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Health Care for People Approaching the End of Life: An Evidentiary Framework

OHTAC End-of-Life Collaborative

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Ontario Health Technology Advisory Committee (OHTAC) End-of-Life Collaborative

Project Lead
N Sikich

Evidence Development and Standards (EDS), Health Quality Ontario (HQO)
S Baidobonsoo, V Costa, C Hulobowich, K Kaulback, I Nevis, S Sehatzadeh, N Sikich, the End-of-Life Expert Panel Working Group, and L Levin

Toronto Health Economics and Technology Assessment (THETA) Collaborative
B Pham and M Krahn

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Health Quality Ontario strives to promote health care that is supported by the best available scientific evidence. The Evidence Development and Standards branch works with expert advisory panels, clinical experts, scientific collaborators, and field evaluation partners to conduct evidence-based reviews that evaluate the effectiveness and cost-effectiveness of health interventions in Ontario.

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List of Abbreviations

CPR	Cardiopulmonary resuscitation
EoL	End of life
GRADE	Grading of Recommendations Assessment, Development, and Evaluation
ICU	Intensive care unit
OHTAC	Ontario Health Technology Advisory Committee
PCPD	Patient care planning discussion
QALY	Quality-adjusted life-year
RCT	Randomized controlled trial

Background

In July 2013, the Evidence Development and Standards (EDS) branch of Health Quality Ontario (HQO) began work on developing an evidentiary framework for end of life care. The focus was on adults with advanced disease who are not expected to recover from their condition. This project emerged from a request by the Ministry of Health and Long-Term Care that HQO provide them with an evidentiary platform on strategies to optimize the care for patients with advanced disease, their caregivers (including family members), and providers.

After an initial review of research on end-of-life care, consultation with experts, and presentation to the Ontario Health Technology Advisory Committee (OHTAC), the evidentiary framework was produced to focus on quality of care in both the inpatient and the outpatient (community) settings to reflect the reality that the best end-of-life care setting will differ with the circumstances and preferences of each client. HQO identified the following topics for analysis: determinants of place of death, patient care planning discussions, cardiopulmonary resuscitation, patient, informal caregiver and healthcare provider education, and team-based models of care. Evidence-based analyses were prepared for each of these topics.

HQO partnered with the Toronto Health Economics and Technology Assessment (THETA) Collaborative to evaluate the cost-effectiveness of the selected interventions in Ontario populations. The economic models used administrative data to identify an end-of-life population and estimate costs and savings for interventions with significant estimates of effect. For more information on the economic analysis, please contact Murray Krahn at murray.krahn@theta.utoronto.ca.

The End-of-Life mega-analysis series is made up of the following reports, which can be publicly accessed at http://www.hqontario.ca/evidence/publications-and-ohtac-recommendations/ohtas-reports-and-ohtac-recommendations.

- End-of-Life Health Care in Ontario: OHTAC Recommendation
- Health Care for People Approaching the End of Life: An Evidentiary Framework
- Effect of Supportive Interventions on Informal Caregivers of People at the End of Life: A Rapid Review
- Cardiopulmonary Resuscitation in Patients with Terminal Illness: An Evidence-Based Analysis
- The Determinants of Place of Death: An Evidence-Based Analysis
- Educational Intervention in End-of-Life Care: An Evidence-Based Analysis
- End-of-Life Care Interventions: An Economic Analysis
- Patient Care Planning Discussions for Patients at the End of Life: An Evidence-Based Analysis
- Team-Based Models for End-of-Life Care: An Evidence-Based Analysis

Rationale and Objective

In 2011, Canada ranked fifth out of 40 countries on a quality-of-death index that measured indicators of the quality, cost, and availability of end-of-life (EoL) care. (1) Notwithstanding this high ranking, however, the Canadian health care system's EoL care strategy continues to be criticized for its lack of a national approach and dependence on hospitals to provide most services. (1)

The personal and economic impact of EoL care is staggering, and will escalate as the population ages. By 2026, the number of Canadians dying each year is projected to increase by 40% to 330,000, and each of those deaths will affect the well-being of an average of 5 others, or more than 1.6 million people. (2) For this reason, the availability and quality of EoL care services has become an area of immediate concern. Moreover, EoL care services are not aligned with patient preferences. Of hospitalized Canadian elderly, 70% reported wanting comfort measures rather than life-prolonging treatment, but more than two-thirds were admitted to intensive care units (ICUs). (3)

Still, while improving *what* services are provided is important, it is only half the picture; (1) improving *to whom* they are provided is equally imperative. Chronic disease represents an increasing burden, both for individuals and for the health care system. (4) In Canada, advanced chronic illness is the underlying cause of most deaths. (5) An estimated 30% of people with chronic illness have access to formal EoL care, but most of these have cancer; (5) expanding the availability of EoL services to those with advanced heart disease, stroke, chronic obstructive pulmonary disease, kidney failure, and Alzheimer's disease (among others) is a necessary component of achieving quality EoL care.

This mega-analysis provides an evidentiary platform to inform public policy, with the goal of improving Ontario's approach to EoL care. The target population was adults (18 years of age and over) with advanced disease who are not expected to stabilize or recover from their condition. The overall objective was to compile a clinical and economic evidence base to guide decisions about interventions that may optimize EoL care, either by improving patient outcomes or promoting system efficiencies. This work will contribute to provincial programs and strategies aimed at better EoL care for people in Ontario.

Clinical Need and Target Population

Description of Disease/Condition

The end of life is "a phase of life when a person is living with an illness that will worsen and eventually cause death." (6) It is not limited to the period immediately before death; it can encompass the years leading up to death. The target population for EoL care includes people whose health is in decline and those who are deemed to be terminal or will die in the foreseeable future. (1)

Between 2007 and 2011, 87,000 to 89,000 people died in Ontario each year. (7) Of those who died between 2007 and 2009, 98.7% were adults aged 18 and older, with chronic conditions. Causes of death included cancer (29.5%), heart disease (20.9%), cerebrovascular disease (6.2%), accidents (4.4%), chronic lower respiratory illnesses (4.2%), diabetes mellitus (3.2%), Alzheimer's disease (2.5%), influenza and pneumonia (2.4%), and kidney disease (1.4%). (8) From 2000 to 2009, death due to Alzheimer's disease underwent the largest relative increase (25.4%). (8)

Public Perception of End-of-Life Issues

There is a need for public discussion about the normalization and demedicalization of death and dying. The results of an online Canadian survey carried out by Harris/Decima in 2013 (9) and completed by 2,976 adults 18 or older in either English or French reported that 55% had never had a discussion with a family member, doctor, lawyer, friend, or financial advisor about their EoL care preferences; 45% had discussed EoL care with someone; and only 5% had had that discussion with their doctor. (9) Survey data were weighted using the 2011 census to reflect the general population according to variables such as gender, age, and region.

Respondents' reasons for reluctance to discuss EoL care included not wanting to upset family members (76%); feeling healthy, so didn't have a reason to think about it (70%); not enough knowledge about the options (70%); being afraid of death (69%); feeling uncomfortable talking about it (64%); nothing they can do about it (61%); and a cultural preference to avoid talking about death (58%). (9) Of the total sample, 79% were unaware of the term *advance care planning* and 87% had not prepared an advance care plan. (9) However, nearly three-quarters of those who indicated that they had not prepared an advance care plan said that they would put one together in the future. These findings show that EoL care discussions are perceived as awkward and unpleasant for everyone involved. (9) The authors postulated that if such negative perceptions could be changed and discussions about death seen as socially acceptable, perhaps more people would feel comfortable talking about their preferences for EoL care. (9)

Project Scope

To improve the congruence in EoL care between patient preferences and services provided, evidence is needed on topics that are important to people approaching the end of life, including avoidance of unwanted life-support measures, effective communication, and continuity of care. (10) To that end, this mega-analysis reviewed the evidence in 6 areas: determinants of place of death, patient care planning discussions (PCPDs), EoL care educational interventions, team-based models of care, cardiopulmonary resuscitation (CPR), and supportive interventions for informal caregivers. We also evaluated the cost-effectiveness of interventions in several of these areas to better understand the investment needed to support quality EoL care.

