. Douglas McKim The Ottawa Hospital</p>
<p>Regina Pizzuti Kingston General Hospital</p>
<p>Lisa Malbrecht Parkwood Hospital</p>
<p>Sally McMackin Toronto Central Community Care Access Centre</p>
<p>Rachel Solomon Toronto Central Local Health Integration Network</p>
<p>Donna Thomson Criticall Ontario</p>
<p>Maureen Williams Ministry of Health and Long-Term Care</p>
<p>Dr. Louise Rose University of Toronto</p>

Appendix B: Family Questionnaire and Family Meeting Note Record

Name of Resource	Family Questionnaire and Family Meeting Note Record
Purpose of Resource	To provide supportive care for patients by gaining a detailed understanding of their needs.
Intended Use	This form is used to document patient needs upon admission to the Provincial Prolonged-ventilation Weaning Centre of Excellence.
Source	Provincial Prolonged-ventilation Weaning Centre of Excellence (Toronto East General Hospital)

PWC Family Questionnaire

Please help us assess the needs of your family member by answering the following questions as completely as possible. Feel free to ask us for help if you have any difficulties completing the questions.

Respect for Pts values, beliefs, concerns **Information From:** _____

Tell me about the patient (family/social situation, personal interests previous health status):

How has he/she coped with stressful situations in the past?

What would the patient identify as his/her biggest worry/concern/fear?

What is his/her hope/dreams/desires:

Initials _____ **Date** _____

Communication, Education & Information **Information From:** _____

What have the doctors told you?

What is/was patient's understanding of his/her condition:

What is your understanding?

Do you need more information? Is there anyway we can make it easier for you to understand with is happening?:

Any pressing concerns:

Initials _____ **Date** _____

Promotion of Physical Comfort **Information From:** _____

What are the religious and cultural beliefs that are important to patient/family?

How can we accommodate religious or cultural observances?

Are there objects you can bring to the hospital that the patient would find comforting?

What are your feelings / concerns about the patient's condition:

What can we do to make your experience less stressful?

Intials _____ **Date** _____

Involvement of Family and Friends **Information From:** _____

Who does the patient rely on for support / is this person (s) available?

Who do you get support from?

Who are you receiving information from?

Are there any problems with lines of communication: Yes No (describe)

Initials _____ **Date** _____

Monthly Meetings Arranged:

	Date	Time
Meeting 1		
Meeting 2		
Meeting 3		

PWC Family Meeting Record

Family Meeting Date: _____

In Attendance:	All Attendees Introduced: <input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/> Patient	SDM/POA: _____
Family Members:	SDM/POA in attendance: <input type="checkbox"/> Yes <input type="checkbox"/> No
PWC Physician:	Consulting Physician:
RN:	APN:
SW:	PT:
Chaplain:	

Purpose of Meeting

<input type="checkbox"/> On Admission	<input type="checkbox"/> Regularly scheduled: <input type="checkbox"/> 4 weeks <input type="checkbox"/> 8 Weeks <input type="checkbox"/> 12 Weeks
<input type="checkbox"/> Family Requested <input type="checkbox"/> Philosophy (Direction) of Care <input type="checkbox"/> Other (describe)	<input type="checkbox"/> Update on changed medical status <input type="checkbox"/> End of Life

Patient and Family Concerns/Questions

i.e. What are your concerns today? Do you have specific questions for the physicians?

Physician's Description of Patient's Medical Conditions and Prognosis

Patient and Family Concerns/Questions

Family Responses:

Appendix C: LTV Patient Flow

Name of Resource	LTV Patient Flow
Purpose of Resource	Highlights the flow of a patient at risk for long-term ventilation through the continuum of care.
Intended Use	For reference only
Source	Long-Term Ventilation Service Inventory Program, Final Summary Report, July 31, 2008

1. Categories of Services

Note: Each category is linked to the flow map on the following pages.

At-risk population

1. Counseling and disease management for at-risk population and families/caregivers

Emergency Department

2. Identification and appropriate referral of patients at risk for long-term ventilation

Critical Care

3. Education of patient's primary care practitioners and specialists (e.g., neurologists)
4. ICU capacity
5. Early identification and management of ICU patients at risk for long-term ventilation
6. Early identification and management of ICU patients who cannot be weaned and are eligible for LTV bed
7. Early identification and management of ICU patients eligible for community-based care and services

Weaning

8. Weaning services

Rehabilitation and Home Vent Training

9. Preparation for discharge to home for individual and families/caregivers (e.g., Rehabilitation and Home Vent Training)

