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## Use of Electronic Documentation for Quality Improvement in Hospice

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### Abstract

Little evidence exists on the use of electronic documentation in hospice and its relationship to quality improvement practices. The purposes of this study were to: (1) estimate the prevalence of electronic documentation use in hospice; (2) identify organizational characteristics associated with use of electronic documentation; and (3) determine whether quality measurement practices differed based on documentation format (electronic vs. nonelectronic). Surveys concerning the use of electronic documentation for quality improvement practices and the monitoring of quality-related care and outcomes were collected from 653 hospices. Users of electronic documentation were able to monitor a wider range of quality-related data than users of nonelectronic documentation. Quality components such as advanced care planning, cultural needs, experience during care of the actively dying, and the number/types of care being delivered were more likely to be documented by users of electronic documentation. Use of electronic documentation may help hospices to monitor quality and compliance.

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#### Conflict of Interest

The authors disclosed no current or foreseeable financial or personal conflicts of interest related to this manuscript and its content.

## Keywords

electronic health record (EHR); quality assurance; performance improvement; hospice

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Evidence suggests that the use of electronic documentation (ED) and computerized health records can minimize medical errors, reduce costs, and improve quality of care.<sup>1-4</sup> For many health care providers, the transition from paper-based record keeping to electronic systems has been a slow process. Obstacles to the adoption of ED systems have been identified including initial expense, lack of interoperability, privacy concerns, and the limited availability of specialized software.<sup>5</sup> Little evidence exists on the use of ED in hospice settings and its relationship to quality improvement (QI) practices. In 2009, new Centers for Medicare & Medicaid Services (CMS) Hospice Conditions of Participation went into effect, requiring hospices to demonstrate quality assessment and performance improvement (QAPI).<sup>6</sup> This study reports findings from a national survey of hospice providers that explored their capacity to implement QAPI, the kinds of QI data they collect, and how they use these data for the purposes of monitoring performance and improving quality.<sup>7</sup> The data reported here focus on the use of electronic and nonelectronic (eg, paper-based) data in hospices, including prevalence of use, associations with use of clinical measures, and the monitoring of care-related activities. This study was guided by the following questions:

- How prevalent is the use of ED for QI in hospice?
- What organizational characteristics are associated with use of ED?
- Does the monitoring and reporting of clinical and administrative data differ based on documentation format (electronic data vs. nonelectronic data)?

This research contributes to the literature by describing data collection practices in hospices and providing preliminary evidence on the relationships between the use of electronic data and QAPI activities.

## Background and Significance

Previous research on the use of ED in health care has used a variety of operational definitions, which makes it difficult to compare findings across studies. A review of the available literature on the use of technology in hospice resulted in a number of terms and concepts with overlapping relevance to the use of ED systems in hospice care (Table 1). Within the context of health care, ED is a form of health information technology (HIT) that includes electronic health records (EHRs).

Although research on the use and impact of ED in hospice is limited, it has been linked to improved quality of care and outcomes in a variety of other settings. ED can be used to support regulatory reporting, evidence-based decision making, and QI.<sup>6</sup> Evidence suggests that ED systems can facilitate QI by providing automated reminders for assessments and care processes as well as embedded decision-support tools. They also allow for timely aggregation and analysis of QI data. The use of ED has been associated with decreased medical errors, greater fidelity to practice standards, and better monitoring of adverse

events.<sup>2</sup> Health information systems also may have the capacity to enhance continuity of care and interconnectivity among referral sources and partnering organizations.<sup>8</sup>

Hospice is distinct from other health care providers in ways that have implications for how ED can be used efficiently. Because hospice care is decentralized, it relies on good communication and coordination between team members and external affiliates such as pharmacies, equipment vendors, and social service agencies.<sup>9</sup> Additionally, ED systems must accommodate for the provision of care across settings, including private residences, nursing facilities, and assisted-living communities.<sup>10</sup> Because a central mission of hospice is to provide family-centered care, ED systems also must be capable of recording information on patients' informal care networks and social supports in addition to standard medical chart content.