Determinants of Place of Death

People's needs in the EoL phase vary; therefore certain places of death may be more appropriate for some patients than for others. (11) In 2011, according to Statistics Canada, 64.7% of deaths in Canada and 59.3% in Ontario occurred in hospitals. (7) An Ontario study of 214 home care recipients and their caregivers, published in 2005, showed that 63% of patients and 88% of caregivers preferred a home death. (11) Thirty-two percent of patients and 23% of caregivers reported no preference for place of death. (11) Understanding the factors that determine the place of death is important for improving support for people's preferences about where to die.

Patient Care Planning Discussions

Patient care planning discussions are conversations that occur between patients, surrogate decision-makers, and health care providers about the goals and desired direction of the patient's care; they may include aspects of advance care planning. (12) The objective of PCPDs is to create a care plan that reflects the patient's and/or family's wishes after considering such factors as disease status and progress, treatment options, preferences, goals, and values. PCPDs have been associated with a reduction in EoL care costs and improved quality of care. (13) A multicentre study in 5 tertiary care Canadian hospitals reported that no more than 18% of persons had had PCPDs with their health care provider. Patients and families who did have PCPDs had higher overall satisfaction and satisfaction with communication and decision-making compared with those who did not. (14) Understanding the effects of PCPDs is important to ensuring that the care provided aligns with patient goals and values.

EoL Care Educational Interventions

Education is "that multidisciplinary practice, which is concerned with designing, implementing, and evaluating educational programs that enable individuals, families, groups, organizations, and communities to play active roles in achieving, protecting, and sustaining health." (15) Education of health care providers, patients nearing the end of life, and their informal caregivers plays a vital role in increasing knowledge about the different care options available. We need to understand the effectiveness and role of education in improving patients' quality of care and patient and informal caregiver outcomes to improve overall EoL care.

Team-Based Models of Care

A *model of care* is an "overarching design for the provision of a particular type of health care service. It consists of defined core elements and principles and has a framework that provides the structure for the implementation and subsequent evaluation of care." (16) How health care services are delivered can affect people's comfort and quality of life, and their satisfaction with the health care they receive. People approaching the end of life need many health care services to help them manage symptoms, cope with impending death, and support their physical, emotional, and spiritual needs. Using a team-based model to deliver EoL care services is generally accepted as the optimal design. The many different types of team-based models of care differ in their core elements, including services offered, mode of patient contact, and setting. It is important to understand which team-based model of care best improves quality of care and patient and informal caregiver outcomes.

Cardiopulmonary Resuscitation

CPR was developed in the early 1960s for people in cardiac arrest and includes the administration of chest compressions combined with artificial respiration, cardiac defibrillation, and intravenous medications. CPR has become the default response to cardiac arrests that occur in or out of hospital. Performing CPR regardless of the underlying cause of cardiac arrest can transiently restore circulation, but it cannot guarantee overall survival. A Canadian study showed that seriously ill hospitalized patients have poor knowledge about CPR. (17) Understanding the effectiveness of CPR for patients at the end of life is important, as some may prefer not to undergo this intervention if they are provided with meaningful and accurate information about their likelihood of survival after receiving it.

Supportive Interventions for Informal Caregivers

An informal caregiver is an unpaid individual who provides care to people who are unable to care for themselves due to physically and/or psychologically limiting birth, trauma, or chronic health conditions. Often, relatives or friends become informal caregivers to people approaching the end of life. Caregiving can be burdensome, and studies have shown that it leads negative health impacts for informal caregivers, including sleep problems, fatigue, depression, anxiety, burnout, and an increased risk of mortality. (18) Informal caregivers also tend to suffer from financial strain. (19) It is important to understand the effectiveness of supportive interventions in improving coping and reducing distress for those who serve as informal caregivers to people nearing the end of life.

Methods

This section briefly describes the methods used to define the scope of the mega-analysis; conduct the systematic reviews of the clinical literature; and complete the economic analysis.

A. Mega-Analysis

A mega-analysis is a systematic review of multiple interventions around a health or disease state, used to assist in comparative decision-making. There are 3 main steps associated with mega-analysis:

- scoping the health or disease state
- disaggregation of the health or disease state into main drivers or domains, from which research questions for evidence reviews are developed
- re-aggregation of evidence results

Scoping

The scoping phase involved mapping the key concepts underpinning the EoL health state, determining possible research questions and relevant outcomes, and assessing the availability of evidence for these questions. (20) The scoping search was conducted using keyword searches on MEDLINE and several health technology assessment and systematic review websites (the Wiley Cochrane Library, the Centre for Reviews and Dissemination/International, Agency for Health Technology Assessment, and the National Institute for Health and Care Excellence), as well as other relevant websites, such the Agency for Healthcare Research and Quality, (21) Canadian Researchers at the End of Life Network, (22) the Registered Nurses' Association of Ontario, (23) the CareSearch Palliative Care Knowledge Network, (24) the American College of Physicians, (25) the College of Physicians and Surgeons Ontario, (26) and the Canadian Virtual Hospice. (27)

Ontario experts in EoL care, palliative care, health systems, and primary care—as well as members of the Ontario Health Technology Advisory Committee (OHTAC)—provided input on the project scope and recommended topics to include in the analysis.

Disaggregation of Technologies

After determining the scope of the project, EoL care was disaggregated into major drivers or domains, and then into relevant interventions for each topic. Each intervention was then systematically reviewed using published literature. Personal and health-system outcomes of interest were determined a priori for each systematic review.

Re-aggregation

Re-aggregation of the evidence was done after considering criteria from the decision determinants framework (28) in 4 main areas: overall clinical benefit; value for money; societal and ethical considerations; and economic and organizational feasibility. (28, 29)

B. Evidence-Based Analyses of Effectiveness

Research Methods

Literature Search

For each of the systematic reviews, a literature search was performed using OVID MEDLINE, OVID MEDLINE In-Process and Other Non-Indexed Citations, OVID EMBASE, EBSCO Cumulative Index to Nursing and Allied Health Literature (CINAHL), the Wiley Cochrane Library, and the Centre for Reviews and Dissemination database to identify potential studies. The publication search dates varied by review, but typically ranged over 5 to 10 years of literature (specific details are available in the individual reports). Abstracts were reviewed by a single reviewer and, for those studies meeting the eligibility criteria, full-text articles were obtained. Reference lists were also examined for any additional relevant studies not identified through the search.

The inclusion and exclusion criteria listed below were used for all analyses. Some analyses used additional criteria specific to the topic of interest, which are detailed in the individual reports.

Inclusion Criteria

- English-language full-text reports
- health technology assessments, systematic reviews, meta-analyses, randomized controlled trials (RCTs), and observational studies
- studies of adult patients who had been diagnosed with an advanced, life-limiting condition and were not expected to improve or stabilize
- study populations consisting of at least 90% adults

Exclusion Criteria

- studies with adult and child populations where summary data for the adult target population could not be extracted
- animal studies
- duplicate publications
- grey literature

Statistical Analysis

Continuous data were pooled to calculate relative risks or odds ratios using the Mantel-Haenszel test and a random- or fixed-effects model as appropriate. Dichotomous data were pooled to calculate weighted mean differences using the inverse variance method and a random- or fixed-effects model. When data could not be pooled, results were summarized descriptively. P values < 0.05 were considered statistically significant. For a complete description of statistical analyses, please see the individual reports.

Quality of Evidence

The quality of the body of evidence for each outcome was examined according to the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) Working Group criteria. (30) The overall quality was determined to be high, moderate, low, or very low using a step-wise, structural methodology.

Study design was the first consideration; the starting assumption was that RCTs are high quality, whereas observational studies are low quality. Five additional factors—risk of bias, inconsistency, indirectness, imprecision, and publication bias—were then taken into account. Limitations in these areas resulted in downgrading the quality of evidence. Finally, 3 main factors that may raise the quality of evidence were considered: the large magnitude of effect, the dose response gradient, and any residual confounding factors. (30) For more detailed information, please refer to the latest series of GRADE articles. (30)

As stated by the GRADE Working Group, the final quality score can be interpreted using the following definitions:

High	High confidence in the effect estimate—the true effect lies close to the estimate of the effect
Moderate	Moderate confidence in the effect estimate—the true effect is likely to be close to the estimate of the effect, but may be substantially different
Low	Low confidence in the effect estimate—the true effect may be substantially different from the estimate of the effect
Very Low	Very low confidence in the effect estimate—the true effect is likely to be substantially different from the estimate of the effect

C. Economic Modelling and Cost-Effectiveness Analysis

A cost-effectiveness analysis was conducted as a companion to the EoL care mega-analysis. Using a decision analytic modelling approach, we evaluated evidence-based interventions identified in the mega-analysis.

