Physician-Focused Payment Model Technical Advisory Committee **LOI: Environmental Scan & Relevant Literature**
Coalition to Transform Advanced Care (C-TAC) **Letter Dated: <no date provided>** **Letter Received: 11/8/2016**

The Coalition to Transform Advanced Care (C-TAC) proposes a physician-focused payment model called the Advanced Care Model (ACM). The ACM is a population health alternative payment model intended to improve quality, care experience, and cost outcomes for beneficiaries with advanced illnesses.

The Advanced Care Model provides a population health management approach for the advanced illness population in the last year of life. The ACM integrates with existing APMs and contributes to their success. By creating an integrative model that is focused on a high-cost and high-need population, the ACM provides a mechanism to risk-stratify a broader Medicare population, specifies effective care interventions and creates additional financial incentives for existing APMs. In addition, the ACM will offer multiple pathways for organizations to incrementally add risk as existing or new APM entities. Primary care providers and specialists can participate in the ACM APM for physician-focused payment under the Quality Payment Program. Furthermore, the ACM meets the requirements for an advanced APM, with the potential to qualify participating palliative care providers and specialists.

The ACM APM is designed to support provider investment in infrastructure, create an ROI opportunity, and help providers migrate from FFS to risk. The three core components of the payment model are 1) a PMPM for up to 12 months post enrollment; 2) a population and value based payment through a phased-in two-sided risk arrangement; and 3) integration with existing value-based payments. The PMPM will cover care management and ambulatory palliative care provider E&M visits. The value-based payment will be adjusted based on meeting a minimum quality performance threshold. The proposed shared-risk model will encompass total cost of care in the last year of life (including PMPM fees) and include a 75-85% shared savings and shared loss rate, 30% total savings limit, 10% total loss limit, and 4% total risk and minimum loss rate.

Key Terms

Palliative Care; End of Life Medicare; Advanced Illness Care; C-TAC; Advanced Care Model; Advanced Care APM; population health payment model

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Section 1. Environmental Scan

Table 1. Environmental Scan		
Key words: Palliative Care; End of Life Medicare; C-TAC Comment Response; Advanced Illness Care; C-TAC; Advanced Care Model; Advanced Care APM		
Organization	**Title**	**Date**
Coalition to Transform Advanced Care (C-TACT) & AHIP Foundation	The Advanced Care Project Report	Accessed on: 11/11/2016
Purpose/Abstract		
Background: The Advanced Care Project (ACP), co-sponsored by the Coalition to Transform Advanced Care and the AHIP Foundation, convened innovators from health systems and health plans to develop: a clinical model of care for patients and families living with advanced illness; a payment model framework that supports the transition from fee-for-service (FFS) toward performance- and risk-based reimbursement; and the identification of key considerations and issues related to operationalizing an advanced care program. *Summary:* This report provides a summary of the clinical and payment model findings and outlines next steps for the ACP. This report provides a framework built on the best practices from leading programs across the country. The ultimate goal of the ACP is to disseminate this framework to encourage adoption and implementation of advanced care models that boost quality, support choice, and increase affordability of care for all Americans with advanced illness along with their families, caregivers and clinicians. Moving forward with such a model of care will help unify and strengthen our healthcare system and help make Medicare more sustainable for future generations.		
Additional Notes/Comments		

Table 1. Environmental Scan		
Key words: Palliative Care; End of Life Medicare; C-TAC Comment Response; Advanced Illness Care; C-TAC; Advanced Care Model; Advanced Care APM		
Organization	**Title**	**Date**
Coalition to Transform Advanced Care (C-TAC)	Policy Agenda: Options to Transform Advanced Care	Accessed on: 11/11/2016
Purpose/Abstract		

Background: The Coalition to Transform Advanced Care (C-TAC) was formed in 2011 by bringing together leaders, experts, policy makers, and stakeholders in the field of advanced illnesses. C-TAC is striving for change in the health care system and larger environment by disseminating best practices and proven solutions in advanced care delivery, promoting professional education, supporting policy and advocacy, and building public demand and empowerment for quality advanced care. Our mission is to transform advanced illness care by empowering consumers, changing the health delivery system, improving public and private policies, and enhancing provider capacity.

Summary: The policy agenda described in this document was developed in collaboration with C-TAC's membership. It reflects areas of consensus for federal and state policymakers and private stakeholders to act on to improve care for individuals with advanced illness and their families. The options are guided by four core principles: (1) transform advanced care to value-based payment and quality measure development; (2) align treatment and care objectives with patient goals and preferences; (3) engage patients, their families, and care givers with a full range of supports and services; and (4) strengthen professional education and engagement in collaborative, team-based models of person- and family- centered care delivery. This policy agenda provides wide ranging options that could help transform care for Americans with advanced illness and their caregivers and families.