Although the successful adoption of ED systems into hospice care has been reported,<sup>11, 12</sup> a number of potential barriers also have been identified. Barriers include implementation costs, regulations, doubts about cost-effectiveness, insufficient knowledge about EHR capabilities, and limited availability of software geared toward hospice.<sup>6, 8, 13, 14</sup> Lack of compatibility and interoperability with other ED systems also has been a challenge for hospices.<sup>15</sup>

Two studies have reported on the use of ED by hospice organizations in the United States. The 2000 National Home Health and Hospice Care Survey found that 32% of home health agencies, 19% of hospice agencies, and 40% of mixed agencies were actively using EHRs.<sup>7</sup> A more recent study found that 49% of hospice-only agencies had adopted an EHR, a 164% increase between 2000 and 2007.<sup>16</sup> Additionally, 2 studies have documented the feasibility of using EHR systems in hospice environments.<sup>11, 12</sup> Another study described the use of point-of-care technology, which was linked to an EHR system to improve pain and symptom management and the process of patient recertification.<sup>10</sup> Although these studies show that hospices can and do use ED, none have reported on its usefulness specific to the purposes of QI.

## Methods

In October 2007, the National Hospice and Palliative Care Organization (NHPCO) conducted a nationwide online survey of member organizations to assess their readiness to collect and utilize data for QI and performance measurement. Participating organizations were asked to respond to questions about their use of 5 different types of QI data and whether the majority of these data were in electronic format. All 2279 NHPCO member organizations were sent prenotification e-mails describing the study. Survey content was developed by the research team at The Carolinas Center for Medical Excellence with additional input from the NHPCO leadership, research, and quality teams. (Survey questions are available from the authors upon request.) The survey took approximately 10 minutes to complete and was accessible for a 3-week period. Instructions indicated that the survey was to be completed by the staff member most familiar with the agency's QAPI efforts. Up to 3 follow-up e-mails were sent to nonresponders. Data were transmitted directly to NHPCO

and de-identified prior to analysis. A detailed description of the main study and its findings were reported in Hanson et al.<sup>7</sup>

Respondents were asked to report on the agency's current QAPI activities including how they collected and used 5 types of QI data: (1) staff data, (2) administrative data, (3) clinical data, (4) patient interview/survey data, and (5) family interview/survey data. Respondents also indicated whether the majority of these data types were collected in an electronic format. When affirmative answers were given, respondents were prompted with a question inquiring about which software providers or EHR vendors were being used to collect information on the respective QI data type. *Staff data* included information on general employee training, professional certifications, cultural competencies, or continuing education. *Administrative data* encompassed visit frequencies, timeliness of care, and a record of the types of services provided. *Clinical data* were defined as any clinical records data recorded by staff describing patients' experiences (eg, measures of pain, symptoms, functional status, spiritual distress). *Patient interviews/surveys* were standardized, patient-reported information questions about quality of care, quality of life, or quality of dying. *Family interviews/surveys* were uniform questions directed toward family members regarding quality of care and satisfaction. Questions were based on the 8 domains for quality of care identified by the National Consensus Project (NCP)<sup>17</sup> and included structure and processes of care; physical aspects of care; psychological and psychiatric aspects of care; social aspects of care; spiritual, religious and existential aspects of care; cultural aspects of care; care of the imminently dying patient; and ethical and legal aspects of care.

The authors constructed a *Use of Electronic Documentation (UED)* score that ranged from zero to 5, with higher scores indicating greater use of ED. The UED score is the cumulative total of affirmative responses to the 5 questions inquiring whether the majority of data were collected electronically. For example, if a respondent indicated their hospice agency only collected the majority of staff data and clinical data in electronic format (but not administrative data, patient interview data, or family interview data) a UED score of 2 would result. Alternatively, a hospice that documented the majority of data in electronic format for all 5 QI data types would receive a UED score of 5. The UED score was developed and applied by the authors after primary data collection was completed to provide a general estimate of the use of electronic documentation by hospices. For the purposes of this study, the authors also focused on 2 distinct types of QI data: clinical and administrative. These data types were examined in particular because it is crucial that hospices collect and monitor them for QI purposes.<sup>17</sup> The authors also explored whether designation of a QI champion (defined as staff member whose primary role is to identify opportunities and strategies to improve the quality of care) was associated with UED scores.