An Ontario Palliative Care Decision Model was developed to simulate "usual" palliative care practice and resource utilization of a cohort of people in their last year of life, and to evaluate the cost-effectiveness of the interventions. Using linked health administration databases from the Institute for Clinical Evaluative Sciences, key model inputs were obtained for a cohort of 256,284 Ontarians who died between January 2007 and December 2009.

Interventions were categorized as pertaining to team-based models of care (in-home team care; inpatient team care; and comprehensive team care); PCPDs (screening long-term care residents and referral to EoL team care; ethics consultation for ICU patients with treatment conflicts in the last month of life; and improving family conferences for relatives of patients dying in the ICU); multicomponent psychoeducational interventions for patients and families; and supportive interventions for informal caregivers.

We compared the cost-effectiveness of each targeted intervention with usual care from the perspective of the Ontario Ministry of Health and Long-Term Care. Results of the base-case analysis were expressed in terms of costs (2013 Canadian dollars), days at home, and proportion of patients dying at home. Results of a sensitivity analysis were expressed in terms of costs and quality-adjusted life-years (QALYs).

As appropriate, we also conducted a population impact analysis of interventions that were deemed to be effective and cost-effective from a health care payer perspective.

For a full description of the methods and results of the economic analysis, please see *End-of-Life Care Interventions: An Economic Analysis* in the report series.

D. Contextualization of the Evidence

An Expert Advisory Panel on End-of-Life Care was convened at the request of OHTAC to assist in contextualizing the results of the evidence-based analyses and economic analysis. The roles of the panel were as follows:

- to provide direction on the scope of the project, including relevant background knowledge and relevant subgroup analyses for the evidence reviews
- to provide direction on the selection of interventions for inclusion
- to review the evidence-based analyses of the included interventions, comment on the accuracy of the interpretation of evidence, and identify any omissions of evidence
- to identify any health system, societal, ethical, or economic issues that were relevant to evaluating the effectiveness of the included interventions

Project Scope

The population considered for this project included adults with an advanced, life-limiting condition who were not expected to improve or stabilize; this definition was used in each evidence-based analysis and the economic analysis. Disease conditions or health states considered to be in scope included cancer, chronic deteriorating health conditions, dementia, and the frail elderly. EoL care in pediatric patients was out of scope.

There were 4 domains of interest: location of care; communication (e.g., decision-making and communication about EoL care with the patient, family, health care providers, and the public); models of care; and services (e.g., life-support interventions, spiritual, psychological and emotional support, and symptom management). Processes of care (e.g., clinical assessments), sociodemographic and cultural issues, care of the imminently dying, ethical and legal issues, and treatments for unique physical symptoms (e.g., pain, nausea) were out of scope. The expert advisory panel agreed that aspects of out-of-scope domains (e.g., ethical or cultural issues) might be applicable to the in-scope domains, but research explicitly focused on these domains would not be undertaken.

After a preliminary review of the literature to determine the availability of evidence and following contextualization by the expert advisory panel, research questions for psychological, emotional, and spiritual support were not prioritized due to a paucity of evidence; instead, the expert advisory panel asked the research team to provide evidence related to interventions for informal caregiver support. For similar reasons, the expert advisory panel recognized that life support may include CPR, invasive ventilation, blood pressure support, and dialysis, but agreed to focus on the use of CPR in EoL care.

Across the 4 domains (location, communication, models of care, and services) the expert advisory panel prioritized 7 topics for review: determinants of place of death; PCPDs, EoL care educational interventions; team-based models of care; CPR; and supportive interventions for informal caregivers. Based on the results of the scoping, the research team developed a conceptual model for EoL care (Figure 1).

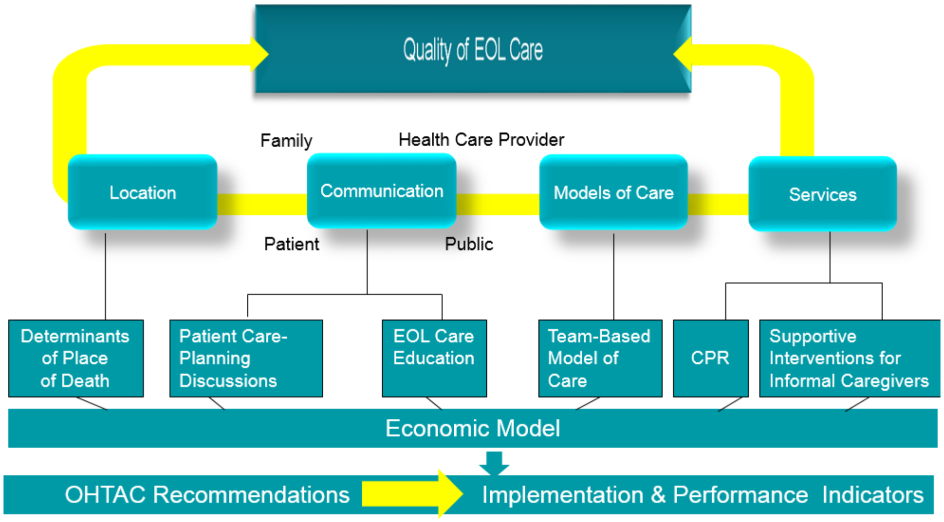

Figure 1: Conceptual Model of End-of-Life Care

CPR, cardiopulmonary resuscitation; EoL, end-of-life; OHTAC, Ontario Health Technology Advisory Committee.

Although the model was not without limitations and gaps, the expert advisory panel supported its use for this mega-analysis. The expert advisory panel requested a review of social marketing strategies, but because this intervention was complex and would constitute an evaluation of an implementation strategy, it was considered to be out of scope. Instead, the results of a large national survey determining the attitudes of Canadians 18 and older provided evidence for Canadian public perceptions of EoL issues. (9)

The research questions included in the final mega-analysis were as follows:

- **Determinants of place of death:** What are the determinants of place of death in adult patients who have been diagnosed with an advanced, life-limiting condition and are not expected to stabilize or improve?
- **Patient care planning discussions:** Which approaches to PCPDs optimize the quality of EoL care for patients with advanced disease, informal caregivers, and providers?
- **EoL care educational interventions:** Do educational interventions in EoL care for health care providers, patients nearing the end of life, or informal caregivers improve the quality of life of patients or informal caregivers compared with usual education?
- **Team-based models of care:** Is there an optimal team-based model of care for delivery of EoL services? What is the effectiveness of different team-based models on relevant patient, caregiver, health care provider, and system-level outcomes?
- **Cardiopulmonary resuscitation:** What is the post-CPR survival rate for patients with terminal illness?
- **Supportive interventions for informal caregivers:** What is the effectiveness of supportive interventions in improving coping and reducing distress for informal caregivers of patients receiving palliative/end-of-life care?
- **Economic analysis:** What is the cost-effectiveness of EoL care interventions identified as part of the EoL care mega-analysis?

Results of Evidence-Based Analyses

This section provides a summary of the findings from each of the individual evidence-based analyses, categorized according to where the intervention would fit into the conceptual model (Figure 1). For complete descriptions of methods and results, please refer to the individual reports in the series; full reviews are available at http://www.hqontario.ca/evidence/publications-and-ohtac-recommendations/ohtas-reports-and-ohtac-recommendations.

1. Determinants of Place of Death

Objective of Analysis

The objective of this analysis was to evaluate the determinants of place of death in adult patients who have been diagnosed with an advanced, life-limiting condition and are not expected to stabilize or improve.

Intervention

The needs of terminally ill patients vary; therefore certain places of death may be more appropriate for some patients than for others. (11) According to a conceptual model, place of death results from an interplay of factors that can be grouped into 3 domains: illness, individual, and environment. (31) Individual-related factors include sociodemographic characteristics and the patient's preferences with regards to place of death. (31) Environment-related factors can be divided into health care input (home care, hospital bed availability, and hospital admissions), social support (living arrangements, patient's social support network, and caregiver coping), and macrosocial factors (historical trends, health care policy, and cultural factors). (31)

Research Question

What are the determinants of place of death in adult patients who have been diagnosed with an advanced, life-limiting condition and are not expected to stabilize or improve?