Long-term Institutional Care

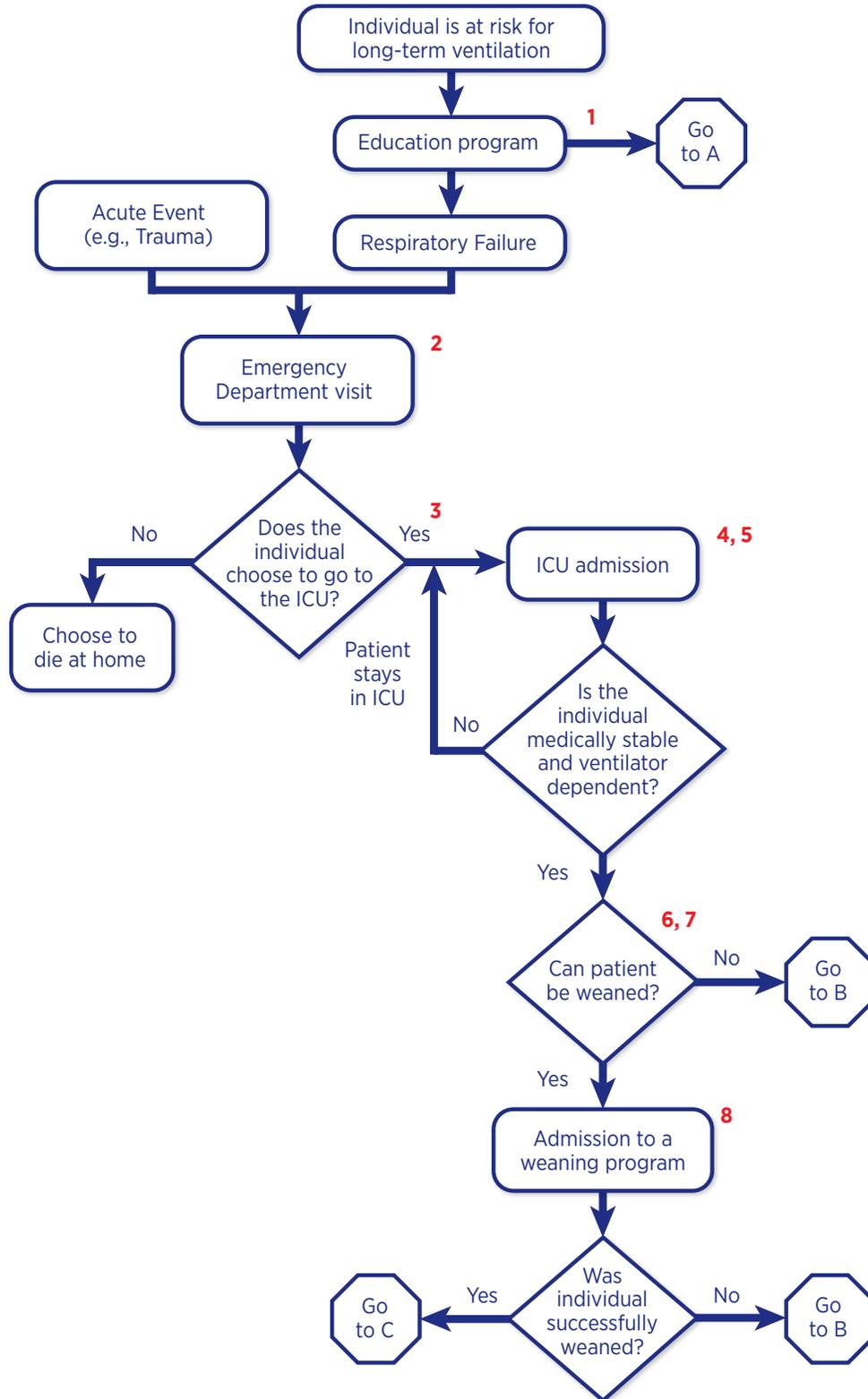
10. LTV in-hospital care and services

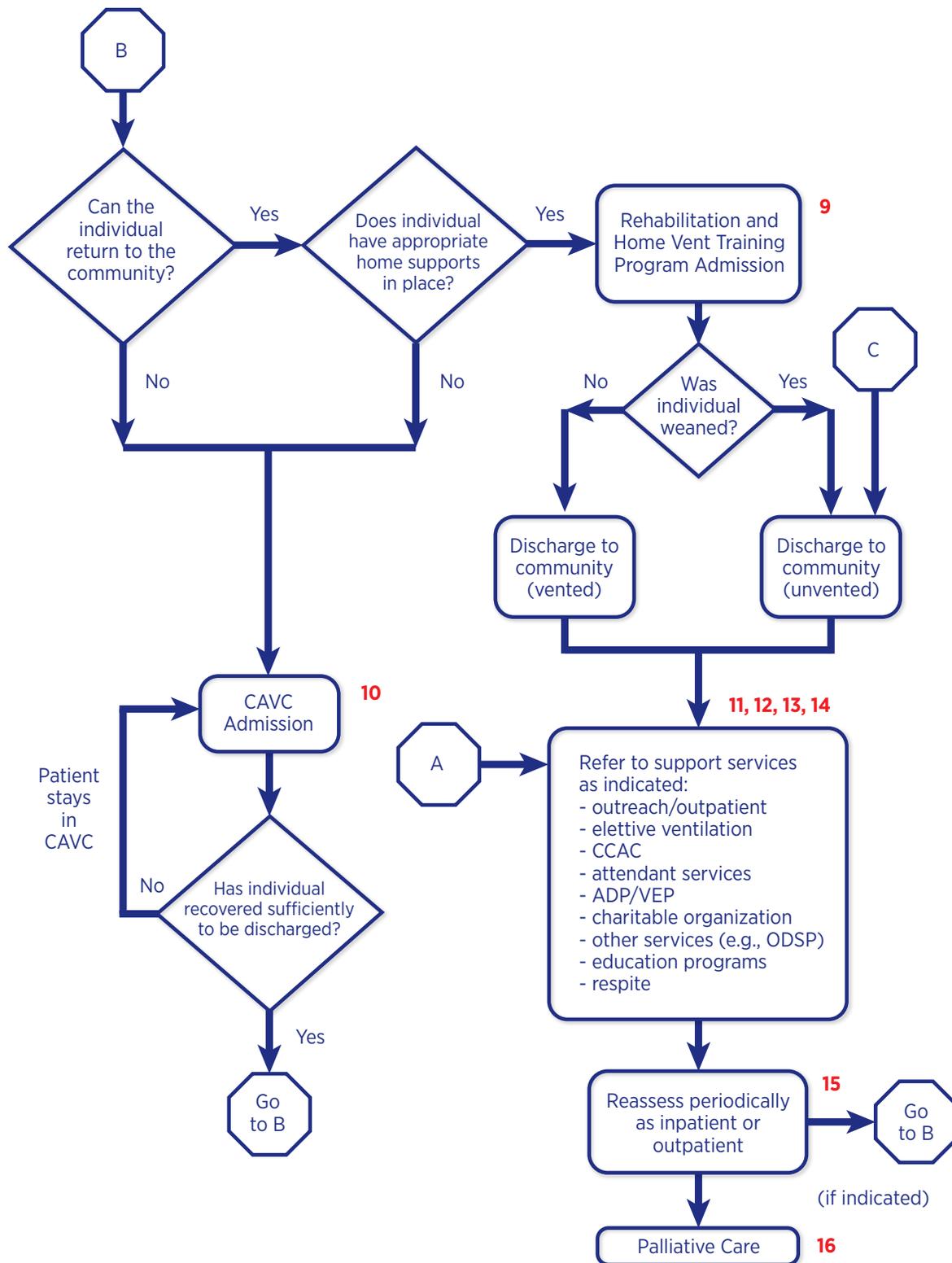
Community-based care and services

11. Community-based care (e.g., nursing, respiratory therapy), by setting (e.g., long-term care home, nursing home, private home, supportive housing)
12. Community-based services (e.g., assistance with daily living, attendant services, ventilator equipment and maintenance)
13. Outpatient or outreach care (e.g., reassessments)
14. Respite care
15. Reassessment (as inpatient or outpatient)

Community-based care and services

16. Palliative and end-of-life care





CCAC = Community Care Access Centre
ODSP = Ontario Disability Support Program

ADP = Assistive Devices Program
CAVC = Chronic Assisted Ventilatory Care

VEP = Ventilator Equipment Pool
ICU = Intensive Care Unit

"Community" includes long-term care homes, supportive housing and private homes.

Appendix D: The Role of Tracheostomy

Name of Resource	The Role of Tracheostomy
Purpose of Resource	To provide background information about the role of tracheostomy in the ICU.
Intended Use	For reference only
Source	<ul style="list-style-type: none"> • Bickenbach, J, M Fries, et al. Impact of early vs. late tracheostomy on weaning: a retrospective analysis. <i>Minerva Anestesiologica</i>. 2011;77(12): 1176-83. • Brook, A. D., et al. Early versus late tracheostomy in patients who require prolonged mechanical ventilation. <i>American Journal of Critical Care</i>.2000; 9(5):352-59. • Griffiths J, Barber VS, Morgan L, Young JD. Systematic review and meta-analysis of studies of the timing of tracheostomy in adult patients undergoing artificial ventilation. <i>BMJ</i>. 2005;330:1243-7 • Young D, Harrison DA, Cuthbertson BH, Rowan K, et al. Effect of Early vs Late Tracheostomy Placement on Survival in Patients Receiving Mechanical Ventilation: The TracMan Randomized Trial. <i>JAMA</i>. 2013;309(20):2121-2129.