Univariate and bivariate analyses were used to describe the sample and answer the research questions. The hospice UED score was treated as a continuous variable ranging from zero to 5. Based on its rank-ordered nature, the variable *agency size* was considered an ordinal variable. Nonparametric tests were used to identify associations between categorical and ordinal-level variables. Inferential statistics were used to test for group differences on continuous variables. To estimate the influence of organizational characteristics (ie, those identified in Table 2) on the UED score a logistic regression was used with a binary

dependent variable constructed for nonuse (ie, a UED score of zero) or use (a UED score of 1 or more) of ED. For identified group differences, means and 95% confidence intervals are reported.

## Results

The survey was accessed by 772 individuals; 87 were opened but not completed. Thirty-two duplicate submissions (ie, multiple surveys from the same organization) were removed from the analysis. In these cases, only the first, fully completed survey from each provider was included. The remaining 653 surveys were included in the analysis and represented distinct hospice agencies. This resulted in a completion rate of 82%, and a response rate of 29% for NHPCO's 2279 membership organizations. Respondent and agency characteristics are reported in Table 2.

Hospices in our sample had a mean UED score of 1.34 (SD=1.47) (Table 3). The hospice UED score differed by agency location, with rural hospices collecting fewer QI data types in electronic format than mixed urban/rural hospices ( $P < .000$ ), and urban hospices collecting less electronic data than mixed urban/rural hospices ( $P = .048$ ). No differences in UED scores were identified between agency types, nor between organizations participating in NHPCO-sponsored data collection, such as Family Evaluation of Hospice Care and Family Evaluation of Bereavement Services,<sup>18, 19</sup> and nonparticipating hospices. Hospices with a designated QI champion were more likely to have a higher UED score ( $P < .001$ ). Additionally, larger agencies were more likely to document electronically in more QI data types ( $P < .001$ ). Nonprofit hospices were more likely to use more forms of ED than for-profit organizations ( $P < .000$ ). Further examination of the differences between for-profit and nonprofit agencies found that nonprofits tended to be larger, while government-run agencies tended to be smaller ( $P < .001$ ). For-profit agencies also were less likely to be primarily rural and more likely to be primarily urban or mixed ( $P = .001$ ). However, results of a binary logistic regression found that average daily census, tax status, and location continued to significantly predict whether hospice agencies use ED ( $P < .001$ ). Hospices with a designated QI champion also were more likely to have a higher UED score ( $P < .001$ ).

### Administrative Data

Most hospices (67%) reported collecting administrative data for QI purposes. Among these agencies, 41% indicated the majority was being gathered electronically. Administrative data were collected in electronic format more often than the other QI data types (Table 3). Differences were examined between agencies that collected most of their administrative data in electronic format and agencies whose data were paper based on 3 categories of care: timeliness of specific aspects of care, frequency of care/encounters, and number and types of care delivered. Agencies that collected the majority of their administrative data in an electronic format were consistently more likely to record these aspects of care (Figure 1), but only the number and types of care delivered was found to be statistically significant ( $P = .009$ ). Hospices that collect administrative QI data in an electronic form were more likely to participate in comparative QI reporting with other organizations, rather than limiting reporting to within the agency ( $P = .004$ ). The most frequently used software systems for

gathering administrative data in electronic format were: Misys ( $n=42$ ; Mysys PLC, London, UK), Suncoast Solutions ( $n=37$ ; Suncoast Solutions, Clearwater, FL), Cerner Homeworks Beyond Now ( $n=32$ ; Sybase Inc, Dublin, CA), and McKesson Horizon Homecare ( $n=20$ ; McKesson Corp, San Francisco, CA). A few respondents indicated the use of Microsoft Access or Excel databases ( $n=6$ ; Microsoft Corp, Redmond, WA).