Included Studies

A literature search was performed on September 24, 2013, that included studies published between January 1, 2004, and September 24, 2013. The search included systematic reviews, RCTs, and observational studies. Studies that adjusted for potential confounders and assessed at least 1 of the determinants of place of death evaluated (type of disease; hospital admissions; functional status; pain; multidisciplinary palliative care in the place of residence, including home visits by physician or nurses; availability of hospital and nursing home beds; patient or family preference for place of death; marital status or living arrangements; support for caregiver and caregiver's ability to care for the patient) were included. One reviewer screened the database (5,899 citations, with duplicates removed); 31 studies (2 systematic reviews and 29 observational studies) were included in the final analysis.

Results

Determinants of Home Death

Twenty-three observational studies evaluated the determinants of home death. Hospital death was the most common comparator. Table 1 summarizes the adjusted odds ratios of home versus hospital death, originating from multivariable analyses; meta-analyses using a random-effects model were performed if appropriate. Factors associated with an increased likelihood of home death included nurse and family physician home visits, multidisciplinary home palliative care, patient and family preference for home death, type of disease, presence of an informal caregiver, informal caregiver coping, and not living alone. Hospital admissions in the last year of life, admission to a hospital with palliative care services, and some diseases decreased the likelihood of home death.

Table 1: Determinants of Home Death (Versus Hospital Death)

Determinant of Home Death	Number of Observational Studies	Pooled Adjusted OR (95% CI)	I^{2a}	GRADE
Nurse Home Visits				
Nurse home visits (vs. no visits)	1 study	2.78 (2.01–3.85)	N/A	Low
Family Physician Home Visits				
Family physician home visits (vs. no visits)	1 study	12.50 (9.37–16.68)	N/A	Low
Home Care				
Multidisciplinary home care team (vs. usual care)	1 study	2.56 (2.31–2.83)	N/A	Low
In-hospital Palliative Care				
In-hospital palliative support team or hospice unit (yes vs. no)	2 studies	0.54 (0.33–0.89)	18%	Low
Preference for Home Death				
Patient preference (vs. no preference) for home death	2 studies	2.13 (1.58–2.87)	0%	Low
Family preference (vs. no preference) for home death	1 study	11.51 (8.28–15.99)	N/A	Low
Disease-Related				
Cancer (vs. other diseases)	11 studies	1.93 (1.52–2.44)	99%	Low
Hematologic cancer (vs. non-hematologic cancer)	3 studies	0.68 (0.53–0.87)	83%	Low
Major acute condition (vs. other diseases)	1 study	0.29 (0.26–0.33)	N/A	Low
Timing of Referral to Palliative Care				
Time from referral to palliative care to death (≥ 1 vs. < 1 month)	1 study	2.21 (1.33–3.67)	N/A	Low
Functional Status				
Worse functional status or bedridden (vs. better functional status or not bedridden)	2 studies	2.05 (1.33–3.15)	0%	Low
Prior Hospital Admission				
≥ 1 hospital admission during the last year of life (vs. no admission)	1 study	0.15 (0.07–0.30)	N/A	Low
Informal Caregiver-Related				
Informal caregiver presence (often vs. none or sometimes)	1 study	2.30 (1.15–4.60)	N/A	Low
Low informal caregiver psychological distress during stable phase (vs. high distress)	1 study	5.41 (1.13–25.92)	N/A	Low

Determinant of Home Death	Number of Observational Studies	Pooled Adjusted OR (95% CI)	I^{2a}	GRADE
Hospital Bed Availability				
Unit increase/1,000 population	3 studies	0.88 (0.84–0.92)	66%	Low
Living Arrangements				
Not living alone (vs. living alone)	4 studies	2.09 (1.68–2.59)	76%	Low

Abbreviations: CI, confidence interval; GRADE, Grading of Recommendations Assessment, Development and Evaluation; N/A not applicable; OR, odds ratio.
[a]If meta-analysis performed.

Determinants of Nursing Home Death

Ten observational studies evaluated the determinants of nursing home death. Hospital death was the most common comparator. Table 2 summarizes the adjusted odds ratios of nursing home versus hospital death originating from multivariable analyses; meta-analyses using a random-effects model were performed if appropriate. Factors associated with an increased likelihood of nursing home death included palliative care services in the nursing home, having an advance directive, preference for nursing home death, type of disease, and functional status.

Table 2: Determinants of Nursing Home Death (Versus Hospital Death)

Determinant of Nursing Home Death	Number of Observational Studies	Pooled Adjusted OR (95% CI)	I^{2a}	GRADE
EoL, Palliative, or Hospice Care in the Nursing Home				
EoL care	1 study	1.57 (1.14–2.16)	N/A	Low
Hospice care	2 studies	15.16 (9.30–24.73)	71%	Low
Palliative care personnel	1 study	9.40 (3.31–26.73)	N/A	Low
Advance Directives				
Any advance directive	1 study	1.57 (1.35–1.82)	N/A	Low
Preference for Nursing Home Death				
Patient preference	1 study	10.40 (4.40–24.90)	N/A	Low
Family preference	1 study	16.62 (11.38–24.27)	N/A	Low
Disease-Related				
End-stage disease (vs. non-end stage)	1 study	3.90 (2.78–5.47)	N/A	Low
Dementia (vs. other diseases)	3 studies	2.94 (2.76–3.13)	17%	Low
Heart failure (vs. other diseases)	1 study	0.75 (0.64–0.88)	N/A	Low
Functional Status				
Worse functional status or bedridden (vs. better functional status or not bedridden)	2 studies	2.22 (2.07–2.38)	0%	Low

Abbreviations: CI, confidence interval; EoL, end-of-life; GRADE, Grading of Recommendations Assessment, Development and Evaluation; N/A not applicable; OR, odds ratio; vs., versus.
[a]If meta-analysis performed.

Determinants of Inpatient Palliative Care Unit Death

One observational study evaluated the determinants of inpatient palliative care unit death. Factors associated with an increased likelihood of inpatient palliative care unit death included cancer diagnosis and multidisciplinary home care team involvement.

Table 3: Determinants of Inpatient Palliative Care Unit Death (Versus Hospital Death)

Determinant of Inpatient Palliative Care Unit Death	Number of Observational Studies	Adjusted OR (95% CI)	GRADE
Cancer (vs. other diseases)	1 study	6.50 (3.88–10.90)	Low
Multidisciplinary home care team	1 study	2.90 (1.53–5.50)	Low

Abbreviations: CI, confidence interval; GRADE, Grading of Recommendations Assessment, Development and Evaluation; OR, odds ratio.

Determinants of Inpatient Hospice Death

Two observational studies evaluated the determinants of inpatient hospice death. Factors associated with an increased likelihood of inpatient hospice death included cancer diagnosis and longer time between palliative care referral and death.

Table 4: Determinants of Inpatient Hospice Death (Versus Hospital Death)

Determinant of Inpatient Hospice Death	Number of Observational Studies	Adjusted OR (95% CI)	GRADE
Cancer	1 study	20.07 (16.05–25.09)	Low
Time from referral to palliative care to death (≥ 1 vs. < 1 month)	1 study	2.0 (1.13–3.60)	Low

Abbreviations: CI, confidence interval; GRADE, Grading of Recommendations Assessment, Development and Evaluation; OR, odds ratio.

Cost-Effectiveness

Determinants of place of death were not included in the cost-effectiveness analysis.

Conclusions

The results obtained were consistent with previously published systematic reviews. Based on low-quality evidence, several factors were identified as determinants of place of death:

- interprofessional EoL care in the place of residence
- time between referral to EoL care services and death
- type of underlying disease
- functional status
- frequency of hospitalizations during the last year of life
- living arrangements, such as living with someone
- presence of an informal caregiver
- informal caregiver coping
- patient or family preference for place of death
- existence of advance directives
- nursing home and hospital bed availability
- availability of resources to support the patient’s physical and psychological needs in the place of residence during the EoL period

2. Patient Care Planning Discussions

Objective of Analysis

The objective of this analysis was to examine the effectiveness of PCPDs in achieving better patient-centred outcomes for people at the end of life.

Intervention

Patient care planning discussions is an umbrella term used to describe discussions that usually lead to a care program specifically designed for a particular patient. It encompasses advance care planning or goals-of-care conversations (i.e., discussions with patients and/or their substitute decision makers about the goals and desired direction of their care). (12)

Ontario law specifies that, even when an advanced care plan or do-not-resuscitate (DNR) order is in place, decisions about treatments cannot be made without informed consent, which requires health care providers to discuss care options with patients or their substitute decision makers. (32) PCPDs are thus a necessary and important component of decision-making in health care. Advance care plans and DNR orders are outputs from the PCPDs, and they should be updated if a patient's wishes, values, or beliefs related to care change in any way. More recent expressions of care preferences take precedence over older ones, even if the older ones are written and the more recent ones are verbal.

