Original Article

Shared Decision Making in the Geriatric Surgery Verification Program: Assessing Baseline Performance

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Abstract

Context. As part of the launch of the Geriatric Surgery Verification program in 2019, the American College of Surgeons issued care standards for older patients, including requirements for preoperative documentation of patients’ goals. Hospital performance on these standards prior to the Geriatric Surgery Verification program is unknown.

Objectives. To assess baseline performance of the Geriatric Surgery Verification (GSV) standard for documentation of preoperative goals for older patients, and to determine factors associated with standard adherence.

Methods. Using natural language processing, this study examines the electronic health records of patients aged 65 years or older who underwent coronary artery bypass grafts (CABG) or colectomies in 2017 or 2018 at three hospitals. The primary outcome was adherence to at least one of the three components of GSV Standard 5.1, which requires preoperative documentation of overall health goals, treatment goals, and patient-centered outcomes.

Results. A total of 2630 operations and 2563 patients were included. At least one component of the standard was met in 307 (11.7%) operations and all three components were met in 5 (0.2%). Higher likelihood of meeting the standard was demonstrated for patients who were female (odds ratio [OR] 1.30; 95% CI 1.00–1.68), undergoing colectomy (OR 2.82; 95% CI 2.15–3.72), or with more comorbidities (Charlson scores >3 [OR 1.55; 95% CI 1.14–2.09]).

Conclusion. Before GSV program implementation, clinicians for two major operations almost never met the GSV standard for preoperative discussion of patient goals. Interdisciplinary teams will need to adjust clinical practice to meet best-practice communication standards for older patients.

Key Words
Shared decision making, geriatric surgery, surgical counseling, geriatric surgery verification program, patient-centered communication

Key Message
In 2019, the American College of Surgeons issued care standards for older patients, including requirements for preoperative discussion and documentation of patients’ health and treatment goals. In this retrospective review of 2563 patients undergoing coronary artery bypass grafts or colectomies, 88.3% of operations did not meet the preoperative communication standard.

Introduction

In July 2019, the American College of Surgeons released 32 care standards for older surgical
patients, which serve as qualifying criteria for Geriatric Surgery Verification (GSV) accreditation. Early data has shown that implementation of the GSV program reduces post-operative length of stay, loss of independence, and risk of major complications, suggesting that these standards are integral to a robust quality strategy.\(^1\,2\) Among these standards are requirements for patient-centered communication.\(^3\)

In particular, Standard 5.1 asks that preoperative discussions include and document patients’ goals, explaining that “shared decision making with patients hinges upon high-quality communication and empowering patients to reflect upon and identify personal health goals.”\(^4\)

Shared decision making is particularly important for adults 65 years or older, who make up more than forty percent of the inpatient surgical population.\(^5\) As compared to younger counterparts, older surgical patients experience increased risk for adverse outcomes such as cognitive decline, functional decline, and nonhome discharge.\(^6\,10\) Those with frailty and multimorbidity are at even higher risk for prolonged or incomplete recovery, worsening quality of life, and increasing caregiver burden.\(^11\,16\)

Given the risks, older adults and their care teams must discuss whether surgery is worth the potential trade-offs in function and quality of life. Placing these decisions within the larger context of a patient’s values and health trajectory is crucial to patient-centered care.\(^17\,19\)

GSV Standard 5.1 outlines key components of the shared decision-making process for older patients. The standard identifies three distinct elements of preoperative counseling: 1) discussion of a patient’s overall health goals, 2) treatment goals, and 3) anticipated patient-centered outcomes (Fig. 1). How hospitals performed on this standard prior to GSV implementation is unknown. Baseline information is critical in identifying gaps and setting targets for improvement. This study examines preoperative documentation of patient goals at three hospitals in a regional health system in the two years prior to the introduction of the GSV program. Our objective was to assess performance of Standard 5.1 among patients ≥65 years old who received a coronary artery bypass graft or colectomy. We selected these operations because they are two of the most common inpatient operating procedures for older adults,\(^20\,22\) and as compared to other common procedures such as prostatectomies and knee replacements, have higher post-operative complication rates and lower thirty-day and long-term survival within this age group.\(^23\,27\) We hypothesized that fewer than 50% of operations would meet all three criteria of the standard.