### Clinical Data

The majority (60%) of organizations were collecting data on patients' experiences as part of the clinical record; 27% of these hospices reported using clinical data in an electronic format. Free-standing hospices were less likely to use electronic clinical data when compared with hospices connected to home health agencies ( $P = .034$ ). Larger hospice organizations were more likely to collect the majority of clinical data in an electronic format than smaller organizations ( $P = .013$ ). Nonprofit agencies were more likely to use electronic clinical data when compared to for-profit agencies ( $P < .001$ ). In fact, only 11% of for-profit hospices reported collecting most of their clinical data in an electronic format while nearly a third (32%) of nonprofit agencies reported doing so. No differences were found when comparing use of clinical data with agency type and location. Hospices collecting clinical data in an electronic format were more likely to use it for comparisons with other organizations than agencies using paper-based documentation ( $P = .022$ ). For respondents who indicated the majority of their clinical data was primarily electronic, the majority identified software systems with EHR capabilities or vendors who supply such products. Leading responses included: Suncoast Solutions ( $n=31$ ), Misys ( $n=22$ ), Cerner Homeworks/Beyond Now ( $n=21$ ), and Patient Care Technologies ( $n=10$ ; Patient Care Technologies, Atlanta, GA). Users of ED were consistently more likely to track clinical QI domains than nonusers (Figure 2) and differences were identified on 3 domains: advanced care planning or communication ( $P = .020$ ), cultural needs ( $P = .044$ ), and experience during active care of the dying ( $P = .007$ ).

### Discussion

Although most hospices reported using ED for at least 1 QI data type, few are fully electronic, and just under half do not collect the majority of any QI data type electronically. This suggests that many hospices are not using ED systems for QI purposes, which may indicate that many organizations struggle with costs, extensive training time, and other logistical constraints associated with implementing ED systems. These constraints have been acknowledged by CMS representatives and are part of the rationale for not requiring adoption of such systems at this time.<sup>6</sup> However, the Affordable Care Act requires the onset of quality reporting by hospices by 2014 and likely will have a profound impact on hospices' adoption of ED systems.<sup>20</sup>

Organizational characteristics such as size, profit status, location, participation in NHPCO-sponsored data collection, and the designation of a "QI Champion" were related to use of ED for QI purposes. Consistent with previous studies,<sup>9,16</sup> nonprofits and hospices affiliated with a home health agency were more likely to collect the majority of data electronically when compared to for-profit agencies. This difference may be related to agency size, as

nonprofits tended to be larger than for-profit agencies. Larger hospices and those associated with a home health agency may have the resources to devote to implementing HIT. ED systems also may enhance communication among interdisciplinary team members in larger organizations, across branch offices, and locations of care. We found hospices in mixed rural and urban locations were more likely to collect QI data electronically than organizations in an exclusively rural or urban setting. This suggests that hospices providing services within a limited coverage area may consider ED systems less important than those that provide services to both rural and urban communities.

Hospices with a “QI Champion” also tended to have higher UED scores. Organizations with a staff member whose main responsibilities are related to QI are likely have an advantage when dealing with the many challenges related to the implementation of HIT into routine clinical practice. Furthermore, coupling our findings with other research on health care quality,<sup>21</sup> the designation of a QI Champion, and the associated job responsibilities, may contribute to improved adherence to practice guidelines and greater attention to quality outcomes. Although more evidence is needed to guide macro-level decision making, policy makers should consider the merits of requiring hospices to identify at least 1 staff member whose primary role includes QAPI leadership.