Discussions are complex interventions, because their multiple components can affect their efficacy. Although they can take different forms depending on the context, they adhere to an underlying structure. (33) These interventions can vary by setting, health care personnel, frequency, topics discussed, intensity, structure, and so forth, and therefore must be broken into their constituent parts when they are being evaluated, and each part must be assessed separately. The *Patient Care Planning Discussions for Patients at the End of Life* evidence-based analysis has deconstructed PCPDs to assess the number of providers involved and the timing of discussions.

Research Question

Which approaches to PCPDs optimize the quality of EoL care for patients with advanced disease, informal caregivers, and providers?

Included Studies

A literature search was performed on October 9, 2013, to identify studies published from January 1, 2004, to October 9, 2013. A single reviewer screened the database (5,314 citations, with duplicates removed); Fifty-two studies (10 systematic reviews, 13 RCTs, and 29 observational studies) met the inclusion criteria. The reference lists of these studies were hand-searched to identify other relevant studies, and 2 additional citations (2 observational studies) were included, for a total of 54 studies. Data from 30 studies (13 RCTs, 11 observational studies with contemporaneous controls, 3 observational studies with historical controls, and 3 cross-sectional studies) were included in the final analysis.

Results

Table 5: Single-Provider Discussion (Versus Usual Care or No Discussion)

Outcome	Population	Measure	Studies	Result	GRADE
QOL	EoL population	Patient's QOL	1 RCT and 2 observational studies	Inconsistent: 2 studies showed improvement (1 was significant), 1 study showed no difference	Very low
		Informal caregivers' QOL	1 RCT	Unclear: statistical tests could not be performed	Very low
Satisfaction with EoL care		Patient's satisfaction with EoL care	3 RCTs	Inconsistent: 1 study showed significant improvement, 1 study showed significant reduction, 1 study showed nonsignificant reduction	Moderate
		Family's satisfaction with EoL care	3 RCTs	Significant improvement	High
Concordance		Concordance between patient's wishes and care received	1 RCT	Nonsignificant improvement	High
		Concordance between patient's and family's wishes	2 RCTs	Significant improvement	High
ACP		Completion of ACP documents and processes	3 RCTs	Significant improvement	High
Health care use		Chemotherapy at EoL	3 observational studies	Significant reduction	Low
		Resuscitation	2 observational studies	Significant reduction	Very low
		Hospital care at EoL	1 RCT	Significant reduction	High
		Hospital LOS	1 RCT	Significant reduction	High
		ED visits	1 observational study	Nonsignificant reduction	Low
		ICU care	3 observational studies	Nonsignificant reduction	Very low
		Home health visits	1 observational study	Nonsignificant increase	Very low
		Outpatient visits	1 observational study	Nonsignificant increase	Low
		Hospice use	1 RCT	Significant increase	High
		Hospice care for > 1 week	3 observational studies	Significant increase	Low

Abbreviations: ACP, advance care planning; ED, emergency department; EoL, end-of-life; GRADE, Grading of Recommendations Assessment, Development and Evaluation; ICU, intensive care unit; LOS, length of stay; QOL, quality of life; RCT, randomized controlled trial.

Table 6: Team-Based Discussion (Versus Usual Care or No Discussion)

Outcome	Population	Measure	Studies	Result	GRADE
QOL	EoL population	Patient's QOL	1 RCT	Nonsignificant improvement	Moderate
Satisfaction with EoL care		Patient's satisfaction with EoL care	1 RCT	Significant improvement	High
ACP		Completion of ACP documents and processes	1 RCT	Significant improvement	High
Health care use		Hospital care at EoL	1 observational study	Nonsignificant increase	Low
		Hospital LOS	2 RCTs	Inconsistent: 1 study showed no difference, 1 study showed a significant reduction	Low
		ED visits	1 observational study	No difference	Moderate
		ICU LOS	2 RCTs	Nonsignificant reduction	High
		Urgent care visits	1 observational study	Significant reduction	Moderate
		Outpatient visits	1 observational study	Significant reduction	Moderate

Abbreviations: ACP, advance care planning; ED, emergency department; EoL, end-of-life; GRADE, Grading of Recommendations Assessment, Development and Evaluation; ICU, intensive care unit; LOS, length of stay; QOL, quality of life; RCT, randomized controlled trial.

Table 7: Earlier Discussion (Versus Later Discussion)

Outcome	Population	Measure	Studies	Result	GRADE
QOL	EoL population	Patient's QOL	1 observational study	Significant improvement	Low
Health care use		Chemotherapy at EoL	1 observational study	Significant reduction	Low
		Hospital care at EoL	1 observational study	Significant reduction	Moderate
		ICU care	1 observational study	Significant reduction	Low
		Hospice use	1 observational study	Significant increase	Moderate

Abbreviations: EoL, end-of-life; GRADE, Grading of Recommendations Assessment, Development and Evaluation; ICU, intensive care unit; LOS, length of stay; QOL, quality of life.

Cost-Effectiveness

Results of the cost-effectiveness analysis provided some evidence in support of PCPDs.

- Compared to usual care, screening long-term care residents nearing EoL and referring them to EoL team care appeared to be a dominant strategy. It reduced health care costs, slightly increased the expected time at home and did not change the percentage of patients dying at home. However, these best estimates may change; the probability of this strategy being dominant was 0.28.
- Compared to usual care, providing ethics consultation for ICU patients who are nearing EoL and have care plan–related conflicts appeared to be a dominant strategy. It reduced health care costs and improved expected health outcomes. However, these best estimates may change; the probability of this strategy being dominant was 0.21.
- Compared to usual care, enabling communication via family conferences for relatives of patients dying in the ICU slightly improved the expected number of days at home but slightly decreased the expected percentage of patients dying at home. This strategy appeared to be cost-effective, with an estimated cost of approximately $42,000 per QALY gained. However, there was high uncertainty in the results of the cost-effectiveness analysis, and the results may change with additional data.

Conclusions

The best available evidence showed that single-provider and team-based PCPDs provided benefits for patients at the end of life and their families. PCPDs done earlier in the course of illness were more beneficial than later ones. Single-provider and team-based discussions were not directly compared in the studies, so conclusions could not be drawn as to which approach may be more optimal.

High quality evidence gave moderate certainty to the conclusion that single-provider PCPDs:

- improved families' satisfaction with EoL care and concordance between patients' and families' wishes
- reduced the likelihood of receiving hospital care and the number of days spent in hospital
- increased the completion of advance care planning processes and documents and the likelihood of receiving hospice care

Moderate to high quality evidence indicated with moderate certainty that team-based PCPDs:

- increased patient satisfaction and the completion of advance care planning documents and processes
- reduced the number of days spent in intensive care and decreased the use of outpatient services

Finally, moderate quality evidence showed that earlier PCPDs were associated with reduced hospital care and increased hospice care.

3. EoL Care Educational Interventions

Objective of Analysis

The objectives of this analysis were to systematically review studies that included educational interventions for health care providers, patients nearing the end of life, and informal caregivers to improve patient and informal caregiver outcomes; and to determine the effectiveness of educational interventions for improving quality of life in patients nearing end of life and informal caregivers.

Intervention

Education is "that multidisciplinary practice, which is concerned with *designing*, implementing, and evaluating educational programs that enable individuals, families, groups, organizations, and communities to play active roles in achieving, protecting, and sustaining health." (15) Health education is "any combination of learning experiences designed to facilitate voluntary actions conducive to health." Ontario health care providers receive continuing medical education on a wide range of topics, but education on EoL care may not be provided regularly. As part of EoL care, health care providers may also need to co-ordinate education for patients nearing EoL and their informal caregivers.

Research Question

Do educational interventions in EoL care for health care providers, patients nearing the end of life, or informal caregivers improve the quality of life of patients or informal caregivers compared with usual care?

Included Studies

A literature search was performed on December 2, 2013, for studies published from January 1, 2003, to October 31, 2013. One reviewer screened the database (2,468 citations, with duplicates removed); 6 studies (RCTs) were included in the final analysis.