**Methods**

**Data Sources**

Medical records were drawn from the Research Patient Data Registry (RPDR), the Electronic Health Record (EHR) database of Mass General Brigham, Massachusetts’ largest regional health network. RPDR contains clinical and administrative data for all patient encounters at affiliated institutions, including clinical notes. The registry also contains claims data, including

<table>
<thead>
<tr>
<th>5.1: Treatment and Overall Health Goals</th>
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<tbody>
<tr>
<td>Deliberation over surgical decision making must allow older adults the opportunity to discuss the following with the surgeon:</td>
</tr>
<tr>
<td>• Overall health goals (not limited to the current condition or treatment options)</td>
</tr>
<tr>
<td>• Treatment goals (specific to the current condition)</td>
</tr>
<tr>
<td>• Anticipated impact of both surgical and nonsurgical treatments on symptoms, function, burden of care, living situation, and survival</td>
</tr>
<tr>
<td>After discussion, the surgeon must document the treatment plan and how it has been informed by shared discussion of the patient’s goals.</td>
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</table>

**Documentation**

- A verbatim quote by the patient about his or her overall health and treatment goals
- Attestation that the surgeon has discussed the anticipated impact of both surgical and nonsurgical treatments on symptoms, function, burden of care, living situation, and survival
- Recommended treatment plan and acknowledgement of how the recommended plan has been informed by shared discussion of the patients’ goals

*Source: Optimal Resources for Geriatric Surgery: 2019 Standards, released by the American College of Surgeons*

Fig. 1. Definition of geriatric surgery verification standard 5.1 [excerpt from *Optimal Resources for Geriatric Surgery: 2019 Standards*].
The International Classification of Diseases, Ninth and Tenth Revision (ICD-9; ICD-10) and Current Procedure Terminology (CPT) codes. We derived zip code data from the 2013–2017 American Community Survey. The Mass General Brigham Institutional Review Board granted approval for this study.

**Inclusion Criteria**

We included coronary artery bypass grafts (CABG) and colectomies performed on patients 65 years and older from January 1, 2017 to December 31, 2018. These procedures were identified in RPDR using CPT and ICD-10 procedure codes.

Standard 5.1 specifies that surgeons are responsible for discussing and documenting each component of preoperative counseling (Fig. 1). However, to capture whether patients had these conversations with any provider, we also examined documentation by non-surgeons. We included notes written by physicians, physician assistants, nurse practitioners, and nurses. We included all notes filed thirty days before surgery through one day following surgery to account for documentation delays. We excluded documentation by chaplains, community health workers, social workers, ostomy nurses, physical therapists, and case managers. We selected two academic and one community hospital that adopted their current EHR systems before the third quarter of 2016 to account for challenges associated with transitioning between EHR systems.

We excluded scanned documents, which typically consisted of consent forms, due to natural language processing software incompatibility. To examine whether these forms included relevant documentation, we reviewed a hospital-stratified random sample of 30 charts. We examined scanned documents uploaded to the EHR thirty days before and one day after the procedure, which included surgical, anesthesia, and ICU consent forms. All text was examined by a clinically-trained investigator (JS) for standard adherence.

**Patient Characteristics**

We collected demographic information from RPDR, including age, gender, primary language, race/ethnicity, insurance, and mental health or substance use disorder as defined by ICD-10 codes and used in prior literature to examine disparities in surgical outcomes. We extracted comorbidities from RPDR via all ICD-10 codes associated with each patient record in the 365 days prior to surgery. Comorbidities were assessed using the Charlson Comorbidity Index, derived from ICD coding as validated by Quan et al. Because previous studies demonstrate relationships between income and patient-centered communication, we abstracted median household income by zip code using United States Census Data from the 2013–2017 American Community Survey, basing this assessment on a prior study validating the use of area-based socioeconomic status indicators to identify healthcare disparities.

**Identification of Preoperative Discussions**

We used ClinicalRegex, a text-identification natural language processing (NLP) software, to identify relevant EHR documentation. ClinicalRegex (developed by CL) identifies predefined keywords and phrases within clinical notes, accounting for language and punctuation variations, and has performed with high sensitivity, specificity, and efficiency at identifying patient-clinician communication among several patient populations in EHRs. To build our keyword library, we sampled language from the text of Standard 5.1.4 We also referenced libraries used by previous NLP studies examining serious illness communication. We refined this codebook through iterative review of records flagged and not flagged by NLP. Sensitivity, specificity, and accuracy of NLP-identified performance of the standard was determined by manual review of 80 randomly-selected patient charts. The final codebook is provided in Supplemental File 1.