The use of clinical measures and the monitoring of care-related activities were associated with the type of QI data format being used. Users of ED were consistently more likely to measure a greater number of care domains for QI purposes. Hospices that use ED were more often measuring advance care planning, cultural needs, and information on the patient experience during active dying. In addition, hospices that gathered the majority of administrative data in electronic format were more likely to record the number/types of care being delivered. This suggests that use of ED can enhance a hospice’s capacity to monitor domains of care for which measurement and documentation are often complex, such as advance care planning. EHR systems frequently are designed to specifically address the 8 quality domains identified by NCP<sup>17, 22</sup> and include system prompts that may encourage hospice providers to input information on these often overlooked domains of care. Hospices that use paper-based records may have a more difficult time acquiring and integrating these types of measures into clinical practice. Finally, hospices with the majority of their clinical and administrative data in electronic format were more likely to engage in comparative reporting (eg, benchmarking) as part of their data reporting activities.

## Limitations

This study canvassed 2279 NHPCO member organizations to elicit a snapshot of QI practices and use of ED across hospices nationwide. Approximately 80% of all US hospices are members of NHPCO<sup>23</sup>; thus, these results do not represent nonmember organizations. Additionally, only 29% of the solicited organizations responded to the survey. As a result, findings may have been biased by nonresponse. An analysis of nonresponding organizations found they that were more likely to be for profit and less likely to be a participant in NHPCO’s Quality Partners initiative.<sup>7</sup> Thus, the hospices in our sample may be more likely to use ED and, consequentially, our findings may overestimate the use of ED by hospices for QI purposes. Results also should be interpreted with respect to the constraints of how study

variables were operationalized. For example, clinical and administrative data format were treated as dichotomous variables (users or nonusers of electronic data); however, some hospices reported using a combination of electronic and paper-based documentation. Because respondents were asked about whether the majority of their data were collected in electronic format, we were unable to account for users of hybrid formats. Also, the UED score may not have captured the full range of relevant QI data types being documented by hospices. The UED score was developed for this study and has not been independently validated in other studies.

### **Implications for Quality Improvement in Hospice and Future Research**

Use of ED can facilitate the rapid aggregation and analysis of performance indicators and quality measures. Real-time feedback on important care-related processes and outcomes can help providers identify and act on opportunities to improve care in a timely manner. Electronic documentation also may enable hospices to more easily compare their performance with other hospices. Future reporting requirements for CMS likely will demand greater utilization of ED systems by hospice providers. For these reasons, hospices that currently rely on non-ED processes may want to plan for the eventual integration of HIT as a part of their strategic development.

Our findings lend support to the expectation that ED can facilitate QAPI in hospice settings. However, further research on this topic is needed to better understand: (1) the validity of electronic QI measures; (2) how data collection methods impact the dynamics of care (eg, is use of a laptop or PDA perceived as impersonal?); (3) how QI data are used to improve care and outcomes; (4) the quality of electronic data (ie, is it better than paper-based charting?); and (5) the efficiency of using ED (eg, staff time, documentation burden, cost).

### **Conclusion**

Efforts are under way to infuse ED systems into routine practice in many sectors of health care. In our sample, users of ED were able to monitor a wider range of QI data types than users of nonelectronic collection methods. Quality components such as measures of advance care planning, cultural needs, experience during active care of the dying, and the number and types of care being delivered were more likely to be documented by users of ED systems. Use of ED systems is promising for QAPI-related data collection and reporting in hospice settings.