Results

Table 8: EoL Education of Patient, Health Care Providers, and Informal Caregivers (Versus Usual Care)

Outcome	Intervention	Measure	Studies	Result	GRADE
Patient QOL	Education of health care providers	RSCL global scale	1 RCT	Significant	Low after considering 5 RCTs as the body of evidence
		Quality of End-of-Life Care questionnaire	1 RCT	Nonsignificant	
		QODD questionnaire	1 RCT	Nonsignificant	
	Education of informal caregivers and patients	COH QOL instruments	1 RCT	Nonsignificant	
		FACIT-Pal	1 RCT	Nonsignificant	
Informal caregiver QOL	Education of health care providers	Quality of End-of-Life Care questionnaire	1 RCT	Nonsignificant	Low
	Education of patients and informal caregivers	COH QOL instruments	1 RCT	Significant	
		CQOLC	1 RCT	Significant	
Patient pain control	Education of health care providers	BPI and POS	1 RCT	Nonsignificant	Moderate
		Chart abstraction	1 RCT	Nonsignificant	
Patient symptom control	Education of health care providers	PHQ-8	1 RCT	Significant	Moderate
	Education of patients and informal caregivers	ESAS	1 RCT	Nonsignificant	
		MSAS	1 RCT	Significant	
Informal caregiver satisfaction	Education of health care providers	Spanish version of SERVQUAL	1 RCT	Nonsignificant	Moderate
		QODD questionnaire	1 RCT	Nonsignificant	
Health care provider satisfaction	Education of health care providers	QODD questionnaire	1 RCT	Nonsignificant	Moderate
Hospital LOS	Education of patients	Number of hospital days	1 RCT	Nonsignificant	Moderate
ED visits	Education of patients	Number of ED visits	1 RCT	Nonsignificant	Moderate
Length of ICU admissions	Education of health care providers	Number of ICU days	1 RCT	Significant	Moderate
ICU admissions	Education of health care providers	Number of ICU admissions	1 RCT	Nonsignificant	Moderate

Abbreviation: BPI, Brief Pain Inventory; COH, City of Hope; CQOLC, Caregiver Quality of Life–Cancer; ED, emergency department; EoL, end-of-life; ESAS, Edmonton Symptom Assessment Scale; FACIT-Pal; Functional Assessment of Chronic Illness Therapy—Palliative Care; GRADE, Grading of Recommendations Assessment, Development and Evaluation; ICU, intensive care unit; LOS, length of stay; MSAS, Memorial Symptom Assessment Scale; PHQ-8, Personal Health Questionnaire-8; POS, Palliative Care Outcome Scale; QODD, Quality of Dying and Death; QOL, quality of life; RCT, randomized controlled trial; RSCL, Rotterdam Symptom Checklist.

Cost-Effectiveness

Compared to usual care, providing multicomponent psychoeducational training sessions for patients and families increased health care costs, decreased the expected time at home, and decreased the percentage of patients dying at home. This strategy was unlikely to be cost-effective, at $480,000 per QALY. However, these best estimates may change; at a cost-effectiveness threshold of $50,000 per QALY, the probability of this strategy being more cost-effective than usual care was 0.26.

Conclusions

Educational interventions for health care providers that were focused on improving communication skills, knowledge, and attitudes towards EoL care:

- significantly improved patient symptom control (moderate quality evidence) but did not significantly improve pain control (moderate quality evidence)
- did not significantly improve informal caregiver quality of life, informal caregiver satisfaction, or health care provider satisfaction (moderate quality evidence)
- did not improve resource utilization, including number of hospital days, emergency department visits, or intensive care unit admissions (moderate quality evidence)
- did not significantly improve patient quality of life (low quality evidence)

Educational interventions for informal caregivers and patients that were focused on symptom management and coping skills:

- significantly improved informal caregiver quality of life (moderate quality evidence)
- significantly improved patient symptom control (moderate quality evidence)
- did not improve resource utilization, including number of hospital days, emergency department visits, or number of intensive care unit admissions (moderate quality evidence)
- did not significantly improve patient quality of life (low quality evidence)

4. Team-Based Models of Care

Objectives of Analysis

The objective was to systematically review team-based models of care for EoL service delivery, to determine whether an optimal model exists. Our review considered the core model components of team membership, services offered, mode of patient contact, and setting.

Intervention

Davidson et al (16) defined a *model of care* as an "overarching design for the provision of a particular type of health care service. It consists of defined core elements and principles and has a framework that provides the structure for the implementation and subsequent evaluation of care." The authors also say that "having a clearly defined and articulated model of care will help to ensure that all health professionals are all actually viewing the same picture, working toward a common set of goals and, most importantly, are able to evaluate performance on an agreed basis."

For empirical evaluation and for implementation, it is important to distinguish the framework of a model from the core elements that define it. Using Davidson's (16) conceptual definition of a model of care, the framework of the models investigated in recent systematic reviews was a team-based design. However, the team-based models differed in terms of their core elements, including membership, team services, mode of patient contact, and setting.

Research Question

Is there an optimal team-based model of care for delivery of end-of-life services? What is the effectiveness of different team-based models on relevant patient, caregiver, health care provider, and system-level outcomes?

Included Studies

A literature search was performed on October 14, 2013, to identify studies published from January 1, 2000, to October 14, 2013. One reviewer screened the database (6,180 citations, with duplicates removed); 12 studies (2 systematic reviews and 10 RCTs) were included in the final analysis.

Results

In this review, we identified models of care in part by setting: home team-based models, comprehensive team-based models, and hospital team-based models. Comprehensive team-based models included care across all inpatient and outpatient (including clinic and home) settings. We also identified models by mode of contact: direct (team meets with and delivers care to the patient) or indirect (team meets with and advises another health care professional, who then directly contacts and delivers care to the patient). Six team-based models of care were represented among the 10 RCTs:

- hospital setting, direct contact
- home setting, direct contact
- home setting, indirect contact
- comprehensive setting, direct contact
- comprehensive setting, indirect contact
- comprehensive setting, direct contact, early start

Team care was interprofessional and coordinated. Minimum core membership included a physician and nurse, 1 of whom was specialized/experienced in EoL health care. At least half of the studies included symptom management, psychosocial care, EoL care planning, development of care plans, and continuity of care methods as their core services offered. Table 9 reports the results of the effect of the different models for relevant outcomes.

Table 9: Team-Based Models of Care (Versus Usual Care)

Outcome	Population	Model	Measure	Studies	Result	GRADE
Patient QOL	EoL population	Hospital, direct contact	Self-reported QOL; EORTC QLQ-C30	2 RCTs	Nonsignificant difference in change scores	Low
		Comprehensive, indirect contact	AQEL	1 RCT	Nonsignificant difference in change scores	Low
		Comprehensive, direct contact	EORTC QLQ-C30	1 RCT	Nonsignificant change scores	Moderate
		Comprehensive, direct contact, early start	FACIT-Sp; QUAL-E; TOI	2 RCTs	Significant improvement in persons receiving comprehensive team-based EoL care started early	Moderate
Symptom management		Hospital, direct contact	Physical area scale; VAS for severity of most bothersome symptom	2 RCTs	Nonsignificant difference in change scores	Low
		Comprehensive, direct contact, early start	ESAS	1 RCT	Significant improvement in persons receiving EoL comprehensive team-based care started early	Moderate
Patient satisfaction		Home, direct contact	Reid-Gundlach Satisfaction with Services instrument	1 RCT	Significant improvement in persons receiving home team-based EoL care	Low
		Comprehensive, direct contact, early start	FAMCARE-P16	1 RCT	Significant, favours team	Moderate
Informal caregiver satisfaction		Hospital, direct contact	New questionnaire developed by author	1 RCT	Nonsignificant difference	Low
		Comprehensive, direct contact	FAMCARE	1 RCT	Significant, favours team	Moderate
Place of death: home		Home, direct contact	Number of people dying at home vs. elsewhere	1 RCT	Significant increase in home deaths with a home EoL team care model	Low
		Comprehensive, direct contact	Number of people dying at home vs. elsewhere	1 RCT	Significant increase in home deaths with a comprehensive EoL team care model	Moderate