Documentation identified by NLP software as containing relevant keywords was reviewed to determine whether it addressed the standard. We developed coding guidelines that contained examples of quotes that did and did not meet criteria. Quotes for which there was ambiguity regarding whether they met criteria were discussed between two clinically-trained investigators to reach consensus (JS, KL). Of all notes containing keywords, only notes that met at least one part of the three-part standard were coded as a positive hit (Table 1). For example, we excluded conversations that elicited patient goals but were not relevant to surgical decision-making. Similarly, code status conversations were excluded unless relevant to surgical decisions. Other examples of documentation that included keywords but did not meet the standard can be found in Table 2.

For each instance of qualifying documentation, we identified whether the documentation contained a direct patient quote. We also identified the type of clinician documenting the conversation (surgeon, non-surgeon MD, or nurse) based on the note’s author. If the note was written by a resident, NP, or PA, then clinician specialty was determined by the attesting attending.

**Outcomes**

Our primary outcome of interest was adherence to at least one of the three components of Standard 5.1. The components were measured separately: 1) documentation of overall health goals, 2) treatment goals, and 3) patient-centered outcomes. Patient-centered
Table 1
Qualifying Documentation Flagged by NLP that Fulfills Each Key Component of GSV Standard 5.1

<table>
<thead>
<tr>
<th>Definition</th>
<th>Examples of Keywords and Phrases from Codebook from Supplemental File 1</th>
<th>Qualifying Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall health goals</td>
<td>Long-term, long-term, quality of life, overall, want, desire, prolong, living well, live well, prognosis, survival, life, live, family meeting, goals of care, care(s), hope, concern, discuss</td>
<td>“He reemphasized his goal of maintaining quality of life, which to him means cognitive function and mobility.”</td>
</tr>
<tr>
<td>Treatment goals</td>
<td>Prognostic, survival, symptom relief, relieve symptom(s), quality of life, protect, prolong, hope, diagnose, diagnosis, preserve, wish(es) (ed)</td>
<td>“From a quality of life perspective, he would like to eat again, which he cannot do unless we palliatively reset this cancer.”</td>
</tr>
<tr>
<td>Patient-centered outcomes</td>
<td>Choice(s), options(s), outcome(s), benefit(s), natural course, complication(s), function (ing), life expectancy, likelihood, care burden, nonsurgical, non-surgical, nonoperative, nonoperative, benefit, observation, survival, survive</td>
<td>“Because of increased frequency of diverticulitis episodes, she wishes to undergo elective sigmoid colectomy to prevent emergency surgery.”</td>
</tr>
</tbody>
</table>

*A full list of the keywords included in the codebook can be found in Supplemental File 1.

Table 2
Examples of Documentation Flagged by NLP that Does not Fulfill GSV Standard 5.1

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Overall health goals</td>
<td>“Her EF has normalized, which is a great predictor for a good postop outcome, both in the short run and also for the years to come.”</td>
<td>“Older adults should have the opportunity to identify an overall health goal that is personal and specific, such as ‘I want to be able to walk at my grandson’s wedding this summer.’” “Deliberation over surgical decision making must allow older adults the opportunity to discuss the following with the surgeon: overall health goals (not limited to the current condition or treatment options)”</td>
</tr>
<tr>
<td>Treatment goals</td>
<td>“She understands the rationale for complete excision caused by the high-grade dysplasia seen in the villous adenoma polyp.”</td>
<td>“Patient health goals related to the surgical condition can be categorized broadly into (1) prolonging life, (2) preserving function or independence, (3) relieving symptoms, (4) curing a condition, or (5) establishing a diagnosis.” “Deliberation over surgical decision making must allow older adults the opportunity to discuss ... treatment goals (specific to the current condition).”</td>
</tr>
<tr>
<td>Patient-centered outcomes</td>
<td>“We reviewed the risks of surgery, including, but not limited to: heart attack, stroke, bleeding or need for permanent pacemaker.”</td>
<td>“Attestation that the surgeon has discussed the anticipated impact of both surgical and nonsurgical treatments on symptoms, function, burden of care, living situation, and survival” “This standard aims to improve preoperative conversations and risk assessment by addressing nonoperative alternatives and patient-centered outcomes such as function and living situation, as well as traditional morbidity and mortality outcomes.” “Despite many surgeons’ attempts to describe the complex risk-benefit balance of a given operation, the “fix-it” model may oversimplify the decision and obscure the repercussions that an acute surgical problem can have on a patient with preexisting comorbidities and functional limitations.”</td>
</tr>
</tbody>
</table>

