

Enhancing Serious Illness Conversations among Patients at High Risk of One-Year Mortality through Quality Improvement Methods

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Abstract

Discussing serious illness with patients is a vital competency for healthcare professionals. A review of mortality records at an urban academic medical center revealed gaps in initiating timely serious illness conversations (SICs) and advance care planning (ACP), both essential to ensuring treatments align with patient-centered goals. This study sought to increase the detection and documentation of SICs among patients identified as having low one-year survival likelihood based on updated Charlson Comorbidity Index (CCI) scores. This quality improvement (QI) project gathered data before and after the intervention at a major urban Level I trauma center in Virginia that functions as a key teaching facility for roughly 400 residents and fellows. Researchers performed chart audits to evaluate medical records and hospital stay information. Statistical analysis employed chi-square tests, with significance defined as $P < 0.05$. Integrated care managers received training to flag elevated CCI scores and address them during multidisciplinary rounds. Clinicians were prompted to record SICs in extent of care (EOC) notes using the institution's cloud-based electronic health record system (EHR), EPIC. A total of 62 patients with elevated CCI scores were included, of whom 16 (25.81%, $P = 0.0001$) had documented EOC notes. Individuals with EOC documentation showed markedly higher rates of care focus changes, leading to increased palliative care consultations (63.04% vs. 50%, $P = 0.007$) and hospice referrals (93.48% vs. 68.75%, $P = 0.01$) compared to those lacking such notes. Follow-up provider surveys indicated that although half conducted SICs, fewer used EOC notes to document them. Findings from this preliminary effort indicate that proper documentation of SICs promotes greater involvement in ACP, palliative care services, hospice referrals, and do-not-resuscitate orders.

Keywords: Prognostication tool, Serious illness conversation, Quality improvement, Advance care planning

Introduction

Discussions involving patients, families, and healthcare providers regarding patients' values, priorities, and care objectives are referred to as serious illness conversations (SICs) [1]. These dialogues have been shown to improve patient quality of life, reduce overall healthcare expenditures, and decrease the use of intensive measures

near the end of life [2-4]. The primary purpose of SICs is to ensure that medical decisions and therapies are consistent with each patient's expressed wishes, aims, and preferences [5]. The COVID-19 pandemic underscored the value of conducting these conversations earlier, especially when rapid choices must be made for patients whose conditions decline quickly [6]. Consequently, physicians must recognize individuals at elevated risk of death within one year so that SICs can be started promptly and repeated as needed.

Nevertheless, many physicians delay SICs until late in a patient's illness. Research has found that three-quarters of patients with renal disease who passed away in acute care settings had not been referred to hospice care, highlighting the critical role of timely SICs [7]. In a

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separate investigation involving 584 individuals with chronic kidney disease, fewer than 10% had engaged in end-of-life discussions with their nephrologist during the preceding year [8]. Clinicians frequently overestimate prognosis and tend to provide overly optimistic survival predictions for patients with advanced illness [9].

Multiple strategies have been tested in inpatient settings to increase both the rate and the effectiveness of SICs. Nurse-driven programs that use a standardized SIC framework have successfully increased the documentation of these discussions [10]. A randomized controlled trial demonstrated that clinician-directed communication prompts led to substantial improvements in SIC documentation in electronic health records (EHRs) [11]. Additional research has explored EHR-based alerts to prompt SICs, although these initiatives did not incorporate established mortality forecasting instruments [12].

In 2011, Quan *et al.* [13] introduced a revised version of the Charlson Comorbidity Index (CCI), a validated approach for estimating one-year mortality risk by categorizing coexisting medical conditions. The Sentara Health System incorporated this instrument into its EHR. The CCI generates a predicted one-year survival percentage derived from each patient's problem list. This value is displayed in EPIC's patient lists and color-coded as follows: 0–53% (red), 54–77% (yellow), and 78–100% (green). The current project aimed to leverage these CCI scores to trigger SICs in patients with the greatest predicted mortality risk.