Additional Notes/Comments

Table 1. Environmental Scan		
Key words: Palliative Care; End of Life Medicare; C-TAC Comment Response; Advanced Illness Care; C-TAC; Advanced Care Model; Advanced Care APM		
Organization	**Title**	**Date**
Coalition to Transform Advanced Care (C-TAC)	C-TAC Public Comment Response: Medicare Program; Merit-Based Incentive Payment System (MIPS) and Alternative Payment Model (APM) Incentive Under the Physician Fee Schedule, and Criteria for Physician-Focused Payment Models	6/27/2016
Purpose/Abstract		
Background: C-TAC supports CMS's shift to a more value-based payment system for its beneficiaries. The unintended consequences of the previous fee-for-service payment system, that promoted more treatment rather than necessarily the right treatment, did not service people living with advanced illnesses. The opportunity now is to incentivize all providers to identify those patients approaching advanced illness and consider advance care planning, advanced illness care, palliative care, or hospice, as patient-and-family-centered options. The goal should be to foster identifying patients' goals and wishes and to share decision-making with them to deliver treatment tailored to meet their need, goals, and values. *Summary:* C-TAC comments on the following: MIPS quality category, MIPS resource use category, Clinical Practice Improvement Activity (CPIA) category and APMs.		
Additional Notes/Comments		
Proposed Rule: https://www.federalregister.gov/documents/2016/11/04/2016-25240/medicare-program-merit-based-incentive-payment-system-mips-and-alternative-payment-model-apm		

Table 1. Environmental Scan

Organization	Title	Date
Altarum Institute & Signatories: Center to Advance Palliative Care (CAPC), Center to Transform Advanced Care (C-TAC), Rush University Medical Center	Request for Information (RFI) - Implementation of Merit-Based Incentive Payment System, Promotion of Alternative Payment Models and Incentive Payments for Participation in Eligible Payment Models	11/17/2015

Key words: Palliative Care; End of Life Medicare; C-TAC Comment Response; Advanced Illness Care; C-TAC; Advanced Care Model; Advanced Care APM

Purpose/Abstract

Background: This document is a response to a request for information from CMS entitled "Implementation of Merit-Based Incentive Payment System, Promotion of Alternative Payment Models and Incentive Payments for Participation in Eligible Payment Models." This response was prepared by Altarum along with signatories that include Center to Advance Palliative Care (CAPC), Center to Transform Advanced Care (C-TAC), Rush University Medical Center, Silberman School of Social Work and supported by the American Geriatrics Society, and the Society for Post-Acute and Long-Term Care Medicine.

Summary: Altarum and signatories welcome the opportunity to create a new and scalable APM that focuses on the frail elderly population and that prioritizes delivery of long term support services. The letter lists the CMMI criteria for models and offers comments with regard to their usefulness, interpretation, and priority. Altarum and others have also added five criteria that would support the development of APMs generally and for our target population.

Additional Notes/Comments

Request for Information: https://s3.amazonaws.com/public-inspection.federalregister.gov/2015-24906.pdf

Table 1. Environmental Scan		
Key words: Palliative Care; End of Life Medicare; C-TAC Comment Response; Advanced Illness Care; C-TAC; Advanced Care Model; Advanced Care APM		
Organization	**Title**	**Date**
Coalition to Transform Advanced Care	Advanced Illness Care: Key Statistics	12/10/2012
Purpose/Abstract		
Background: The Coalition to Transform Advanced Care (C-TAC) is a nonprofit nonpartisan organization dedicated to transforming advanced illness care empowering consumers. This report provided by C-TAC highlights key statistics that are relevant to improve a fee-for-service payment schedule. The statistics contained in this report provide an insight at facts that are sometimes unreported in medical reports. **Summary**: This report also provides information on models that address advanced illnesses providing better outcomes. Notable models mentioned include the Sutter Health's Advanced Illness Management (AIM) program, which reduced hospitalization rates by over 60% and direct inpatient costs by $2,000 per enrollee per month on average; the Aetna Compassionate Care program where inpatient days/1000 patients decreased by 82% and ICU days/1000 were reduced by 86%; and the Home-Based Primary Care (HBPC) model which has shown to reduce hospital days by 63%, nursing home days by 83% and total costs of care by 24%.		
Additional Notes/Comments		

Table 1. Environmental Scan

Key words: Palliative Care; End of Life Medicare; C-TAC Comment Response; Advanced Illness Care; C-TAC; Advanced Care Model; Advanced Care APM

Organization	Title	Date
American Hospital Association	Advanced Illness Management Strategies	8/1/2012

Purpose/Abstract

Background: The American Hospital Association (AHA) Board Committee on Performance Improvement (CPI) was created in 2010 to support performance improvement strategies across the AHA membership to align with the AHA's strategic platform. In 2012, CPI focused on advanced illness management (AIM). This report examines in depth how hospitals can increase access to AIM program. Additionally, it outlines AIM goals and highlights strategies on how to meet those goals.