*These are direct quotes from “Optimal Resources for Geriatric Surgery: 2019 Standards”, released by the American College of Surgeons.
outcomes are defined by the standard as anticipated impacts of both operative and nonoperative approaches on symptoms, function, burden of care, living situation, and survival. Any documentation flagged by NLP was coded for any component of Standard 5.1 it contained. Documentation meeting one or more of these components was included in our primary outcome. Standard 5.1 also requires inclusion of a verbatim patient quote regarding overall health and treatment goals, which we assessed as a secondary outcome and measured separately from adherence to the standard’s three components.

Analysis

Data were analyzed at the procedure level, with each surgical episode representing a discrete observation. Patient, clinician, and hospitalization characteristics were displayed as proportions, medians, and quartiles where appropriate.

Based on prior studies, the sensitivity, specificity, and accuracy of NLP were measured compared to manual chart review in 80 randomly-selected operations. We also conducted a sensitivity analysis by manual chart review of consent forms to address bias from exclusion of scanned documents.

To test associations between patient, clinician, and hospitalization characteristics and standard adherence, we performed bivariable logistic regressions with the dependent variable defined as performance of at least one of the three components of Standard 5.1 and the independent variable defined as the characteristic in question. Independent variables shown to have coefficients with a P-value <0.1 in bivariable analysis were included in the final multivariable logistic regression. Results were reported as odds ratios with a 95% CI. Statistical analysis was performed on Stata/MP v16.1.

Results

Patient Characteristics

We identified 2630 operations (53.2% CABGs, 46.8% colectomies) and 2563 patients. The median age was 73 and 61.1% were male. Most were white (2335, 88.8%) and English-speaking (2753, 94.3%) (Table 3).

NLP Performance

NLP demonstrated sensitivity of 88.9%, specificity of 98.4%, and accuracy of 96.3% compared to manual chart review. Further validation data can be found in Supplemental File 2. Manual review of scanned consent documents revealed that neither the handwritten nor typed text of these excluded documents met the standard. Of note, all surgical consents included attestation to a discussion of multiple possible interventions. For example, all forms at one institution included: “I understand...the benefits to be expected compared to other approaches as has been explained to me.” This statement is suggestive of the standard’s third component, which requires discussion of anticipated benefits. However, this component also requires explicit discussion of surgical and nonsurgical intervention on patient-centered outcomes such as symptoms and function, which these forms did not address. Moreover, because all consent forms contained this statement, and because research suggests that patients often do not read or understand consent forms, we did not accept this prepopulated text as evidence that this conversation occurred.

Performance of Communication Requirements

Using NLP, all 50,307 notes associated with 2,630 operations were reviewed for documentation of discussion of overall health goals, treatment goals, and patient-centered outcomes. Among notes flagged by NLP, 307 operations (11.7% of all operations) contained text that met at least one of the three requirements. Only 5 operations (0.2%) had documentation of all three requirements. Qualifying documentation was most often performed by surgeons (10.8% of all qualifying operations), followed by non-surgeon physicians (1.1%), and then nurses (0.2%) (Table 4).

The most commonly-met requirement of the standard was assessment of treatment goals, which comprised 69.3% of all relevant hits but appeared in documentation of only 10.0% of all operations. Conversations about patient-centered outcomes for operative and nonoperative treatment were documented in 3.7% of operations, and elicitation of overall health goals was documented in 0.7% of operations.

Factors Associated with Standard Adherence

Bivariable analysis demonstrated that colectomies, operations on female patients, and operations on patients with Charlson scores >1 were each associated with greater likelihood of meeting at least one requirement (value P <0.10). In multivariable logistic regression, clinicians were more likely to meet the standard for patients who were female (OR 1.30; 95% CI 1.00–1.68), undergoing colectomy (OR 2.82; 95% CI 2.15–3.72), or with more comorbidities (Charlson scores >3 [OR 1.55; 95% CI 1.14–2.09]).

