ARTICLE TITLE: Electronic Patient-Reported Outcome Systems in Oncology Clinical Practice

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2. Summarize the challenges in implementing an electronic patient-reported outcome system.

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Electronic Patient-Reported Outcome Systems in Oncology Clinical Practice

Antonia V. Bennett, PhD; Roxanne E. Jensen, PhD; Ethan Basch, MD, MSc

Patient-reported outcome (PRO) questionnaires assess topics a patient can report about his or her own health. This includes symptoms (e.g., nausea, fatigue, diarrhea, pain, or frequent urination), physical functioning (e.g., difficulty climbing stairs or difficulty fastening buttons), and mental health (e.g., anxiety, fear, or worry). Electronic PRO (ePRO) systems are used in oncology clinical care because of 1) their ability to enhance clinical care by flagging important symptoms and saving clinicians time; 2) the availability of standardized methods for creating and implementing PROs in clinics; and 3) the existence of user-friendly platforms for patient self-reporting like tablet computers and automated telephone surveys. Many ePRO systems can provide actionable links to clinical care such as summary reports in a patient’s electronic medical record and real-time e-mail alerts to providers when patients report acute needs. This review presents 5 examples of ePRO systems currently in use in oncology practice. These systems support multiple clinical activities, including assessment of symptoms and toxicities related to chemotherapy and radiation, postoperative surveillance, and symptom management during palliative care and hospice. Patient self-reporting is possible both at clinical visits and between visits over the Internet or by telephone. The implementation of an ePRO system requires significant resources and expertise, as well as user training. ePRO systems enable regular monitoring of patient symptoms, function, and needs, and can enhance the efficiency and quality of care as well as communication with patients. CA Cancer J Clin 2012;62:336-347. © 2012 American Cancer Society.

Keywords: health outcomes, health communication, palliative care, chemotherapy, medical oncology

Introduction

Patient reports of symptoms and quality of life have become widespread in a number of health care contexts, such as clinical trials and hospital performance evaluations. There is increasing interest in bringing these methods into clinical practice settings to allow patients to self-report symptoms, functional status, and quality of life, in order to enhance clinical practice (particularly symptom management) and to improve efficiency.

Patient-reported outcome (PRO) questionnaires assess topics a patient can report about his or her own health. This includes symptoms (e.g., nausea, fatigue, diarrhea, pain, or frequent urination), physical functioning (e.g., difficulty climbing stairs or difficulty fastening buttons), and mental health (e.g., anxiety, fear, or worry). These outcomes are best assessed by patients themselves. Patients report this information via questionnaires that ideally have been rigorously developed, as discussed below.

In this article, we describe the measurement of PROs using electronic assessment systems in the clinical care setting. These systems present the PRO data to clinicians in order to improve patient monitoring and support clinical practice (e.g., symptom management). To begin, we define PROs and discuss the standard methods for creating and implementing PRO measures, and the common uses of PROs in research settings. We outline the increasing use and future potential of PROs in clinical care due to: 1) the increasing recognition that PROs can enhance clinical care by flagging important symptoms and by saving clinicians time; 2) the standardization of methods for creating and implementing PROs; and 3) the current availability of sophisticated, user-friendly, electronic platforms for patient self-reporting, such as personal digital assistants (PDAs), tablet computers, and automated telephone surveys, which enable the patient’s symptom data to be conveyed in real time to their clinicians.

We present 5 examples of electronic PRO (ePRO) systems used in clinical care, in current use at Johns Hopkins University in Baltimore, Maryland; Duke Comprehensive Cancer Center in Durham, North Carolina; and medical centers in the United States.