Summary: This report starts by defining AIM as the process in which a person with an advanced illness goes through four phases from when the condition is reversible to the final where the patient is eligible for hospice care. The correct planning and management of an advanced illness can lead to better outcomes including better quality of life and longer life. Strategies to increase access to Advanced Illness Management highlighted in the report include: developing a multidisciplinary care team with leadership buy-in; identifying qualifying patients through evidence based protocols; thinking beyond the hospital to promote the program; and using a performance improvement framework to measure, monitor, evaluate and adapt program between disease states and throughout time.

Additional Notes/Comments

Section 2. Relevant Literature

Table 2. Relevant Literature		
Key words: Palliative Care; End of Life Medicare; C-TAC Comment Response; Advanced Illness Care; C-TAC; Advanced Care Model; Advanced Care APM; population health payment model		
Journal	**Title**	**Date**
Journal of Palliative Medicine	An Evaluation of the Advanced Illness Management (AIM) Program: Increasing Hospice Utilization in the San Francisco Bay Area	12/1/2006
Purpose/Abstract		
Background: In the Medicare population, end-of-life care is fragmented and hospice is underutilized. Evidence suggests that hospice care is associated with increased patient/family satisfaction and reductions in overall health care costs. Advanced Illness Management (AIM) is a home-based program established to ease the transition between curative and comfort care for seriously ill patients who lack coordinated hospital, home health, and hospice care. **Objective:** Measure the impact of the AIM program on the discharge disposition of participating home health patients. Design: Retrospective cohort study. **Setting/subjects**: A total of 435 patients who received home health services through the Sutter Visiting Nurse Association and Hospice (SVNA&H) and who were discharged between 2003 and September 2005 were included in this study. Participants were selected based on a life expectancy of 6 months or less and additionally matched on prognosis of current episode of illness and symptom status. Intervention patients were compared to those receiving usual home health care at two SVNA&H branches. **Results**: In the within-branch comparison, a 28% difference was observed in the number of hospice referrals between patients who received the AIM intervention and Usual Care I (47% AIM; 33% UCI, p = 0.003). When patients receiving the AIM intervention were compared to patients from another branch, Usual Care II, a 67% difference emerged (47% AIM; 16% UCII, p < 0.0001). Among African American patients, 60% and 73% more patients were referred to hospice when AIM patients were compared to Usual Care I and Usual Care II patients, respectively (p < 0.01). These differences persisted after controlling for symptom status, patient demographics and home health length of stay. **Conclusions**: The AIM program was successful at increasing hospice utilization through a targeted intervention focused on palliative and end-of-life care, increased patient education and decision making, and a dynamic treatment approach. The finding of increased utilization by African Americans, a population traditionally reluctant to use hospice, was particularly noteworthy.		
Additional Notes/Comments		

Section 3. Related Literature

Table 2. Related Literature		
Key words: Palliative Care; End of Life Medicare; C-TAC Comment Response; Advanced Illness Care; C-TAC; Advanced Care Model; Advanced Care APM; population health payment model		
Journal	**Title**	**Date**
Healthcare	From healthcare to health: A proposed pathway to population health	9/28/2016
Purpose/Abstract		
Background: Innovations in payment are encouraging clinical-community partnerships that address health determinants. However, little is known about how healthcare systems transform and partner to improve population health. **Methods**: The authors synthesized views of population health experts from nine organizations and illustrated the resulting model using examples from four health systems. **Conclusions**: The transformation requires a foundation of primary care, connectors and integrators that span the boundaries, sharing of goals among participants, aligned funding and incentives, and a supporting infrastructure, all leading to a virtuous cycle of collaboration. Policies are needed that will provide funding and incentives to encourage spread beyond early adopter organizations.		
Additional Notes/Comments		
https://www.ncbi.nlm.nih.gov/pubmed/27693259 Amsterdam, Netherlands		

Table 2. Related Literature

Key words: Palliative Care; End of Life Medicare; C-TAC Comment Response; Advanced Illness Care; C-TAC; Advanced Care Model; Advanced Care APM; population health payment model

Journal	Title	Date
Journal of Palliative Medicine	Interventions to Improve Hospice and Palliative Care Referral: A Systematic Review	8/1/2014

Purpose/Abstract

Background: Hospice and palliative care are underutilized among patients at the end of their lives despite evidence that they improve patient satisfaction and reduce costs.

Objective: To synthesize evidence regarding interventions to increase hospice referral/enrollment.

Design and Measurements: Researchers conducted a systematic review of the literature and selected studies that evaluated interventions aimed at increasing hospice use. We performed a MEDLINE search (1979 to April 2013) supplemented by manual searches of bibliographies of key articles. Study design, quality criteria, population, interventions, and outcomes for each study were extracted. The main outcome evaluated was hospice referral/enrollment.