Variation in Documentation of Goals

Of the standard’s three requirements, documentation of treatment goals was the most common. However, we found a wide range of documentation styles among qualifying operations. Some notes simply stated the surgical indication. For example, “We discussed that revascularization is indicated for symptom relief” and “We reviewed that the intent of the operation as palliative rather
Because these statements inform the patient of the goal of surgery, we counted it as meeting the standard. However, other documentation illustrated the patient’s individualized treatment goal: for example, “Because of increased frequency of diverticulitis episodes, she wishes to undergo elective sigmoid colectomy to prevent emergency surgery” and “He has stated that he is more interested in having an operation to come off steroids for good.” In these cases, surgeons elicited the patient’s personal rationale for surgery: to prevent emergency surgery or eliminate the need for steroids. These conversations revealed patient preferences that can then prompt discussion about whether this immediate treatment goal is compatible with long-term health goals. Although all the above examples meet the standard, the range

<table>
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<th>Table 3</th>
<th>Patient Characteristics Stratified by NLP-Identified Performance of GSV Standard 5.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristics</td>
<td>Operations (% of total), n=2630</td>
</tr>
<tr>
<td>Age, median (IQR)</td>
<td>73 (69–78)</td>
</tr>
<tr>
<td>Age quartile (quartile range)</td>
<td>Q1 (65–69)</td>
</tr>
<tr>
<td></td>
<td>Q2 (69–73)</td>
</tr>
<tr>
<td></td>
<td>Q3 (73–78)</td>
</tr>
<tr>
<td></td>
<td>Q4 (78–98)</td>
</tr>
<tr>
<td>Gender</td>
<td>female</td>
</tr>
<tr>
<td></td>
<td>male</td>
</tr>
<tr>
<td>Race</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>Black</td>
</tr>
<tr>
<td></td>
<td>LatinX</td>
</tr>
<tr>
<td></td>
<td>Asian/Asian Pacific</td>
</tr>
<tr>
<td></td>
<td>Other/Unknown</td>
</tr>
<tr>
<td>Mental health disorder</td>
<td>873 (33.19)</td>
</tr>
<tr>
<td>Substance use disorder</td>
<td>106 (4.03)</td>
</tr>
<tr>
<td>Language</td>
<td>English as primary</td>
</tr>
<tr>
<td></td>
<td>Non-english as primary</td>
</tr>
<tr>
<td>Charlson comorbidity index</td>
<td>CCI≤1</td>
</tr>
<tr>
<td></td>
<td>CCI 2–3</td>
</tr>
<tr>
<td></td>
<td>CCI &gt;3</td>
</tr>
<tr>
<td>Household income by zip code (quartile range)</td>
<td>Q1 (16727–65041)</td>
</tr>
<tr>
<td></td>
<td>Q2 (65041–82118)</td>
</tr>
<tr>
<td></td>
<td>Q3 (82118–102577)</td>
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<tr>
<td></td>
<td>Q4 (102577–213173)</td>
</tr>
<tr>
<td>Primary insurer</td>
<td>Medicare</td>
</tr>
<tr>
<td></td>
<td>Medicaid / MassHealth / HSN</td>
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<tr>
<td></td>
<td>Commercial / Other</td>
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<tr>
<td></td>
<td>Military</td>
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<tr>
<td></td>
<td>Self pay</td>
</tr>
<tr>
<td>Hospital</td>
<td>Tertiary academic hospital #1</td>
</tr>
<tr>
<td></td>
<td>Tertiary academic hospital #2</td>
</tr>
<tr>
<td></td>
<td>Community teaching hospital</td>
</tr>
<tr>
<td>Procedure</td>
<td>CABG</td>
</tr>
<tr>
<td></td>
<td>Colectomy</td>
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</tbody>
</table>

<sup>a</sup>Sub-components: overall health goals, treatment goals, and patient-centered outcomes. Meeting a sub-component does not require a direct patient quotation.

<sup>b</sup>Values are n (%) unless otherwise noted.