Materials and Methods

Setting and participants

The project took place at a large urban teaching hospital affiliated with a medical school. Both the academic

faculty group and private hospitalist teams participated. The academic service included five resident physician teams, each composed of two interns and one senior resident. For simplicity, this manuscript occasionally uses the term “providers” to encompass both the academic and hospitalist groups.

Study design

The hospital's mortality review committee convenes periodically to analyze deaths, identify avoidable factors, and find opportunities to improve care quality. A recurring issue identified was the infrequent or delayed performance of SICs for patients with serious conditions. In response, a QI team was assembled, consisting of an academic hospitalist, QI coordinators, and a geriatrician. The team adhered to the Model for Improvement framework to guide this QI initiative [14].

Cause-and-effect analysis and driver diagram

The QI team developed a fishbone (cause-and-effect) diagram (**Figure 1**) to explore barriers contributing to the infrequent occurrence of SICs. These barriers were grouped into four main domains: environment, physician, EHR, and patient. In the environmental domain, the QI team highlighted three key contributors to low or absent SIC rates: (i) insufficient availability of private areas for sensitive discussions; (ii) limited continuity among resident physicians and hospitalists; and (iii) an institutional culture that did not emphasize these conversations. Additional influences identified included challenges in recognizing patients at high risk of 1-year mortality, time constraints due to heavy workloads, physician burnout, and insufficient training in EHR documentation of SICs.

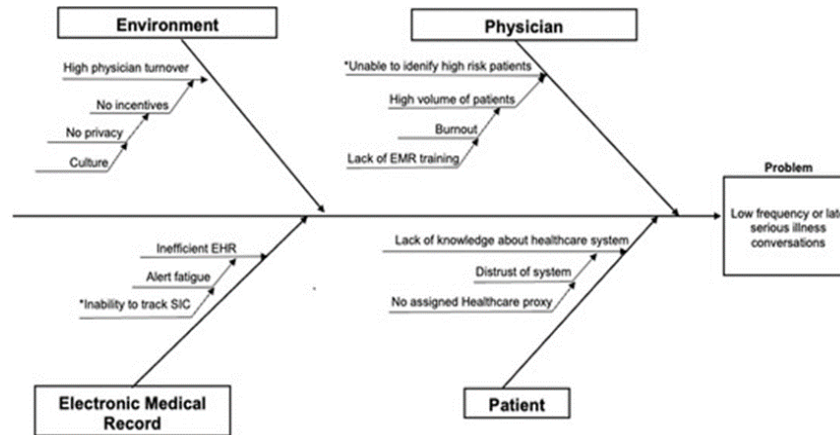


Figure 1. Cause-and-effect diagram. Items marked with “*” were given priority during data collection.

Within the EHR domain, the analysis highlighted that cumbersome electronic health record systems can impede proper documentation of serious illness conversations (SICs), that excessive alerts risk pulling focus away from patients at greatest risk, and that the EHR may lack effective mechanisms for monitoring completed SICs. Patient-related factors included the absence of a designated medical power of attorney, a lack of trust in the healthcare system, and limited medical literacy, which could prevent patients from making well-informed choices following SICs.

Drawing from the QI team’s prioritization process and collaborative discussions, a driver diagram (**Figure 2**) was created to clarify the key influences affecting the aim of expanding SICs. This diagram illustrated the main drivers supporting the study’s primary objective, along with the contributing secondary elements. The intervention in this project focused on systematically identifying patients with elevated one-year mortality risk, with the goals of increasing SIC documentation rates and boosting referrals to palliative medicine.