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TABLE 1. Summary of the Method for Developing New PROs

| Step | Description |
|------|-------------|
| 1) IDENTIFYING CONTENT | The topic of the questionnaire is chosen based on the research question (eg, physical functioning in patients with advanced lung cancer), and then the specific content (eg, difficulty walking up stairs, shortness of breath, or frequent coughing) is identified through literature reviews, interviews with patients, and by input from content experts such as clinicians and nurses. The goal of this step is to identify all the issues that are relevant to the topic of the questionnaire and important to patients. |
| 2) DRAFTING THE QUESTIONNAIRE | The questionnaire developers will draft the questionnaire items in clear language that is easily understood by patients. Developers will also determine the recall period (eg, within the past 7 days) and aspect of measurement (eg, frequency or severity), as well as the most appropriate response options for each questionnaire item. These decisions are based on information from the literature reviews, patient interviews, content experts, published research about survey methodology, and developers’ past experience with creating and testing questionnaires. |
| 3) INTERVIEWS WITH PATIENTS TO CONFIRM CLARITY OF SURVEY QUESTIONS | The draft questionnaire is tested through cognitive interviews with patients to determine if the meaning of each question is understood by patients as it was intended. |
| 4) TESTING THE STATISTICAL PROPERTIES OF THE QUESTIONNAIRE | The questionnaire is administered to a large sample of patients, and the data are analyzed to test the statistical properties of the questionnaire. This includes “validity” (does the questionnaire measure what we think it measures), “reliability” (does the questionnaire provide the same answers when completed repeatedly), and “sensitivity/responsiveness” (does the questionnaire detect differences between patients or within patients over time). |

PRO indicates patient-reported outcome.

Kingdom; and Memorial Sloan-Kettering Cancer Center in New York City. These examples show that ePRO systems can be designed for patients in diverse treatment contexts, such as to assess the symptoms and toxicities of chemotherapy and radiation, recovery of function after surgery, or symptom management during palliative care and hospice. We report common challenges in the implementation of ePRO systems in clinical care. In closing, we discuss the future directions in clinical care that are being enabled by these systems.

**PROs in Cancer Clinical Trials**

PRO assessments are now widely used in clinical trials, and the data may be submitted to the US Food and Drug Administration (FDA) as evidence of product effectiveness. PROs are frequently used as secondary or exploratory endpoints to evaluate the effect of the product on key indicators other than survival (eg, pain or functioning). PROs support the primary endpoints of phase 3 trials of supportive drugs used in oncology, such as antiemetics and analgesics.

**Standardized Methods for Developing PRO Questionnaires**

Rigorous methods for creating and using PRO questionnaires in clinical trials have been developed and standardized. The approach preferred by regulatory agencies is outlined in an FDA guidance published in 2009. Additional methodological research has also been conducted to fill gaps in knowledge about the use of PRO questionnaires that became apparent while the guidance was being written. The methodology outlined in this guidance and subsequent research has advanced the science of PRO assessment in clinical trials and has also set a high standard for how PROs are measured in other contexts such as clinical care. An overview of the methods for developing PRO questionnaires is given in the following section.

How Are PRO Questionnaires Developed?

PROs are developed in what is essentially a 4-step process. We describe each step briefly in Table 1 to provide a thumbnail sketch of the process. The process is described in full detail by Patrick et al. If a clinical practice is selecting an existing questionnaire for use in patient assessment, these criteria should be considered for determining whether the questionnaire was well developed for the intended use.

**Selecting PROs for Use in Clinical Care**

Although not all of the FDA standards must be met when assessing PROs in clinical care (where the emphasis is on feasibility and clinical usefulness), the use of PRO questionnaires should adhere to established best practices of development and implementation. This will assure the PRO data collected are both meaningful and actionable. To assist clinicians interested in using PRO questionnaires in clinical practice, members of the International Society for Quality of Life Research developed the User’s Guide for Implementing Patient-Reported Outcomes Assessment in Clinical Practice. This guide discusses the advantages and disadvantages of options for key design issues such as selecting questionnaires; determining the frequency with which the questionnaires are administered; determining when, where, how, and to whom the results will be presented; planning the response to patient
needs identified by the PROs; and evaluating the use and benefit of PROs in a particular setting.

Computer Systems for Capturing PRO Data in Real Time
For many years, a key barrier to the use of PRO data in clinical care settings was the difficulty of transforming paper-based questionnaires into a source of instantly accessible information. Now, with the rapid expansion of Internet-connected computers and mobile devices, both at home and in the clinical setting, it is possible to build survey systems with a broad range of clinical uses.