IQR = interquartile range; CABG = coronary artery bypass graft; CCI = Charlson comorbidity index; HSN = health safety net.
of styles may reflect the difference between eliciting a patient’s own treatment goal vs. informing a patient of the procedure’s objective.

**Discussion**

Before GSV implementation, fewer than 12% of CABGs and colectomies met at least one part of the three-part communication standard released by the American College of Surgeons. Non-surgeons performed approximately one in ten qualifying documentations, suggesting an important and perhaps underutilized role for members of an interdisciplinary team to meet the standard. Patients with higher comorbidity burden were more likely to have documentation of these conversations in their chart, but age was not independently associated with standard performance. Although Standard 5.1 requires a verbatim patient quote about health and treatment goals, we found only 4 instances of direct quotes.

Our findings build upon earlier work highlighting gaps in preoperative counseling. One qualitative study examining how surgical oncologists relate to the GSV standards found that few surgeons explicitly ask patients to define their goals for surgery. Moreover, prior literature describes how surgeons may employ a “fix-it” model of counseling, in which a surgical problem is viewed as an isolated anatomical abnormality that can be restored to normalcy via surgical intervention. By divorcing surgical problems from surgical risks, this communication style disservices patients, who can make truly informed decisions only when they understand surgery as an intervention that can lead to a range of outcomes, including protracted recovery and functional decline.

We found that fewer than 4% of operations contained documentation of discussion of patient-centered outcomes, defined by the standard as anticipated impact on symptoms, function, burden of care, living situation, and survival. Simply listing individual procedural complications such as “bleeding” or “infection” does not fulfill the standard if that conversation does not also include how those complications may shape a patient’s health trajectory. Our findings align with previous research, which has also demonstrated that preoperative counseling for both CABGs and colectomies may obscure some of the possible repercussions of surgery. In one study, approximately half of patients who had undergone colorectal surgery could not recall preoperative discussions of key outcomes, such as bowel function, sexual function, and body image. Similarly, multiple studies have demonstrated that a large proportion of patients undergoing CABGs have a limited understanding of risks of and alternatives to intervention. Without exploring how surgical intervention may influence the outcomes that matter most to patients, older adults may incompletely understand how surgery may either advance or regress their personal health goals. Of note, this study found low standard adherence for both CABGs and colectomies, which are performed by different surgical subspecialists for very different indications. Poor standard performance for both operations suggests that lack of preoperative documentation occurs across surgical specialties and patient populations.

This project examines documentation of preoperative communication, not the communication itself, meaning that the frequency of preoperative counseling that meets the standard may be higher than our results indicate. Previous qualitative work from our group suggests surgeons discuss goals routinely but rarely document them. However, GSV standard 5.1 requires documentation of these conversations, and measurement of performance at an institutional level is only possible through documentation. Furthermore, as documentation is vital to promoting safe, high-quality, person-centered surgical care across care settings, especially for complex patients, efforts to improve documentation are critically important. One study found that when trying to better understand patients’ goals of care in a surgical intensive care unit, single-phase clinicians such as intensivists and nurses often rely on preoperative documentation by longitudinal clinicians, such as surgeons.

Clinicians may assume that documentation of these conversations is time-consuming. However, we found several succinct examples of qualifying documentation, suggesting that comprehensive counseling does not necessarily impose a significant EHR burden on clinicians. For example, the following description is both concise and illuminating: “He reemphasized his goal of maintaining quality of life, which to him means cognitive function and mobility.” (Table 1) In 2017, palliative care clinicians activated a template within the Mass General Brigham EHR that utilizes a series of checkboxes and free-text boxes to record the hopes and worries of seriously ill patients, increasing documentation efficiency while also eliciting valuable information. One prompt, for example, asks providers to document “What’s important to patient/family,” while another allows providers to check off specific concerns the patient may have, such as “pain,” “loss of control,” or “being a burden.” Surgical clinicians can adopt a similar strategy, as template-based prompts may both improve documentation efficiency and remind providers to explore the key components of preoperative counseling as defined by the GSV standard: discussion of overall health goals, treatment goals, and patient-centered outcomes.