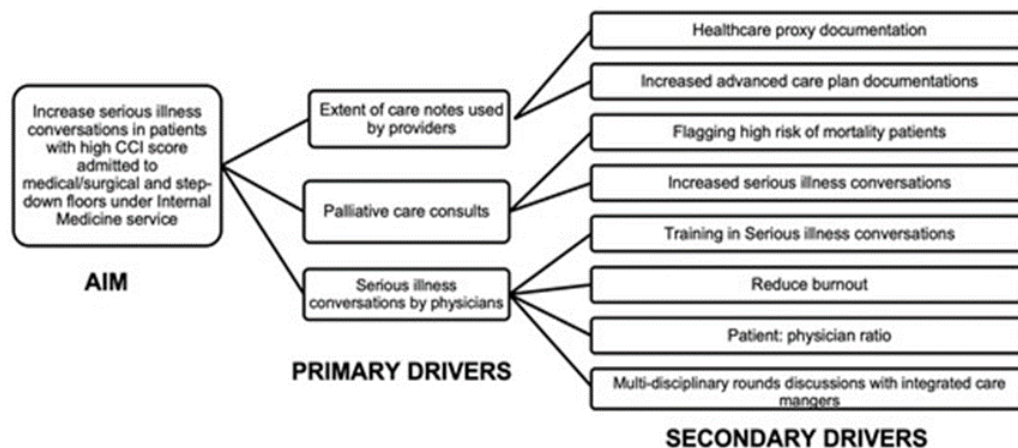


Figure 2. Driver diagram. Abbreviations: CCI = Charlson Comorbidity Index.

Once the CCI was embedded in the electronic health record (EHR), it became feasible to identify patients at high risk of one-year mortality. The QI team understood that this capability would enable SICs to be initiated sooner and more regularly.

Intervention

This manuscript reports results from a single plan–do–study–act (PDSA) cycle. In the “plan” stage of the PDSA cycle, the value of the CCI as a prognostication instrument was reviewed with both providers and integrated care managers. Previously, the daily patient lists generated for integrated care managers did not display a CCI score column. The score was subsequently

added to the patient lists used by providers and integrated care managers alike. The purpose was to prompt conversations during multidisciplinary rounds about whether patients with elevated CCI scores had already undergone a SIC with their care team. When the conversation was deemed complex, the team requested a palliative medicine consultation.

The QI team developed an updated workflow designed to raise the frequency of SICs. They outlined every step in

detail and created a straightforward visual reference for all participating staff, shown in the process map (**Figure 3**). Clinicians were urged to record every completed SIC within an EOC note. The revised process involved only minor adjustments to existing routines and equipped providers with reliable, evidence-based information to recognize patients at elevated risk of one-year mortality.

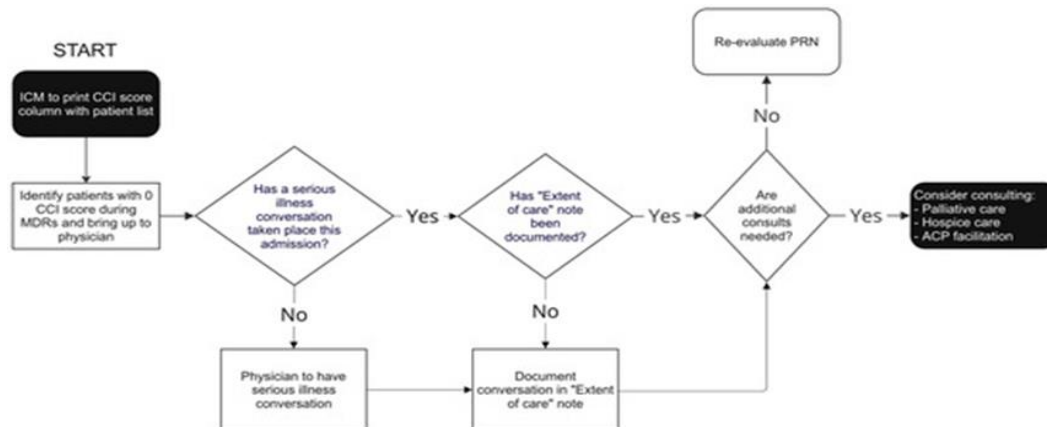


Figure 3. Map of new process to increase serious illness conversations. Abbreviations: ICM = Integrated Care Manager; CCI = Charlson Comorbidity Index; ACP = Advance Care Planning.

To ensure the new approach was followed correctly, QI coordinators conducted spot checks by joining multidisciplinary rounds, where they observed the process in action and addressed any immediate concerns raised by staff. A brief, single-page information sheet was prepared for physicians; it outlined the meaning of CCI scores and how the tool could help spot individuals who would gain from a timely SIC. These handouts were shared with clinicians during educational meetings and while on rounds.