Results: The search strategy yielded 419 studies, of which only 6 met our eligibility criteria. Three studies included nursing home populations; 1 included home care patients, 1 targeted care managers, and 1 reported on heart failure patients. Three studies had a cohort design, 2 were pre–post, and only 1 was randomized. Two studies evaluated a process to identify eligible subjects. Two evaluated the impact of advance care planning programs and 2 only provided education. Interventions that only provided education showed a median increase in referral of 5% (2.8%–17%) while interventions that identified hospice candidates showed a median increase in hospice referral of 19.5 % (19%–20%).

Conclusions: Interventions of different levels of complexity can improve the use of hospice services among subjects with high mortality risk. An approach that allows the medical team to assess patients' treatment goals and that engages the treating physician seems to be the most successful one.

Additional Notes/Comments

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Key words: Palliative Care; End of Life Medicare; C-TAC Comment Response; Advanced Illness Care; C-TAC; Advanced Care Model; Advanced Care APM; population health payment model		
Journal	**Title**	**Date**
BMC Health Services Research	Elements of effective palliative care models: a rapid review	3/26/2014
Purpose/Abstract		
Background: Population ageing, changes to the profiles of life-limiting illnesses and evolving societal attitudes prompt a critical evaluation of models of palliative care. We set out to identify evidence-based models of palliative care to inform policy reform in Australia. **Method:** A rapid review of electronic databases and the grey literature was undertaken over an eight week period in April-June 2012. We included policy documents and comparative studies from countries within the Organization for Economic Co-operation and Development (OECD) published in English since 2001. Meta-analysis was planned where >1 study met criteria; otherwise, synthesis was narrative using methods described by Popay et al. (2006). **Results:** Of 1,959 peer-reviewed articles, 23 reported systematic reviews, 9 additional RCTs and 34 non-randomized comparative studies. Variation in the content of models, contexts in which these were implemented and lack of detailed reporting meant that elements of models constituted a more meaningful unit of analysis than models themselves. Case management was the element most consistently reported in models for which comparative studies provided evidence for effectiveness. Essential attributes of population-based palliative care models identified by policy and addressed by more than one element were communication and coordination between providers (including primary care), skill enhancement, and capacity to respond rapidly to individuals' changing needs and preferences over time. **Conclusion:** Models of palliative care should integrate specialist expertise with primary and community care services and enable transitions across settings, including residential aged care. The increasing complexity of care needs, services, interventions and contextual drivers warrants future research aimed at elucidating the interactions between different components and the roles played by patient, provider and health system factors. The findings of this review are limited by its rapid methodology and focus on model elements relevant to Australia's health system.		
Additional Notes/Comments		

Table 2. Related Literature

Key words: Palliative Care; End of Life Medicare; C-TAC Comment Response; Advanced Illness Care; C-TAC; Advanced Care Model; Advanced Care APM; population health payment model

Journal	Title	Date
Annals of Internal Medicine	Evidence for Improving Palliative Care at the End of Life: A Systematic Review	1/15/2008

Purpose/Abstract

Background: Many persons and their families are burdened by serious chronic illness in late life. How to best support quality of life is an important consideration for care.

Purpose: To assess evidence about interventions to improve palliative and end-of-life care.

Data Sources: English-language citations (January 1990 to November 2005) from MEDLINE, the Database of Abstracts of Reviews of Effects, the National Consensus Project for Quality Palliative Care bibliography, and November 2005 to January 2007 updates from expert reviews and literature surveillance.

Study Selection: Systematic reviews that addressed "end of life," including terminal illness (for example, advanced cancer) and chronic, eventually fatal illness with ambiguous prognosis (for example, advanced dementia), and intervention studies (randomized and nonrandomized designs) that addressed pain, dyspnea, depression, advance care planning, continuity, and caregiving.

Data Extraction: Single reviewers screened 24Â 423 titles to find 6381 relevant abstracts and reviewed 1274 articles in detail to identify 33 high-quality systematic reviews and 89 relevant intervention studies. They synthesized the evidence by using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) classification.

Data Synthesis: Strong evidence supports treating cancer pain with opioids, nonsteroidal, radionuclides, and radiotherapy; dyspnea from chronic lung disease with short-term opioids; and cancer-associated depression with psychotherapy, tricyclics, and selective serotonin reuptake inhibitors. Strong evidence supports multi component interventions to improve continuity in heart failure. Moderate evidence supports advance care planning led by skilled facilitators who engage key decision makers and interventions to alleviate caregiver burden. Weak evidence addresses cancer-related dyspnea management, and no evidence addresses non-cancer pain, symptomatic dyspnea management in advanced heart failure, or short-acting antidepressants in terminal illness. No direct evidence addresses improving continuity for patients with dementia. Evidence was weak for improving caregiver burdens in cancer and was absent for heart failure.