Outcome	Population	Model	Measure	Studies	Result	GRADE
Place of death: nursing home		Comprehensive, direct contact	Number of people dying in a nursing home vs. elsewhere	1 RCT	Significant reduction in nursing home deaths with a comprehensive EoL care team model	Moderate
ACP		Hospital, direct contact	Proportion of people with ACPs	2 RCTs	Nonsignificant increase in ACP in people receiving hospital EoL team care	Low
		Home, indirect contact	Proportion of people with ACPs	1 RCT	Nonsignificant increase in ACP people receiving indirect home EoL team care	Very low
		Comprehensive, direct contact, early start	Proportion of people with ACPs	1 RCT	Significant increase in ACP people in the community receiving comprehensive EoL team care	Low
ED visits		Home, direct contact	Proportion of people visiting the ED	1 RCT	Significant reduction in ED visits in people receiving home EoL team care	Low
		Home, indirect contact	Average ED visits per month	1 RCT	Nonsignificant difference	Low
		Comprehensive, direct contact, early start	Proportion of people visiting ED	1 RCT	Nonsignificant difference	Very low
Hospital admissions		Home, direct contact	Proportion of people admitted to the hospital	1 RCT	Significant reduction in people receiving home EoL team care	Low
		Comprehensive, direct contact	Proportion of people admitted to the hospital	1 RCT	Nonsignificant reduction	Moderate
		Comprehensive, direct contact, early start	Proportion of people admitted to the hospital	1 RCT	Nonsignificant reduction	Moderate
ICU admissions		Hospital, direct contact	Proportion of people admitted to the ICU	1 RCT	Significant reduction in people receiving hospital EoL team care	Low
Hospital LOS		Hospital, direct contact	Hospital LOS (index admission)	4 RCTs	Nonsignificant difference	Moderate
		Comprehensive, direct contact	Hospital LOS (index admission)	1 RCT	Nonsignificant difference	Moderate

Abbreviations: ACP, advance care planning; AQEL, Assessment of Quality of Life at the End-of-Life; ED, emergency department; EoL, end-of-life; EORTC QLQ-C30, European Organization for Research and Treatment of Cancer Quality of Life-C30; ESAS, Edmonton Symptom Assessment System; FACIT-Sp, Functional Assessment of Chronic Illness Therapy-spiritual Well-Being; FAMCARE-P16, Family Satisfaction with Care of Patients with Advanced Cancer-Patient Version; GRADE, Grading of Recommendations Assessment, Development and Evaluation; ICU, intensive care unit; LOS, length of stay; QOL, quality of life; QUAL-E, The Quality of Life at the End-of-Life, RCT, randomized controlled trial; TOI, Trial Outcome Index; VAS, visual analogue scale.

Cost-Effectiveness

Results of the cost-effectiveness analysis provided evidence in support of team-based models of care:

- Compared to usual care, in-home team care was a dominant strategy. It was likely to reduce health care costs (due to a significant reduction in ED visits and hospital admissions) and improve the health outcomes of days at home and percentage dying at home. This finding was derived from a high-quality economic evaluation; the probability of this intervention being dominant was 0.72.
- Compared to usual care, inpatient team care was a dominant strategy. It reduced health care costs and improved health outcomes. However, these best estimates may change; the probability of this intervention being dominant was 0.38.
- Compared to usual care, comprehensive team care increased health care costs but improved health outcomes. It was associated with an estimated cost of approximately $73,000 per QALY gained. However, these best estimates may change; at a cost-effectiveness threshold of $50,000 per QALY, the probability of this strategy being more cost-effective than usual care was 0.32.

Conclusions

Comprehensive Team-Based Model

There is moderate quality evidence that a comprehensive team-based model with direct patient contact significantly:

- improves patient QOL, symptom management, patient and informal caregiver satisfaction
- increases the patient’s likelihood of dying at home
- decreases the patient’s likelihood of dying in a nursing home
- has no impact on hospital admissions or hospital length of stay

Hospital Team-Based Model

There is moderate quality evidence that a hospital team-based model with direct patient contact has no impact on length of hospital stay. There is low quality evidence that this model significantly reduces ICU admissions.

Home Team-Based Model

There is low quality evidence that a home team-based model with direct patient contact:

- significantly increases patient satisfaction, and increases the patient’s likelihood of dying at home
- significantly decreases ED visits and hospital admissions

Team Membership and Services

Team membership includes at minimum a physician and nurse, 1 of whom is specialized in EoL health care. Team services include:

- symptom management
- psychosocial care
- development of patient care plans
- EoL care planning
- coordination of care

5. Cardiopulmonary Resuscitation

Objective of Analysis

The objective of this analysis was to systematically review the literature to provide an accurate estimate of chance of survival following CPR in patients with terminal health conditions.

Intervention

CPR includes administration of chest compressions in combination with artificial respiration, cardiac defibrillation, and intravenous medications. The CPR technique was developed in the early 1960s as a simple and effective way to resuscitate patients suffering from cardiac arrest. Performing CPR regardless of the underlying cause of cardiac arrest can transiently restore circulation, but this survival is not guaranteed to the point of leaving hospital alive.

A meta-analysis of studies that investigated the rate of immediate survival and survival to discharge for all adult patients who underwent in-hospital CPR showed that the rate of immediate survival was 4 in 10, and that the likelihood of survival to discharge was 1 in 3 for those patients who were revived (1 in 8 among all patients who underwent CPR in the hospital).

Research Question

What is the post-CPR survival rate for patients with terminal illness?

Included Studies

A literature search was performed on January 10, 2014, to identify studies published from January 1, 2004, to January 10, 2014. One reviewer screened the database (2055 citations, with duplicates removed); 10 studies (1 systematic review and 9 clinical trials) were included in the final analysis.

Results

Four clinical studies (34-37) and 1 systematic review (38) reported CPR in cancer patients. Three clinical studies reported on CPR in patients with chronic health conditions (34, 39, 40) and 4 (34, 41-43) reported on CPR in older patients. Results are shown in Table 10.

Table 10: Survival After Cardiopulmonary Resuscitation

Population	Outcome	Studies	Result	GRADE
Patients with Cancer				
In-Hospital Cardiac Arrest				
Patients with cancer (all types)	Survival to discharge	1 large study	11.6% vs. 15.3%, $P < 0.001$	Low
Patients with cancer (all types)	30-day survival	1 small study	16% vs. 23%	Low
Patients with metastatic or hematological malignancy	Survival to discharge	1 national registry of CPR	7.8%	Low
Patients with cancer in ICU and patients with cancer in ward	Survival to discharge	1 meta-analysis	ICU: 2.2% Ward: 10.1%	Low

Population	Outcome	Studies	Result	GRADE
Patients with cancer according to different time periods	Survival to discharge	1 meta-analysis and 1 recent observational	Pre-1990: 3.7% 1990–2005: 6.7% 1999–2011: 16%	Low
Out-of-Hospital Cardiac Arrest				
Patients with cancer	Survival to discharge	1 observational	17%	Low
Patients with Chronic Conditions				
In-Hospital Cardiac Arrest				
Patients with chronic health conditions	Survival to discharge according to the type of chronic health condition	1 observational	Acute MI: 23.9% Previous MI: 18.8% Heart failure: 16.9% Diabetes: 15.9% Respiratory insufficiency: 12.4% Renal insufficiency: 11.4% Acute stroke: 10.9% Infection/septicemia: 7.6% Hepatic insufficiency: 7.3%	Low
Hemodialysis patients in hemodialysis unit	Survival to discharge	1 observational	30-day: 75% 60-day: 58%	Low
Out-of-Hospital Cardiac Arrest				
Patients with chronic health conditions	Survival to discharge according to the number of chronic health conditions	1 observational	Number of health conditions 0: 43.4% 1: 35% 2: 32.7% 3: 24% 4: 18.4% OR and 95% CI for survival to discharge was 0.84 (0.74–0.95) for each successive increase in chronic health condition. This relationship was modified by EMS response time: **EMS response time of 8 min:** OR, 0.72 (0.59–0.88) **EMS response time of 3 min:** OR, 0.95 (0.79–1.14)	Low
Patients With Advanced Age				
In-Hospital Cardiac Arrest				
Patients at different ages	Survival to discharge	1 observational	18–39: 13.6% 40–59: 19 60–79: 16.9% 80+: 10.9%	Low
Patients 65 years and older	Survival to discharge according to the	1 observational	**Age** **1 CPR** **> 1 CPR** 65–69 21.8% 8.9% 70–74 20.3% 9.3% 75–79 18.4% 9.0%	Low

Population	Outcome	Studies	Result			GRADE
	frequency of CPR		80–84	16.3%	7.1%	
			85–89	14.3%	7.8%	
			90+	11.3%	5.3%	
Patients 65 years and older	Survival to discharge according to residential and functional status	1 observational	Community dwelling	Independent: 18% Dependent: 11%	**With good neuro-logical outcome:** Independent: 15% Dependent: 10%	Low
			Nursing home	Independent: 13% Dependent: 9%	Independent: 11% Dependent: 8%	
In- and Out-of-Hospital Cardiac Arrest						
Patients at different ages	Survival to discharge	1 observational	< 60: 5.1% ≥ 60: 10.6% The proportion of patients with terminal illnesses and traumatic injuries was higher in younger patients			Low

Abbreviations: CI, confidence interval; CPR, cardiopulmonary resuscitation; EMS, emergency medical services; GRADE, Grading of Recommendations Assessment, Development and Evaluation; ICU, intensive care unit; MI, myocardial infarction; OR, odds ratio.