Inclusion and exclusion criteria

The pilot took place on a 30-bed medical-surgical ward and a 24-bed progressive care unit from September 2022 through December 2022. Every patient admitted to these two units who the CCI identified as having a 0% predicted probability of surviving one year qualified for inclusion. Across both units, roughly 18% of the average daily patient census met this 0% survival threshold. Patients showing any higher survival likelihood on the CCI were not enrolled. All patient information gathered for the project was stripped of identifiers before being analyzed.

Data management

Manual review of medical charts supplied the following data points: patient name, medical record number, any modifications to code status, existence of advance care planning documents, documentation of EOC notes, results of the SIC, requests for palliative medicine consultation, frequency of hospital admissions over the prior two years, hospice referrals, plus admission and discharge dates. These records were kept secure in a password-protected Excel spreadsheet. Two weeks after the original multidisciplinary discussion, researchers performed an additional retrospective chart audit to supplement and update the collected information.

Qualitative feedback and stakeholder engagement

Monthly gatherings were arranged with hospitalists via integrated care manager sessions and with internal medicine residents through their regular forums. Study data and early findings were presented to these stakeholders to elicit qualitative comments, offering insight into how frontline providers viewed the updated workflow. A survey designed to capture this feedback

was built in the secure online platform REDCap and delivered to participants through email.

Measures

Table 1 presents the outcome and process measures evaluated in this study.

Table 1. Description of study measures and their operational criteria. Abbreviation: ACP = advance care planning.

Study measure	Operational definition
Patients identified as having elevated risk of mortality within one year (process measure)	The number of patients admitted to the medical service who were classified by the CCI assessment tool as having no expected one-year survival probability (0% predicted survival). These individuals were categorized as patients with elevated Charlson Comorbidity Index (CCI) scores.
Documentation of serious illness conversation in EOC records (process measure)	The proportion of medical service inpatients whose active hospitalization records contained an EOC note indicating completion of a serious illness conversation (SIC), recorded as a binary variable (yes/no).
Presence of advance care planning documentation (outcome measure)	The proportion of patients hospitalized under the medical service who had a documented ACP record available in their medical chart, classified as present or absent (yes/no).
Completion of palliative care consultation (outcome measure)	The proportion of medical inpatients with a documented palliative medicine team consultation note during their hospitalization, categorized as yes or no.
Hospice care consultation (outcome measure)	The proportion of patients admitted to the medical service who received an evaluation from a hospice liaison, with corresponding documentation entered into the medical record during the hospital stay (yes/no).
Do-not-resuscitate (DNR) code status designation (outcome measure)	The proportion of hospitalized medical patients whose active code status was documented as DNR at any point during the admission, regardless of when the transition from full code status occurred (yes/no).

At the end of the third month, the QI team advanced to the “study” portion of the PDSA cycle. At that point, they finished compiling all data and performed the complete analysis.

Statistical analysis

Researchers assessed the collected information by examining EOC notes, which served as the main dependent variable, in relation to several independent factors. These included whether advance care planning (ACP) documents were present, whether palliative medicine consultations occurred, whether hospice services were involved, and the patient’s code status (specifically do-not-resuscitate or DNR). Percentages and counts summarized the categorical data, while means with standard deviations described the continuous measures. When any cell in the analysis contained fewer than five cases, Fisher’s exact test was applied; Pearson’s chi-square test was used for the remaining comparisons. All statistical tests were two-sided, with significance determined at $P < 0.05$. SAS version 9.4 was used for all calculations.

Ethics

This initiative was formally submitted to the Institutional Review Board (IRB) of Eastern Virginia Medical School, which granted an exemption from comprehensive IRB oversight. Participation in the REDCap survey remained voluntary, and participants’ responses were collected anonymously.

Results and Discussion

Review of medical records showed that, among the 62 qualifying patients, only 16 had extent-of-care (EOC) notes recorded. Staffing challenges prevented full data collection from the step-down unit.