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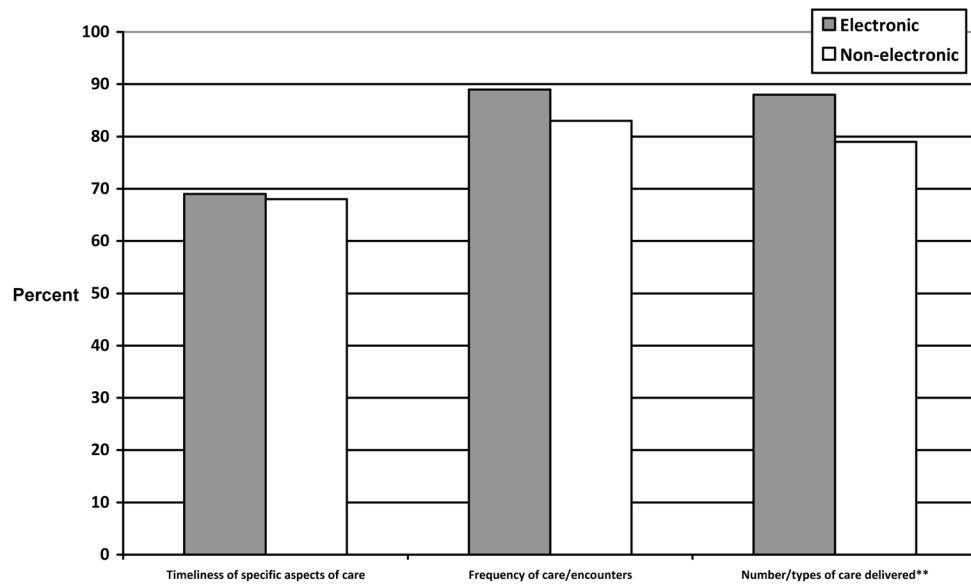
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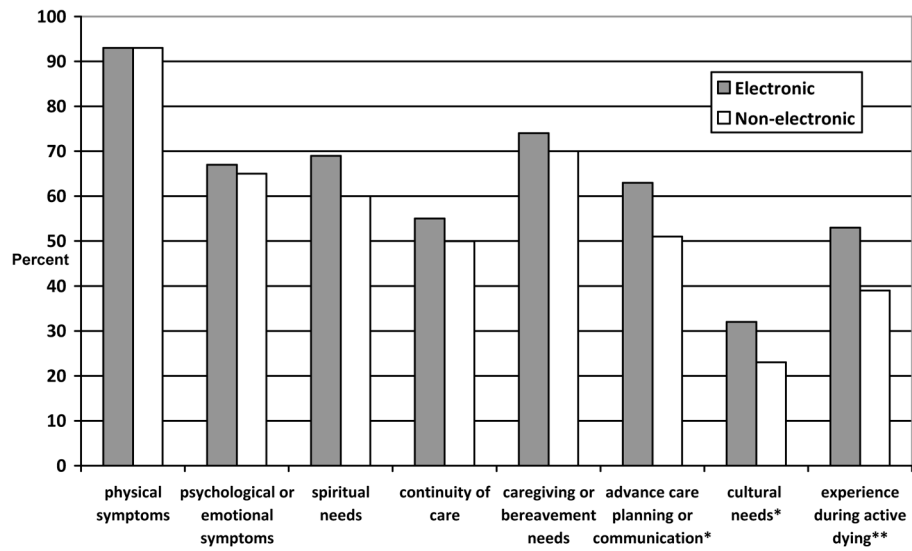
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**Figure 1.** Hospice use of administrative data for quality improvement (QI) purposes by method of data collection ( $N=437$ )\*  
 \*This subsample was limited to hospices that reported collecting administrative QI data.  
 \*\* $P<.01$



**Figure 2.** Hospice use of clinical data for quality improvement (QI) purposes by method of data collection ( $N=390$ )<sup>†</sup>

<sup>†</sup>This subsample was limited to hospices that reported collecting clinical QI data.

\* $P < .05$

\*\* $P < .01$

**Table 1**

## Selected Terms and Definitions Related to Electronic Documentation in Hospice

<b>Term</b>	<b>Definition</b>
<b>e-Hospice -</b>	A model for integrating health information technology into hospice settings. <sup>16</sup>
<b>Electronic Documentation -</b>	The collection and storage of data in a computerized or otherwise digital database for the purposes of retrieval, tracking, and analysis. This can include electronic health records (HER), electronic medical records (EMR), and computerized medical records (CMR).
<b>Electronic Health Records (EHR) -</b>	An electronic version of a patient's medical chart that can include key administrative and clinical data pertaining to an individual's care; related to CMR and EMR. <sup>6</sup>
<b>Health Information Technology (HIT) -</b>	Hardware, software, integrated technologies or related licenses, intellectual property, upgrades, or packaged solutions sold as services that are designed for or support the use by health care entities or patients for the electronic creation, maintenance, access, or exchange of health information. <sup>24</sup>
<b>Point-of-Care (POC) Technology -</b>	Mobile interface systems, such as laptops, tablets, and personal digital assistants (PDAs), designed to facilitate clinical documentation and assessment while at the patient's bedside; sometimes referred to as point-of-service (POS) technology. <sup>10</sup>
<b>Telehospice -</b>	The use of phone or videophone technology to facilitate communication between hospice patients, families, and providers (ie, the application of telemedicine in hospice care). <sup>25</sup>