Limitations: Variable literature indexing for advanced chronic illness and end of life limited the comprehensiveness of searches, and heterogeneity was too great to do meta-analysis.

Conclusion: Strong to moderate evidence supports interventions to improve important aspects of end-of-life care. Future research should quantify these effects and address the generalizability of insights across the conditions and settings of the last part of life. Many critical issues lack high-quality evidence.

Additional Notes/Comments

Table 2. Related Literature		
Key words: Palliative Care; End of Life Medicare; C-TAC Comment Response; Advanced Illness Care; C-TAC; Advanced Care Model; Advanced Care APM; population health payment model		
Journal	**Title**	**Date**
Health Services Research	Identifying Older Adults with Serious Illness: A Critical Step toward Improving the Value of Health Care	3/18/2012
Purpose/Abstract		

Objective: To create and test three prospective, increasingly restrictive definitions of serious illness.

Data Sources: Health and Retirement Study, 2000–2012.

Study Design: We evaluated subjects' 1-year outcomes from the interview date when they first met each definition: (A) one or more severe medical conditions (Condition) and/or receiving assistance with activities of daily living (Functional Limitation); (B) Condition and/or Functional Limitation and hospital admission in the last 12 months and/or residing in a nursing home (Utilization); and (C) Condition and Functional Limitation and Utilization. Definitions are increasingly restrictive, but not mutually exclusive.

Data Collection: Of 11,577 eligible subjects, 5,297 met definition A; 3,151 definition B; and 1,447 definition C.

Principal Finding: One-year outcomes were as follows: hospitalization 33 percent (A), 44 percent (B), 47 percent (C); total average Medicare costs $20,566 (A), $26,349 (B), and $30,828 (C); and mortality 13 percent (A), 19 percent (B), 28 percent (C). In comparison, among those meeting no definition, 12 percent had hospitalizations, total Medicare costs averaged $7,789, and 2 percent died.

Conclusions: Prospective identification of older adults with serious illness is feasible using clinically accessible criteria and may be a critical step toward improving health care value. These definitions may aid clinicians and health systems in targeting patients who could benefit from additional services.

Additional Notes/Comments

Accuracy of Physician Predictions of Survival among Patients with Advanced Illness and Predictors of Survival in Non-Institutionalized Populations with Advanced Illness

A Brief Review of the Literature Prepared for the Coalition to Transform Advanced Care Preliminary Review Team

Accuracy of Physician Predictions of Survival among Patients with Advanced Illness and Predictors of Survival in Non-Institutionalized Populations with Advanced Illness

Purpose

Social & Scientific Systems, Inc. (SSS) conducted this brief review of the literature in response to a request for information from the Physician-Focused Payment Model (PTAC) Preliminary Review Team (PRT). The literature review helps inform the PRT's review of the proposal submitted by the Coalition to Transform Advanced Care (C-TAC), titled "Advanced Care Model (ACM) Service Delivery and Advanced Alternative Payment Model," as indicated in the proposal submitted to PTAC on February 7, 2017:

> "The Advanced Care Model provides a population health management approach for the advanced illness population in the last year of life. …delivers comprehensive, person-centered care management; multi-disciplinary team-based care; concurrent curative and palliative treatment…and end[s] when the beneficiary enrolls in hospice or dies."

The population targeted by the C-TAC ACM includes Medicare fee-for-service beneficiaries "with advancing chronic condition(s) associated with an expected one-year mortality. To be enrolled, these individuals must have one or more chronic conditions and show active and irreversible clinical, functional and/or nutritional decline as determined by clinical and utilization data...In addition, their clinicians must attest that the individual is likely to die in the next year."

To assist in reviewing the C-TAC ACM proposal, the PRT requested SSS provide information to answer two research questions:

- How accurately do physicians predict one-year survival among patients with advanced illness?
- What factors have been shown to be significant predictors of survival in a non-institutionalized population with advanced illness?

Methods

SSS performed a focused review to address the research questions identified above. The literature search strategy included peer-reviewed literature, as identified using PubMed. Publications dated from 2012 to the present. Some exceptions were seminal literature or published systematic reviews of the literature, as these reviews provided an efficient means of summarizing evidence in this area. Attempts were made to include as many domestic studies as possible and exclude international studies. C-TAC defines "advanced illness"[1] as occurring when one or more conditions become serious enough that general health and functioning decline, and treatments begin to lose their impact, a process that continues to the end of life. Similarly, advanced illness as used in this review includes terminal illness.