Table 2 details the presence of EOC notes for various outcome measures. EOC notes were present in 16 of 62 patients (25.81%, $P = 0.0001$). Patients with these notes were also substantially more likely to have advance care planning documentation ($n = 10$, 62.50%, $P = 0.01$). Within the EOC group, 81% ($n = 13$) carried DNR orders, compared with just 18% ($n = 3$) who remained full code. Furthermore, half ($n = 8$) of patients with EOC notes obtained palliative care consultations, while 31.25% ($n = 5$) had hospice consults in place. Except for DNR status, all comparisons were statistically significant ($P < 0.05$).

Table 2. Association of extent of care notes with other outcome variables. Abbreviations: EOC = extent of care; ACP = advanced care plan; DNR = do not resuscitate; DNI = do not intubate.

	EOC note (n = 62)		P-value
	Present (N, %)	Absent (N, %)	
Number of patients with ACP documentation	16 (25.81)	46 (74.19)	0.0001
Yes	10 (62.50)	13 (28.26)	0.01
No	6 (37.50)	33 (71.74)	
DNR code status			
DNR/DNI; DNR with limits	13 (81.25)	41 (89.13)	0.41
Full status/comfort care	3 (18.75)	5 (10.87)	
Palliative care consult			
Yes	8 (50)	7 (15.22)	0.005
No	8 (50)	39 (84.78)	
Hospice consult			
Yes	5 (31.25)	3 (6.52)	0.02
No	11 (68.75)	43 (93.48)	

Post-intervention feedback via redcap survey

We held regular monthly sessions with internal medicine residents and hospitalists to present project findings and collect input. In total, 8 of the 12 resident physicians and 4 of the 8 hospitalists completed the survey during these sessions. Among the 12 providers who responded, three

reported using the CCI tool within the previous month. Additionally, six of the 12 providers reported documenting serious illness conversations (SICs) using EOC notes. **Figure 4** displays the main obstacles that physicians identified when attempting to conduct SICs with patients.

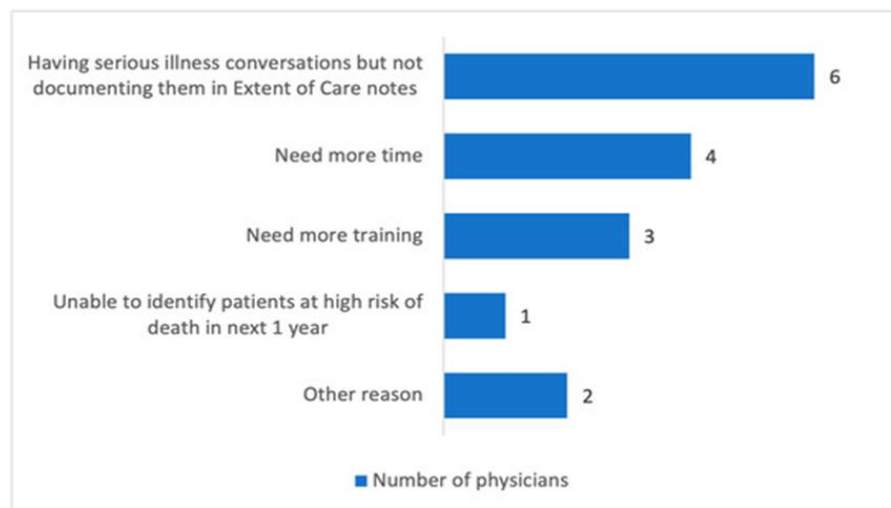


Figure 4. Graph depicting what barriers were felt by physicians in having serious illness conversations with patients.

This quality improvement project showed that employing a validated prognostication instrument to flag patients with elevated one-year mortality risk successfully prompted serious illness conversations (SICs). Individuals with recorded SICs demonstrated higher rates of advance care planning (ACP) documentation, palliative medicine referrals, hospice referrals, and

transitions to do-not-resuscitate (DNR) status. Reminders from integrated care managers during multidisciplinary rounds likely helped ensure consistent use of EOC notes to document these discussions. Overall, the results indicate that conducting SICs earlier can facilitate shifts in code status and increase engagement with palliative care and hospice services.

In one outpatient effort focused on patients with advanced cancer, SIC documentation reached 30–40% over one year [15]. By contrast, the present inpatient study achieved documented SICs in 26% of the identified high-risk patients.