When patients complete ePRO questionnaires in the clinical setting, such as at the time of check-in, their symptom data are automatically scored and available in easily interpretable reports to be viewed when the clinician meets with the patient. Surveys can now be administered through PDAs, tablet computers, Web pages, and automated telephone survey systems. Unlike paper-based surveys, data entry by staff is not required. The data can be automatically transferred in real time to a computer server, which can lead to many different clinically relevant actions based on PRO scores; results can be added to the patient’s electronic medical record, score alerts can be generated to notify clinical staff of acute patient needs, and patients can be immediately provided electronically with educational material tailored to their scores. Furthermore, when the PRO data are stored in the patient’s electronic medical record, a clinician can easily review a patient’s symptom data over time.

Paper-based questionnaires often need to be altered to be presented in electronic formats. Because this could change the way patients respond to the questions, PRO methodologists have outlined the reasons and approaches for testing the equivalence of the questionnaire data across each mode of administration when data are intended for research purposes. Results of a large number of studies show that paper- and Web-based surveys provide data that are essentially equivalent. There are currently a small but quickly growing number of studies testing the equivalence of Web- and/or paper-based surveys to telephone-based surveys.

Rationale for Using PROs in Clinical Practice

Improves Symptom Identification and Patient Satisfaction

ePRO systems can improve patient-provider communication during clinic visits and alert clinicians to acute needs for symptom management between visits. Some systems are designed to provide educational material to patients, tailored to their reported symptoms and needs, right after they complete a survey. ePRO systems make it possible for clinicians to have systematically collected symptom data that can support clinical decision-making. These features have been found to improve patient satisfaction with their care and have the potential to improve symptom management.

Saves Time During Clinic Visits
ePRO systems enable patients to complete symptom assessments prior to meeting with the clinician so that clinicians can quickly identify specific areas that need attention. Some ePRO systems are designed to enable patients to complete a questionnaire version of the review of systems while waiting for their appointment, which can then be efficiently assessed by the clinician during their meeting time. ePRO systems do not replace the clinician-patient discussion, but help to focus the discussion on symptoms that need attention and allow the clinician to quickly determine whether symptoms are worsening or improving over time.

Improves Accuracy of Symptom Assessment

Research on PRO assessment has investigated the differences between patient-reported and clinician-reported symptoms. In these studies, patients completed a PRO questionnaire at clinic visits. Patient reports were compared with the clinician grading of the corresponding adverse event. Patients detected symptoms sooner and with a higher severity than clinician reports. Research has also found that symptom assessments are not reliable across clinicians. A separate study assessing the reliability of clinician grading of adverse event symptoms found that, on average, pairs of clinicians who rated the same patient within 60 minutes of each other had only modest levels of agreement. PRO assessment provides a patient-focused, clinically relevant, and reliable perspective on the patient symptom experience.

Examples of ePRO Systems Being Used in Oncology Clinical Practice

Five examples of ePRO systems are presented to reflect the range of currently available functions and approaches. The systems vary in their goals and scope. This review of systems and their features is not meant to be exhaustive, but rather illustrative. We describe these systems with a focus on key characteristics, including the purpose of PRO assessment, the type of questionnaire, how often assessments are completed, where assessments are completed, the type of technology platform used, and system flexibility. These systems are also briefly outlined in Table 2.

We limited our selection of examples to systems with peer-reviewed published literature documenting the development and use of the system. Substantial detail about the systems and their development can be found in the references cited for each example. The systems may have new added features that are not yet reported in the published literature. An extensive review of ePRO systems is...
being conducted by investigators at Georgetown University as part of an ongoing research project in this area, led by Dr. Roxanne Jensen (a coauthor of this article).

**PatientViewpoint: An Example of a Flexible Platform That Can Be Adjusted to Measure Any PROs Particular to the Context of Use**

PatientViewpoint is a Web-based PRO platform currently used at the Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins University that is designed to collect and report PRO data to be used by clinicians during patient visits. Patients complete surveys prior to their clinic visit from home through the Web interface. The surveys can include both general domains (eg, physical function, fatigue, anxiety, or sleep disturbance) and cancer-specific domains (eg, treatment toxicities and symptoms), as well as supportive care needs. The PRO scores are automatically added to the patient's electronic health record. In reports provided to the clinician, scores are reported graphically and numerically, and the clinical significance of scores is noted in order for the scores to be easily interpreted (Fig. 1). One goal of the system is to improve patient-provider communication during clinic visits. The system also allows patients to log in to the Web site at any time to see changes in their PRO scores over time.