**Table 2**

Organizational and Respondent Characteristics of Those Responding to the QAPI Preparedness Survey, 2007  
(N=652)

Variable	N	Percent*	Mean UED** Score, (95% CI)
<i>Organizational Characteristics</i>			
Average Daily Census <sup>†</sup>			
25 or less	138	21%	0.90, (.68–1.11)
26–100	254	39%	1.24, (1.06–1.41)
101–350	188	29%	1.67, (1.44–1.89)
351 or more	66	10%	2.05, (1.62–2.47)
Agency Type <sup>†</sup>			
Hospice, freestanding	365	56%	1.31, (1.15–1.46)
Hospice, hospital based	116	18%	1.36, (1.10–1.63)
Hospice, home health agency based	113	17%	1.53, (1.25–1.81)
Other or mixed	58	9%	1.48, (1.02–1.94)
Tax Status <sup>††</sup>			
Voluntary (not for profit)	483	74%	1.51, (1.38–1.65)
Proprietary (forprofit)	137	21%	0.86, (.64–1.08)
Government	13	2%	1.15, (.27–2.04)
Location <sup>†</sup>			
Primarily Urban	123	19%	1.22, (.98–1.46)
Primarily Rural	193	30%	1.06, (.866–1.25)
Mixed Urban and Rural	323	50%	1.59, (1.42–1.77)
<i>Respondent Characteristics</i>			
Role in Organization			
Executive Staff (Exec. Director, CEO)	183	28%	
Director of Clinical Services	130	20%	
Quality Improvement Coordinator	126	20%	
Clinical Staff (MD, RN, Social Worker)	64	10%	
Compliance officer or similar position	26	4%	
Other	114	18%	
Missing	0	2%	
	<u>Mean</u>	<u>(SD)</u>	
Years in a hospice/palliative setting	9.9	(6.9)	
Years in current organization	8.1	(6.9)	

\* Cumulative percentages may not total 100% due to rounding.

\*\* The UED score is the cumulative total of affirmative responses to the 5 questions about whether the majority of data were collected electronically. The UED ranges from 0 to 5 with higher scores indicating greater use of electronic documentation.

<sup>†</sup> Associated with UED score,  $P < .001$

<sup>††</sup> Non-significant when tested for an association with UED score.

CEO, chief executive officer; CI, confidence interval; MD, medical doctor; QAPI, quality assessment and performance improvement; RN, registered nurse; UED, use of electronic documentation

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**Table 3**

Use of Electronic Documentation (UED) Score and Quality Improvement (QI) Data Types Being Collected by Hospices (N=652)

<b>Variable</b>	<b>N</b>	<b>Percent *</b>	<b>Cumulative % *</b>
<i>UED Score</i>			
0	276	42%	42%
1	117	18%	60%
2	114	18%	77%
3	78	12%	90%
4	40	6%	96%
5	27	4%	100
<i>QI Data Type in Electronic Format</i>			
Staff Data	144	22%	
Administrative Data	273	42%	
Clinical Record Data	176	27%	
Patient Interview Data	89	13%	
Family Interview Data	192	29%	
<i>QI Data Type in Any Format</i>			
Staff Data	493	76%	
Administrative Data	437	67%	
Clinical Record Data	390	60%	
Patient Interview Data	305	47%	
Family Interview Data	459	70%	

\* Percents rounded