Alternative approaches for initiating SICs have included the “surprise” question (“Would I be surprised if this person died within the next year?”). One investigation found that answering “no” to this question was associated with a seven-fold higher likelihood of mortality [16]. Because clinicians often overestimate survival, experts have recommended combining the surprise question with more objective clinical measures [17, 18]. The current project utilized an automatically generated CCI score from the EHR as such an objective trigger.

Comparable instruments have also been applied to stimulate SICs. For example, the Gagne tool helped identify patients at increased one-year mortality risk, and one study using this approach raised SIC documentation from 0% to 88% [19].

Haley *et al.* [20] reported that a multifaceted intervention boosted SIC rates from 20.5% in the control arm to 44.6% in the intervention arm. Their strategy involved a brief 10-minute educational session and electronic reminders.

Strengths

Key strengths of this project include the thorough preparation undertaken before launching the intervention. The QI team engaged all essential stakeholders from the outset, including the director of integrated care managers, QI coordinators, and physicians from internal medicine and geriatrics. Gathering both quantitative data and qualitative provider perspectives offered practical, frontline insights useful for planning subsequent PDSA cycles. Another advantage was the intervention’s simplicity: briefly discussing prognostic scores during existing multidisciplinary rounds added little extra time per patient. In addition, the EPIC EHR system’s ability to automatically calculate and continuously update CCI scores supported ongoing prognostic awareness throughout each hospitalization.

Limitations

One limitation was incomplete data capture for all high-risk patients during rounds. The integrated care manager could only collect information as time allowed, and the absence of a dedicated permanent care manager led to

missing records from the step-down unit. Future efforts may benefit from starting on a smaller scale, such as a single unit, to refine the process based on observed workflow patterns.

A second limitation involved inconsistent availability of integrated care managers due to heavy workloads, staffing shortages, and high turnover during the intervention period. Concentrating the project on one stable unit could help address this issue.

Third, not every hospitalist and resident physician was informed about the project or the CCI tool, as attendance at the monthly meetings was not universal.

Fourth, no reliable pre-intervention baseline for the rate of documented SICs existed, as this information was not readily accessible and required manual review. In upcoming cycles, the QI team could conduct chart reviews of high-risk patients on set days before implementation to establish a clearer baseline.

Using a prognostic tool, such as the CCI score, during multidisciplinary rounds proved effective at identifying patients at the greatest one-year mortality risk. This objective approach can reduce reliance on subjective judgment, improve prognostic accuracy [9], and help ensure care aligns with patients’ personal goals and values. Such tools promote fairness by minimizing bias and providing consistent prognostic information for all patients.

Future Direction

Encouraged by the outcomes of the initial PDSA cycle, the team expects further gains in CCI tool adoption and SIC documentation in subsequent cycles. The team will incorporate lessons learned from current limitations and qualitative comments into the next iteration. The team will gather additional data on patients’ cultural backgrounds to identify potential disparities. The long-term aim is for physicians to independently consult CCI scores during routine chart review without needing prompts from integrated care managers. Since the primary obstacle noted was incomplete documentation of SICs, sharing results from this first cycle should help motivate better recording practices. Future cycles may also target secondary drivers, including enhanced training on conducting effective SICs and strategies to alleviate physician burnout.

The success of this project has already prompted a parallel initiative at the Heart Hospital, which operates on the same EHR platform. That effort applies the CCI tool to patients admitted with cardiac conditions—such

as heart failure exacerbations, coronary artery disease, and cardiomyopathies—to facilitate timely SICs and enhance outcomes.

Conclusion

Incorporating the CCI tool, which forecasts one-year mortality risk, into multidisciplinary rounds effectively promotes the documentation of serious illness conversations within the EHR. This approach results in greater completion of advance care planning documents, more palliative medicine and hospice consultations, and increased DNR orders. The intervention is straightforward, efficient, and low-cost, making it suitable for adoption by other hospitals and health systems that use comparable EHRs. Ultimately, it supports care delivery that better matches the goals and preferences of patients at highest risk of mortality.

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Conflict of Interest: None

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Ethics Statement: None

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