Search terms included multiple Boolean (and/or/not) combinations of the following:

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[1] http://www.thectac.org/plan/what-is-advanced-illness/

- End of life
- Advanced illness
- Chronic conditions
- Palliative care
- Palliative Performance Scale (PPS)
- Karnofsky Performance Scale (KPS)
- Eastern Cooperative Oncology Group (ECOG)

- Functional status
- Survival prediction
- Prognostic confidence
- Survival prognostication
- Prognostic index
- One-year mortality
- Mortality prediction

Summary of Findings

A review of the search results yielded the following overall findings:

➢ **Physicians tended to be overoptimistic in their estimates of survival.**

Physicians tended to overestimate survival in patients with advanced illness. Some studies showed more optimistic predictions for cancer patients compared to non-cancer patients with advanced illness. Overall, prognostication appeared to be difficult and error-prone.

➢ **Various prognostication tools were being used by physicians for survival prediction.**

Prognostication tools were found to aid physician's predictions and boost physician's confidence in their predictive ability. These tools primarily focused on patient functional impairments, or combinations of functional impairments, patient ability to perform, and clinical measures. Currently, no Gold Standard seems to exist for accurate survival prediction by physicians.

➢ **Fewer studies reviewed reported predictions of survival with respect to a one-year timeframe compared to shorter periods.**

Prognostication tools and prediction models for survival in this review tended to focus on shorter periods, from a few days up to six months. A limitation of these prediction tools was that many required further validation on more studies and with longer timeframes.

➢ **Factors in prediction of one-year survival varied across terminal illness type, and advanced disease status and severity.**

Prognostic factors depended on the extent of advanced illness and physicians' ability to characterize survivability. Performance status was a factor found in both cancer and non-cancer studies to be a strong predictor associated with survival time. Factors such as the physicians' clinical judgements along with patients' clinical symptoms, when combined with nutritional condition, performance status, and other prognostication tools, reportedly could improve survival predictions for elderly patients with advanced illnesses.

➢ **Much of the relevant literature on survival prediction for patients with advanced illness found in this search focused on cancer, or a combination of cancer and non-cancer diagnoses.**

The literature search uncovered scant evidence for specific non-cancer advanced illnesses, given the study search criteria ,with few individual and review articles devoted solely to non-cancer diagnoses.

Accuracy of Survival Predictions

Several studies of clinical predictions and prognostic factors have found physicians show variable accuracy in predicting survival. Physicians tend to be overly optimistic in their predictions of survival among patients with advanced cancer or other advanced illnesses, often leading to too late referrals to hospice care or diminished quality of care near end of life (Chow et al., 2001; Christakis & Lamont, 2000; Glare et al., 2003).

Accuracy of Predictions in Patients with Cancer

A recent review article (Cheon et al., 2016) studied the accuracy of clinicians' predictions in 15 prospective and retrospective cohort studies focused on patients with advanced cancer. The authors noted that in 12 of the 15 research studies included in the review, clinicians' prediction of survival exceeded actual patient survival time.   Similarly, in a review of 31 studies of physicians' accuracy in estimating survival times in cancer patients, Chow et al. (2001) found that clinical prediction was inaccurate, and in the optimistic direction, but that the predictions tended to improve with repeated clinical measurements. The authors concluded that there was not strong evidence to support use of clinical estimates alone in predicting survival.

Another study demonstrated the difficulty in predicting the survival of cancer patients, as all physicians[2] in the study were unable accurately to predict survival, and were incorrect by as much as 12 to 18 months (Kondziolka et al., 2014). Among the clinicians studied, medical oncologists and neuro-oncologists as a group had better success at predicting one-year survival. Neurosurgeons and radiation oncologists tended to be more optimistic in their predictions than medical oncologists were.

The accuracy of survival predictions also varied depending on how physicians predicted survival expectations. Traditionally, clinician predictions were based on the temporal question "How long will this patient live?" Studies of advanced cancer have found this approach to yield an accuracy rate of between 20 percent and 30 percent (Hui, 2015). In contrast, probabilistic questions, such as asking physicians to state the probability that a patient will survive within a certain timeframe, vary widely in accuracy. These probabilistic estimates tended to be more accurate than survival estimates using the temporal approach. Another approach for asking clinicians to estimate survival was termed the "surprise question," where clinicians were asked to indicate whether they would be surprised (yes or no) if a particular patient died within a specific timeframe. Survival predictions asked in this manner had an estimated 76 percent to 88 percent accuracy for a one-year timeframe (Hui, 2015).

Accuracy of Predictions in Patients with Advanced Illnesses other than Cancer

Few studies have examined physician prognostication of survival in patients with non-cancer diagnoses. To examine clinician accuracy of predictions of survival in palliative care, and whether any subsets of clinicians were better at prediction, White et al. (2016) conducted a review of the literature that built upon earlier reviews restricted to cancer diagnoses only. The studies included in their review spanned a variety of diseases and disease combinations, including cancer, chronic obstructive pulmonary disease (COPD), heart failure, and liver disease, though most included cancer diagnoses. Of the 42 studies cited in this review,[3] 17 examined physicians' prognostic ability compared to other clinician types. In 35 percent of the 17 studies comparing accuracy among clinicians, the accuracy of survival predictions did

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[2] 18 cancer specialists: 6 neurosurgeons, 7 radiation oncologists, and 5 medical/neuro-oncologists.