Just as surgical clinicians may adopt documentation strategies from palliative care clinicians, palliative care skillsets, whether delivered by primary surgeons or...
specialists, may be particularly valuable when elucidating patient values and aligning goals with treatment options. An increasingly large body of literature has explored the role of palliative care for surgical patients. A workgroup convened by The National Institutes of Health and the National Palliative Care Research Center produced a national research agenda in 2018, naming communication and decision-making as one of three key research priorities within surgical palliative care. A 2022 paper defined twenty-seven quality indicators by which to measure palliative care processes for surgical patients; four of these indicators examine whether preoperative counseling addresses how surgery aligns with patients’ goals and values. This prior work demonstrates that high-quality preoperative communication is a fundamental component of palliative care in the surgical setting. Our study highlights a critical gap in the preoperative encounter, suggesting that communication-specific palliative care skillsets may aid surgical teams in meeting the standard set forth by the GSV Program.

Meeting GSV standards for preoperative counseling may require multidisciplinary intervention. Our findings show that only 1% of documentation was by non-surgeon clinicians, demonstrating an opportunity for other team members to discuss and document patient goals. Quality indicators in surgical palliative care do not require surgeons to be the sole arbiter of goal-concordant care. Interdisciplinary models for preoperative counseling have been associated with better clinician understanding of patients’ priorities and better patient understanding of benefits and burdens of surgery. For example, Goldenberg et al suggest that preoperative clinics screen for frailty and then discuss patient’s priorities, basing their counseling on the Serious Illness Conversation Guide developed by Ariadne Labs. Roswell Park Cancer Center has piloted another model, in which preoperative evaluations flagging patients at high surgical risk trigger multidisciplinary meetings involving surgery, anesthesia, and palliative care to better understand how surgery aligns with patients’ overall goals. Non-MDs may also play a role in preoperative counseling: one study demonstrated that nurse-led conversations in cardiac surgery clinic improved patient and surrogate-decision-maker understanding of alternatives to and outcomes of surgery. Given the increasingly team-based nature of surgical practice and the multifaceted needs of older adults, future interventions should explore the potential of integrated perioperative care.

There are several limitations to this study. First, we included hospitals contained within the same healthcare system and so these findings may not apply to other settings. We sought to mitigate this bias by including patients from both community and tertiary hospitals. Furthermore, because our sample was predominantly white, male, and English-speaking, our results may not be generalizable. We could not access documentation outside our healthcare network, meaning that documentation by unaffiliated clinicians was not captured. However, our goal was to determine compliance within a hospital as it would be measured by GSV. Such exclusions will need to be considered in national efforts to capture data about perioperative communication. Lastly, we were not able to cluster our results by individual clinician, which is a topic for future study. It is possible that individual clinicians account for a disproportionate amount of qualifying documentation, which would ultimately support the conclusion that standard adherence is feasible but infrequently performed.

Conclusions

Before implementation of the GSV program, surgical teams for two major operations common in older patients almost never met Standard 5.1. Targeted and interdisciplinary intervention is necessary to adjust clinical practice.

Disclosures and Acknowledgments

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

RR and ZC are recipients of a John A. Hartford Foundation Grant to the American College of Surgeons for the Geriatric Surgery Verification Program. RR is the chair for the Committee for the Geriatric Surgery Verification Program, serves on the advisory board of Age-Friendly Health Systems, and received travel support for meeting attendance from the American College of Surgeons. ZC is funded for unrelated work by the Henry Jackson Foundation (HU0001-2-12-0089) and NIH (5R01AG070252-02; 5R01AG067507-03; 1R01NR020439-0). CL is funded for unrelated work from the National Institute on Aging. CL is an unpaid board member of the Palliative Care Quality Collaborative (PCQC). MJ has received grants from the National Institute on Aging. CL is funded for unrelated work by the National Institute on Aging and the Department of Defense. MJ has received a speaker honorarium from the NIH Pain Consortium. JS received travel support from the Foundation of Anesthesia Education and Research.