A useful feature of the PatientViewpoint system is that it was designed to be flexible in the type of content of the surveys administered to patients. A provider can select questionnaires on urinary, sexual, and bowel functioning for prostate cancer patients, and different functions for other cancer populations. The system is also designed to allow providers to easily select both the content and the frequency of the survey assessments for each patient. For example, if there are patient-specific concerns that would benefit from additional monitoring, such as depression, the survey assessments can be adjusted on an individual patient basis to include that area. As a result, the survey assessments can be tailored to the unique needs of patient populations and individuals, and also to the phases of their care, across treatment and survivorship. All of the surveys available for use through the PatientViewpoint system are validated PRO measures, and descriptions of the surveys are provided for clinicians to assist in selecting the best surveys for their needs and interests.
Survey Name: PROMS

Jane Smith

Comments: View All

Is there one problem in particular you’d like your doctor or nurse to address during your next visit?

I am having trouble doing the things I need to do.

Enter any other comments or questions for your doctor or nurse.

It’s helpful answering these questions.

The results for the most recent and four previous surveys are graphed below. Graphs highlighted in yellow represent either a significant worsening or a score that is likely to be a problem. For a summary of the items in each score, click What is this? For an explanation of the scoring, click Score meaning. For suggestions for how to address potential problems, click What can I do?

**Physical Function** - Score meaning

**Pain Impact** - Score meaning

**Social Roles** - Score meaning

**Fatigue** - Score meaning

**Anxiety** - Score meaning

**Depression** - Score meaning

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Table Chart

|                      | 03/19/2012 | 03/10/2012 | 11/08/2010 | 09/16/2010 |
|----------------------|------------|------------|------------|------------|
| Physical Function    | 27.1       | 42.6       | 35.0       | 14.1       |
| Pain Impact          | 59.1       | 61.8       | 61.8       | 78.3       |
| Social Roles         | 36.2       | 44.4       | 27.0       | 65.6       |
| Fatigue              | 53.7       | 47.6       | 67.8       | 72.9       |
| Anxiety              | 52.6       | 61.3       | 52.6       | 82.7       |
| Depression           | 65.0       | 54.0       | 61.6       | 81.1       |
| Comments             | Yes        | Yes        | No         | No         |

*First three rows are the most recent data, followed by the previous three data points.

FIGURE 1. PatientViewpoint Clinician Report Example.
Patients use a handheld tablet computer at check-in to complete the PCM survey, which is designed as a review of systems (Fig. 2). It is a comprehensive 80-item questionnaire (86 for women) concerning the following domains: general physical symptoms, impaired performance, impaired ambulation, treatment side effects, distress, and despair. The PCM was developed to be applicable across different cancer types, including genitourinary, lung, melanoma/sarcoma, and breast cancer.23,24 Patients’ scores are presented to the clinician in a color-coded report to enable the clinician to examine longitudinal changes across different symptoms and function. Another significant benefit of the PCM system is the survey responses can be used to identify patients needing educational interventions.

The use of PCM at patient check-in allows for it to be seamlessly integrated in the patient workflow. Other important patient information often collected on paper, such as updates to insurance status or current medications, can be collected through the system. The data are integrated into the electronic medical record in real time, so it is immediately available for review by clinical staff.