[3] Of the 42 studies examined, 25 studies had cancer diagnoses, one had a liver disease participant, and 17 had both cancer and non-cancer diagnoses.

not differ by type of clinician. Another study found that survival estimates made by a multidisciplinary team were more accurate than by an individual provider (Gwilliam et al., 2013). White et al. (2016) also concluded that the timeframe of the prognosis (e.g., death being imminent versus within 12 months) was a factor in overall and provider-specific prediction accuracy.

A study of patients with chronic kidney disease found the surprise question ("Would you be surprised if this patient died in the next 12 months?), when used by nephrology providers (mainly nephrology physicians and fellows) to predict patient one-year survival, demonstrated moderate to good reliability (Javier et al., 2017).

Prognostication Tools

Clinical predictive models or prognostication tools largely are based on the ability of the patient to perform certain routine activities of daily life. These tools can increase physician's confidence in their prognostic ability and aid physicians in predicting survivability (Hallen et al., 2014).

Two popular tools are the Karnofsky Performance Status Scale (KPS) Index and the Eastern Cooperative Oncology Group (ECOG) scale developed in 1982 (Karnofsky and Burchenal, 1949; Oken, Creech and Tormey, 1982). With scores ranging from 0 to 100 percent (0 as "dead" and 100 percent being "normal") the KPS is a standard way of measuring the performance of ordinary tasks among cancer, AIDS, and other chronically ill patients. The ECOG scores are graded from 0 to 5, where 0 is "fully active" and 5 is "dead." Both the KPS and ECOG scales are based on functional impairments (e.g., limitations in ambulation, work activities). Patients with poor performance on these indices have been associated with poor outcomes. In a Canadian study of advanced illness (cancer[4] and non-cancer) patients, de Kock et al. (2013) found that the PPS and KPS could be used interchangeably as functional tools and within prognostic tools. Additionally, with some population-specific limitations, the ECOG scale also was reportedly interchangeable with the PPS and KPS.

A third widespread prognostication tool, the Palliative Performance Scale (PPS), combines elements of functional impairments--which include ambulation, ability to perform activities of daily living and self-care--with information on the extent of disease, food and fluid intake, and level of consciousness (Anderson et al., 1996). A simple assessment tool for functional status, the PPS has been used to predict survival times ranging from a few days to six months (Lau, et al., 2007). The PPS appears to be widely used for patients with both cancer and non-cancer diagnoses.

Other prognostication tools, developed by health care providers in different specialties, have modified existing performance status scales and incorporated models that examine clinical symptoms and laboratory results. A systematic review of prognostic tools for estimating survival time in palliative care by Lau et al. (2007) identified 10 prognostic tools that may be used in end-of-life palliative care. Not all tools were specific to one-year survival prediction, and ranged from a few days, weeks, months, up to one year. The tools included four non-disease-specific tools and six disease-specific tools (4 cancer and 2 non-cancer).

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[4] Cancer was the primary diagnoses for 86 percent of the 955 patients studied. Non-cancer included non-cancer infectious and neuromuscular diseases.

The non-disease-specific tools included the PPS, palliative prognostic score (PaP), prognostic index for one-year mortality in older adults (PIMOA), and the mortality risk index score (MRIS). Although PaP usually focuses on 30-day survival probability, the PPS, PaP, and MRIS could be used to predict one-year survival, according to Lau et al. (2007). (Disease-specific tools are discussed below.)

While other prognostication tools are available, the C-TAC proposal specifically targets the ECOG scale, KPS, and PPS--in combination with utilization, functional decline, and/or nutritional decline--as criteria that may qualify a beneficiary to participate in the ACM.

Prognostication Tools in Patient with Cancer

A recent study of patients with advanced cancer found that the three indices—the ECOG scale, KPS, and PPS, have similar predictive ability (Jang et al., 2014). Although the accuracy of these scales was found to be relatively modest, the study showed performance status alone was a good prognostic factor in outpatients with advanced cancer.

Lau et al. (2007) identified four disease-specific prognostic tools in cancer: the intra-hospital cancer mortality risk model (ICMRM), cancer prognostic scale (CPS), palliative prognostic index (PPI), and lung cancer prognostic model (LCPM). Among these four tools, only LCPM could help predict one-year survival, whereas the remaining three tools were found to be useful with predicting shorter survival times (up to 6 weeks).