References


Supplemental File 1: Clinical Regex Keyword Library

Codebook used to scan through free-text documents for relevant documentation

### Comprehensive keyword coding

<table>
<thead>
<tr>
<th>Goal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensiveness</td>
<td>coding, simplify, maintain, goal of care, care goal, care goals, GOC, main goal, primary goal, value, surgery</td>
</tr>
</tbody>
</table>
Comprehensive keyword coding

> biventricular function(s]
< systolic bp < diastolic bp < hgb bp hgb systolic tpm pt pl[
< nutritional needs]' status], (rclmediate postop]) (rclapproved the plan of) (rclspiritual]
< establish] (rclcritical] (rclCOORDINATION OF] (rclCOORDINATING] (rcldirect] (rcl< appreciative of] (rclcooperative v] (rclcooperative with] (rclmop]) (rclCenter for Perioperative]
< initial episode of] (rcl<assessment and plan of] (rcldiscussed with all appropriate health] (rcltoral]
< < routine dental] (rclRAND response to] (rclSacramental]
< minutes providing medical] (rcl<in minutes providing] (rcl<in minutes providing] (rcl<brief palliative
< in minutes in subsequent hospital] (rcl<in minutes in subsequent] (rcl<ref VS. &] (rcl<in mouth]
< health] (rcl<monitored anesthesia] (rclProgram seeks to advance the]
< < intermediate postop]) (rcl<in minutes providing critical] (rclPrinciples of ostomy]] (rcl<minutes providing]
( < assumed] (rcl<assumed the] (rcl<respiratory] (rcl<primary care] (rcl<primary care[ about for] of]] (rcl<provider]
< proxy] agent] team] plan partner] directie] (rcl<primary care[ about for]] (rcl<provider]
< < medical readiness] Surgery Attending Attestation] per hct] (rclplan partner contact info], (rcl<ref]
( rcl<distal motor function is] Preserv(ing)] (rcl<Brief] (rcl<brief] (rcl<brief] (rcl<brief]
< systolic| diastolic| LVEF] [r] vj ejection fraction] of] [cm] biventricular [bed reff], (rcl<acute sleep]
< related] (rcl<please contact me if there are questions or] (rcl<with questions or] (rcl<should you have additional questions or]
< other topics] concern(ed] (rcl<for] (rcl<for] (rcl<for] (rcl<for] (rcl<for] (rcl<for] (rcl<for]
< in the setting of recent treatment] for CAD mediated] infections vs. ischemic colitis], (rcl<Active Problem List]
< <land rendered or confirmed the] (rcl<Nutrition] (rcl<was admitted to OSH with]
< <female with a primary] (rcl<female with a primary] (rcl<above]
< <cellular infiltrate and support the] (rcl<agree with their] (rcl<active problem list] (rcl<final pathology] (rcl<admission]
< < discharge diagnosis] (rcl<date] (rcl<codes] (rcl<code] (rcl<to emphasize are as follows] (rcl<are unrelated to the surgical procedure noted above], (rcl<Provided: Encourage realistic] hope

Patient-Centered Outcomes

Long term, alternative, mortality, likelihood, limit, limitation, probable, survival, life expectancy, burden of care, care burden, living situation, live, independent, comfort, dependent, non-surgical, nonoperative, expect, expectations, outcome, benefit, maintain, complications, natural course, observation

Simplified keywords
(without linguistic variation and context exclusion permitted by NLP software)
Supplemental File 2: Validation of Natural Language Processing (NLP) compared to Manual Review

Supplemental Table 1 and Supplemental Table 2

Supplemental Table 1
Detection of Qualifying Documentation with Manual Review vs. NLP

Based on Manual Review of 80 Randomly-Selected Charts

<table>
<thead>
<tr>
<th></th>
<th>Manual Review &quot;gold standard&quot;</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(+)</td>
<td>(-)</td>
</tr>
<tr>
<td>NLP Review</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>(-)</td>
<td>2</td>
<td>61</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>62</td>
</tr>
</tbody>
</table>

(+): detection of qualifying documentation
(-): no detection of qualifying documentation
NLP = natural language processing

Supplemental Table 2
Performance of NLP Compared to Manual Chart Review in Identification of Quality Standard

<table>
<thead>
<tr>
<th>Performance</th>
<th>Presence of Qualifying Documentation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>88.9%</td>
</tr>
<tr>
<td>Specificity</td>
<td>98.4%</td>
</tr>
<tr>
<td>Positive predictive value</td>
<td>94.1%</td>
</tr>
<tr>
<td>Negative predictive value</td>
<td>96.8%</td>
</tr>
<tr>
<td>Accuracy</td>
<td>96.3%</td>
</tr>
</tbody>
</table>