The PCM system was built as part of a goal to design a “rapid learning health care infrastructure.”28,29 In this context, an ePRO system would be used to systematically support clinical decision-making and provide a large data set assessing quality of care, detecting practice pattern variation, and developing practice guidelines.30

Advanced Symptom Management System: An Example of Symptom Assessment During Chemotherapy Via Mobile Telephone

The Advanced Symptom Management System (ASyMS) is a symptom monitoring system originally developed in the United Kingdom to track patient-reported symptoms and treatment toxicities during the course of chemotherapy (ie, diarrhea, nausea/vomiting, fatigue, mucositis, or hand-foot syndrome).15,19 Patients complete the symptom survey on their mobile telephone twice a day and any time they feel unwell, and the data are sent in real time to the study server. When reported symptoms are severe, alerts based on the degree of severity are automatically generated and sent to clinicians. Nurses are able to review patients’ symptom scores through a secure Web page and then provide follow-up care and advice to patients. After completing the survey, patients also receive evidence-based self-care advice on their mobile telephone, which is tailored to their survey responses. Studies of this system have reported positive perceptions and experiences by nurses and patients.15,19

ASyMS has also been adapted for palliative care symptom management and youth populations.18,20 One of the motivations for adapting ASyMS for palliative care was to improve the symptom monitoring, in particular, of patients living in rural areas because of research suggesting they have “a higher threshold for initiating contact with the health care team.”20 The ASyMS was adapted for young...
people being treated with chemotherapy in order to measure their most common symptoms and concerns (ie, mouth sores, nausea, vomiting, weight loss, and diarrhea), and to encourage young people to seek help for their symptoms instead of just accepting them.18

Symptom Tracking and Reporting: An Example of Assessing Function Following Radical Prostatectomy

The Symptom Tracking and Reporting (STAR) system at Memorial Sloan-Kettering Cancer Center was originally built to document patient-reported symptoms during chemotherapy.31,32 One of its current applications is to assess men’s functional recovery after radical prostatectomy.33 The assessment includes urinary function, sexual function, bowel function, and overall quality of life. A Web-based survey is completed by men at 3, 6, 9, 12, 18, 24, 36, and 48 months after surgery, and the survey responses are automatically added to the electronic medical record (Figs. 3 and 4).

This assessment of functioning has been incorporated into routine care. The STAR system interacts with the hospital’s electronic clinical management system to identify surgery dates of eligible patients and the patient’s e-mail address if provided.33 These patients are then automatically e-mailed a link to the Web survey at the time of each scheduled survey. The STAR system also queries the electronic clinical management system to identify clinic visits that are not close to the predefined survey schedule, and e-mails the patient a link to the survey so that it can be completed in time for the visit.

The clinician is able to view numerical and graphical summaries of the patient’s functioning over time from within the electronic medical record. The patient is also able to see this information through the STAR system Web interface. A very innovative feature of this project is that patients and clinicians can also see the average functional improvement of patients with similar characteristics and, in addition, what their functioning will likely be in the future. The STAR system is programmed to generate summaries and run prediction models using the patient reports of functioning being collected and stored in the secure project database.33,34

Tell Us™: An Example of Symptom and Needs Assessment of Advanced Cancer Patients in Palliative Care and Hospice

Tell Us™ is a Web-based system created to monitor the symptoms and care needs of advanced cancer patients in palliative care and hospice.17 It was designed to address a particular challenge in caring for this patient population, which is the sharing of patient information among providers and communication among patients, families, and providers. Patients typically log in to the secure Web page on a daily basis and report symptoms (eg, pain, shortness of breath, or nausea) and mental health (eg, anxiety), and other needs (eg, medication supply). Alerts are sent to providers when intervention may be necessary, and reports are generated to allow providers to examine the patient’s symptoms over time. The system can also provide educational material to the patient, specific to their indicated needs, through the Web interface.

The Tell Us™ system is designed to accommodate individual patient preferences. It is suggested that patients complete the assessments on a daily basis, but the frequency of assessments is based on the patient’s wishes.17 Additional survey questions ask patients for information about their goals (eg, what level of pain is acceptable) in order to
establish for each patient a particular score or score change threshold at which providers will be notified. This allows patients the autonomy to dictate when they want assistance. The Tell Us™ system may also be tailored to include caregiver assessments of the patient’s symptoms and needs.

Common Challenges in Implementing ePRO Systems in Clinical Care

The implementation of an ePRO system in clinical care requires considerable planning and resources at the outset. Seeking clinician input for the goals of the ePRO system (i.e., the purpose of assessment, what PROs are assessed, and how and when are they presented to clinical staff) and the support of organizational leadership are key. Creating a new ePRO system requires a significant amount of programming time and requires dedicated project management and leadership.