Prognostication Tools in Patients with Advanced Illnesses other than Cancer

Lau et al.'s (2007) review also noted two non-cancer disease-specific tools. The first was the heart failure risk scoring system (HFRSS), which enabled calculation of one-month and one-year mortality rates, and the second the dementia prognostic index (DPI), which helped to predict six-month survival in newly admitted hospice patients.

Researchers also have developed a prognostic tool for prediction of individuals who would not survive beyond one year following a hip fracture (Cenzer et al., 2016). The results supported use of a small number of risk factors[5]—five in total—to predict low or high risk of not surviving one year post-fracture, all of which reportedly could be obtained from the patient or caregiver.

Factors Predictive of Survival in Non-Institutionalized Populations with Advanced Illness

Prediction of survival often is based on physician judgement, sometimes complemented by functional or performance status. Clinical symptoms alone reportedly are not good predictors of survival; however, clinical symptoms, when used in conjunction with other functional or performance information, have been found to aid and improve survival predictions. Factors based on physician characteristics--such as age, sex, or years of practice and experience—were reported not to be significant (Cheon et al., 2016).

Factors Predictive of Survival among Patients with Cancer

Prognostic factors in advanced cancer include symptoms, physiological changes, and laboratory abnormalities. These factors also vary by the stage of disease. Although early stages of cancer survival could be determined by cancer biology (histology/pathology) such as the tumor stage, in patients with advanced cancer, patient-related factors such as performance status and dyspnea are more important

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[5] Factors included sex (male/female), older age (65-85, 85-90, >=90 years [sic]), congestive heart failure (absent/present), Preparing meals (no difficulty/difficulty, can't, don't), and ability to drive (yes/not able, never did).

(Hui, 2015). In their recent study, Hui et al. (2016) underscore the need to use objective prognostic factors and models for survival prediction, and highlight the limitations of clinician prediction of survival in the advanced cancer setting.

Salpeter et al. (2012) performed a review of terminally ill patients with cancer diagnoses, focusing on solid and hematologic cancers shown to have a median survival of six months or less. A review of nearly 400 studies found certain indicators or prognostic factors of terminal disease in cancer patients, including: decreasing performance status; advancing age; weight loss; metastases to the brain, spine, or liver; recurrence; and laboratory-based abnormalities indicative of inflammation or extensive diseases. Though patient condition is important, some cancers result in different prognoses. For example, cancers with good treatment options, such as breast cancer, become terminal when the patient scores less than 60 on the KPS or has at least three of the prognostic factors listed above. If the cancer is one with a poor initial prognosis, such as a biliary cancer, then a patient can become terminal with a score of 90 on the KPS or when found to have just one prognostic factor (as listed above).

In 2005, a working group of the research network of the European Association for Palliative Care (Maltoni et al., 2005) analyzed results from various studies of patients with advanced cancer and assigned a ranking to the clinical prediction of survival when used with other prognostic factors. The group found clinical signs and symptoms, such as the cancer anorexia-cachexia syndrome, dyspnea and delirium, or cognitive failure, to be prognostically significant. In another review of clinical predictors among cancer patients (Chow et al., 2001), authors found performance status was strongly correlated with the duration of survival, followed by symptoms such as anorexia (loss of appetite), weight loss, and dysphagia (difficulty swallowing) that constitute the "terminal syndrome."

Factors Predictive of Survival among Patients with Advanced Illnesses, other than Cancer

A systematic review by Salpeter et al. (2012) of prospective and retrospective studies of clinical presentations in non-cancer terminally ill patients,[6] defined as those with a median survival of up to one year, found poor performance status, advanced age, malnutrition, comorbid illness, organ dysfunction and hospitalization for acute decompensation to be consistently associated with a six-month prognosis. Different prognostic factors were found to be associated with different conditions. For those with severe COPD hospitalized for an exacerbation, for example, median survival was six months or less when associated with three or more of the following:

- Age exceeding 70 years
- Right-sided heart failure
- Decreased functional status
- Need for home care on discharge
- Malnutrition
- Serum creatinine more than 2 mg/dL
- Repeat hospitalization for COPD exacerbation within two-month period
- History of intubation and mechanical ventilation

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[6] Diagnoses included terminally ill patients with dementia, heart failure, COPD, and end-stage renal disease.

Advanced dementia, characterized by dependency in all activities of daily life, being bedbound with decreased verbal communication, and having urinary or bowel incontinence, itself had a median survival of one to two years. Hospitalization of advanced dementia patients worsened survival if associated with one or more factors such as malnutrition, one or more pressure ulcers, and presence of nasogastric or gastrostomy feeding tube. Frail elderly patients with end-stage renal disease (ESRD) and significant comorbidities was associated with a median survival of one to two years (with or without dialysis). However, survival of patients on dialysis dropped to six months or below when associated with factors such as age over 70 years, poor performance status, and malnutrition.

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