Cost-Effectiveness

Cardiopulmonary resuscitation was not included in the cost-effectiveness analysis.

Conclusions

- Recent studies have reported a higher chance of survival in cancer patients. This may reflect the impact of “do not resuscitate” orders in recent years for patients with end-stage cancer.
- Overall, patients with cancer had lower chances of survival following CPR than patients without cancer.
- Severity of illness in cancer patients can impact survival following CPR. A meta-analysis showed survival to discharge of patients with cancer who received CPR in ICUs was 2.2%, one-fifth the rate of survival of patients with cancer who received CPR in general ward (10.1%) despite constant monitoring in ICUs.
- Patients with cancer who had cardiac arrest out of hospital and received CPR either out of hospital or in EDs had survival to discharge rates similar to hospitalized patients who received CPR in hospital.
- The type and number of chronic health conditions can affect survival following CPR. Studies showed that patients who had myocardial infarction had better survival to discharge following CPR than patients with other health conditions and that patients undergoing hemodialysis had a high chance of survival following CPR.
- Older age is not necessarily a factor in lowering the odds of survival but functional dependence and undergoing multiple CPRs, particularly in advanced age, can reduce the chance of survival following CPR.
- Emergency medical services response time contributed to the chance of survival following out-of-hospital CPR in patients with chronic health conditions.

6. Supportive Interventions for Informal Caregivers

Objective of Analysis

The objective of this rapid review was to determine the effectiveness of supportive interventions in improving coping and reducing burden and distress for informal caregivers of patients who are at the end of life.

Intervention

The needs of caregivers are diverse and broad, and interventions to address those needs are diverse. However, supportive interventions for informal caregivers have some common aims: providing relief from care, improving coping skills, and improving well-being. (19)

Research Question

What is the effectiveness of supportive interventions in improving coping and reducing distress for informal caregivers of patients receiving palliative/EoL care?

Included Studies

A literature search was performed on February 26, 2014, to identify studies published from January 1, 2009, to February 26, 2014. One reviewer screened database (191 citations, with duplicates removed); 1 systematic review was included in the final analysis.

Results

Table 11: Interventions Providing Direct Support (Versus No Intervention or Usual Care)

Outcome	Population	Measure	Studies	Result	GRADE
Coping	Informal caregivers of people at EoL	Coping	7 RCTs	Nonsignificant reduction	Low
Distress		Distress	8 RCTs	Significant reduction	Low

Abbreviations: EoL, end-of-life; GRADE, Grading of Recommendations Assessment, Development and Evaluation; RCT, randomized controlled trial.

Table 12: Interventions Providing Indirect Support (Versus No Intervention or Usual Care)

Outcome	Population	Measure	Studies	Result	GRADE
Coping	Informal caregivers of people at EoL	Coping	0 studies	None	N/A
Distress		Anxiety	2 RCTs	Inconclusive: 1 study showed nonsignificant improvement, 1 study showed significant improvement	Very low
		Depression	2 RCTs	Nonsignificant improvement	

Abbreviations: EoL, end-of-life; GRADE, Grading of Recommendations Assessment, Development and Evaluation; N/A, not applicable; RCT, randomized controlled trial.

Cost-Effectiveness

Compared to usual care, providing supportive services for caregivers may be cost-effective, with an estimated cost of approximately $87,000 per QALY gained. However, these best estimates may change; at a cost-effectiveness threshold of $50,000 per QALY, the probability of this intervention strategy being more cost-effective than usual care was estimated 0.28.

Conclusions

- Low quality evidence showed that direct interventions had a small effect on reducing distress for informal caregivers of people at the end of life, but no effect on helping them cope. A more stratified exploration found that direct interventions for informal caregivers that combined general advice and support with educational strategies to improving coping and communication skills were associated with lower distress (moderate quality evidence).
- Evidence of very low quality showed that indirect interventions (interventions provided to the person at the end of life instead of directly to the informal care provider) did not have an effect on informal caregivers' distress.

Conclusions

This mega analysis provides both a clinical and economic evidentiary platform for persons in the EoL phase. Evidence on the determinants of place of death; PCPDs; EoL care educational interventions for patients, informal caregivers, and health care providers; team-based models of care; effectiveness of CPR in an EoL care population; and supportive interventions for informal caregivers was reviewed. Economic modelling and cost-effectiveness analysis were also completed to determine the cost-effectiveness of those interventions having clinical effectiveness. Results of each review and the economic analysis were presented to OHTAC on March 28, 2014. Based on the evidence, OHTAC has made recommendations, which can be found on the Health Quality Ontario website at www.hqontario.ca.

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Editorial Staff
Jeanne McKane, CPE, ELS(D)

Medical Information Services
Corinne Holubowich, MLIS
Kellee Kaulback, BA(H), MISt

Health Quality Ontario's Expert Advisory Panel on End-of-Life Care

Panel Member	Affiliation(s)	Appointment(s)
Panel Co-Chairs		
Dr Robert Fowler	Sunnybrook Research Institute University of Toronto	Senior Scientist Associate Professor
Shirlee Sharkey	St. Elizabeth Health Care Centre	President and CEO
Professional Organizations Representation		
Dr Scott Wooder	Ontario Medical Association	President
Health Care System Representation		
Dr Douglas Manuel	Ottawa Hospital Research Institute University of Ottawa	Senior Scientist Associate Professor
Primary/ Palliative Care		
Dr Russell Goldman	Mount Sinai Hospital, Tammy Latner Centre for Palliative Care	Director
Dr Sandy Buchman	Mount Sinai Hospital, Tammy Latner Centre for Palliative Care Cancer Care Ontario University of Toronto	Educational Lead Clinical Lead QI Assistant Professor
Dr Mary Anne Huggins	Mississauga Halton Palliative Care Network; Dorothy Ley Hospice	Medical Director
Dr Cathy Faulds	London Family Health Team	Lead Physician
Dr José Pereira	The Ottawa Hospital University of Ottawa	Professor, and Chief of the Palliative Care program at The Ottawa Hospital
Dean Walters	Central East Community Care Access Centre	Nurse Practitioner
Critical Care		
Dr Daren Heyland	Clinical Evaluation Research Unit Kingston General Hospital	Scientific Director
Oncology		
Dr Craig Earle	Ontario Institute for Cancer Research Cancer Care Ontario	Director of Health Services Research Program
Internal Medicine		

Panel Member	Affiliation(s)	Appointment(s)
Dr John You	McMaster University	Associate Professor
Geriatrics		
Dr Daphna Grossman	Baycrest Health Sciences	Deputy Head Palliative Care
Social Work		
Mary-Lou Kelley	School of Social Work and Northern Ontario School of Medicine Lakehead University	Professor
Emergency Medicine		
Dr Barry McLellan	Sunnybrook Health Sciences Centre	President and Chief Executive Officer
Bioethics		
Robert Sibbald	London Health Sciences Centre University of Western Ontario	Professor
Nursing		
Vicki Lejambe	Saint Elizabeth Health Care	Advanced Practice Consultant
Tracey DasGupta	Sunnybrook Health Sciences Centre	Director, Interprofessional Practice
Mary Jane Esplen	De Souza Institute University of Toronto	Director Clinician Scientist

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Health Quality Ontario
130 Bloor Street West, 10th Floor
Toronto, Ontario
M5S 1N5
Tel: 416-323-6868
Toll Free: 1-866-623-6868
Fax: 416-323-9261
Email: EvidenceInfo@hqontario.ca
www.hqontario.ca

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