The benefits and disadvantages of tracheostomy are well documented in the literature on critical care medicine. Some of the benefits and disadvantages of tracheostomy are outlined below:

Benefits of Tracheostomy	Disadvantages of Tracheostomy
<ul style="list-style-type: none"> • “Reduced laryngeal ulceration and respiratory resistance; • “[Tracheostomy] improves [patients’] capacity to communicate; • “[Tracheostomy] makes for easier nursing care” 	<ul style="list-style-type: none"> • “Complications resulting from the [tracheostomy] procedure include stomal infections, stomal haemorrhage, pneumomediastinum, pneumothorax, and occasionally death”

Source: Griffiths et al, 2005

The timing of when a tracheostomy is performed may or may not have an impact on patients undergoing mechanical ventilation. Some sources in the literature suggest it is beneficial to perform early tracheostomy (rather than late tracheostomy), while other sources indicate that timing does not have an impact on patients. Examples of different perspectives on the timing of tracheostomy are outlined below:

The Timing of Tracheostomy
<ul style="list-style-type: none"> • “Tracheostomy performed less than 4 days of mechanical ventilation results in reduced incidence of VAP compared to late tracheostomy (after 10 days)” (Bickenbach et al, 2011) • “Early tracheostomy is associated with shorter lengths of stay and lower hospital costs than is late tracheostomy among patients in the medical intensive care unit” (Brook et al., 2000). • “Late tracheostomy was associated to higher amount of ventilator days and ICU LOS” (Bickenbach et al, 2011) • “Early tracheostomy has no effect on mortality in mechanically ventilated patients” (Young et al, 2013)

Clinicians should assess the potential benefits and disadvantages of tracheostomy on an individual basis.

Appendix E: Alignment with other CCSO Initiatives

Name of Resource	Alignment with other CCSO Initiatives
Purpose of Resource	In addition to the LTMV Toolkit, acute care providers may be interested in reviewing the resources outlined in this section (which are also produced by CCSO).
Intended Use	For reference only
Source	CCSO

Critical Care Balanced Scorecard Toolkit:

The ICU Scorecard Toolkit, distributed to hospitals in August 2012, is designed to guide Ontario’s critical care unit and system leaders in their quality and performance improvement initiatives. It includes indicators and support tools to assist critical care units in targeting and achieving objectives aligned with the Critical Care Strategy and the Excellent Care for All Act (ECFAA).

Critical care unit peer groups and scorecard indicator reports have also been developed. The new scorecards, created by CCSO in collaboration with the Critical Care LHIN Leads and CriteCall Ontario, are designed to help promote system wide learning and improvement by providing critical care stakeholder with information to:

- Evaluate the performance of their critical care units relative to similar units
- Identify opportunities to learn from other critical care units
- Set strategic directions for critical care quality improvement
- Establish achievement targets for critical care units

All hospitals will receive an ICU scorecard report summarizing each critical care unit’s data based on the peer groups and unit-specific annual trends.

For information about the ICU Scorecard Toolkit, please contact Critical Care Services Ontario at:
 Phone: 416-340-4800 x 5577
 Email: ccsadmin@uhn.ca

VAP/CLI Toolkit:

Distributed to hospitals in May 2012 by CCSO, the VAP/CLI Toolkit provides tools to support hospitals in the reduction of ventilator associated pneumonia (VAP) and Central line infection (CLI) incidents. Reducing rates of VAP and CLI are part of the MOHLTC Patient Safety Indicator initiative. The toolkit addresses best practices for surveillance and prevention of these infections, and provides local examples of successful tools and strategies that may assist hospitals with quality improvement initiatives.

For information about the VAP/CLI Toolkit, please contact Critical Care Services Ontario at:
 Phone: 416-340-4800 x 5577
 Email: ccsadmin@uhn.ca

Critical Care Access and Consent Toolkit:

The *Critical Care Consent and Access* toolkit outlines the consent pathway that informs and guides decision-making amongst healthcare providers, patients and families. It aims to support the development of appropriate treatment plans proposed by clinicians and consented to by patients or SDMs. In short, it will ensure that the patient receives beneficial treatment in the right bed (to meet their care needs) at the right time.

The principles of Canadian “*just society*” imply that treatment decisions must respect individual autonomy, and cultural, ethnic and religious diversity. To that end, the toolkit seeks to:

- Clarify the legal and ethical obligations embedded in the consent process;
- Address the complex clinical challenges that arise in critical care; and
- Provide tools to enhance communication between healthcare providers, patients, SDMs and family members at end-of-life (EOL) through consistent language.

The toolkit was developed by CCSO, in collaboration with a group of Subject Matter Experts proficient in the area of critical care and ethics, who informed the development of the document and the inclusion of tools considered as best practice in addressing the issues of consent and decision-making.

For information about this toolkit, please contact Critical Care Services Ontario at:

Phone: 416-340-4800 x 5577

Email: ccsadmin@uhn.ca