Design challenges include integrating the system into the clinic workflow and interpreting clinical relevance. For example, accessing and reviewing PROs in an independent electronic system have the potential to lengthen clinical visits. Integrating the PRO reports into the electronic medical record is one potential solution to significantly streamline PRO review by clinicians.

PRO reports and alerts presented to clinicians must be clear and provide actionable data; however, it can be difficult to identify the appropriate thresholds for PRO-based clinical alerts. Many PRO questionnaires were designed to identify group estimates rather than individual change, and the clinical significance of particular scores is not always known. For these PRO questionnaires, the thresholds for alerts may require some adjustment over time based on the experience of clinical staff who follow up on alerts and discuss scores with patients. Furthermore, as the use of PROs in clinical care increases, more PRO questionnaires will be developed or revised to better assess individual change.

Finally, another challenge is the necessity for comprehensive and role-specific training for all parties (clinicians, staff, and patients) using the ePRO system.
For example, clinical staff may take an active role in ePRO use such as training patients to use the system, providing surveys to patients in clinic, responding to patient symptom alerts generated by assessments completed at home, and addressing patient questions and technical issues. Clinicians may require training on areas such as system use (eg, reviewing PRO reports and alerts), score interpretation, and the discussion of PRO scores with patients.

Discussion
ePRO systems provide unique opportunities in clinical care settings to provide real-time data about patient symptoms and needs during the many phases of cancer care, including treatment, palliative care, survivorship, and hospice. ePRO systems can use technology to support clinicians in providing patient-centered care, specifically to identify and track symptom progression, and to integrate the prompt identification of patient education and other patient-specific intervention opportunities into routine clinical care.

ePRO systems have been designed in a variety of ways based on particular assessment-specific goals. ePRO systems can be standard across clinics to meet broad-reaching goals, or can be designed to be flexible in order to accommodate particular patient and provider goals and preferences. PRO questionnaires typically capture data about symptoms, functional status, general health, and needs, and can be completed by patients in clinic or from home on a schedule that makes sense for the goals of the assessment. By using PRO questionnaires that have been developed and implemented according to current methodological standards, data will be reliable and meaningful to patients and providers.

The systems discussed in this article are unique in a number of ways. PCM is designed for comprehensive assessment completed at each visit.16,17 PatientViewpoint is designed as a flexible system that can be easily tailored for patient and provider interests and unique needs.21 ASyMS is designed to provide prompt intervention to patients, especially those living far from clinic, who are receiving palliative care and for both adult and adolescent patients being treated with chemotherapy.15,18-20 The STAR system is being used to assess men’s functional recovery after radical prostatectomy, so that clinicians and patients can see progress over time.33 The Tell Us™ system was created to assist patients and caregivers in communication with both clinicians and hospice care providers, in part to improve coordination of care. It also allows patients to select the types of assessments they want to complete and to set the thresholds for scores or score changes that will generate a notification to their provider.17 The systems presented in this article were meant to illustrate the scope of features available through integrating PRO collection into clinical settings.

The addition of ePRO systems into clinical care requires a significant investment of resources and planning. The added value of an ePRO system is very dependent on the type of outcomes it was designed to achieve and on how well the system was designed for its purpose and context of use. In this article, we reviewed key issues and common challenges in designing ePRO systems, including selection of instruments, interpretation of scores, integration of the system into clinic workflow, and training. We recommend that experts in ePRO be involved in the design and implementation of a new system due to their familiarity with these challenges.

The Future of ePRO Systems in Clinical Care
From the published literature describing each system, it is apparent the systems are being leveraged for new and innovative uses. For example, the PCM system creates large data sets of symptom and clinical data to enable future research into patient care and comparative effectiveness.30 The STAR system, which was initially designed to track patient outcomes, is being augmented with statistical prediction models to show prostatectomy patients how their functional improvement compares with other patients like themselves and how much functioning they will likely recover in time.26,27

Epic, a widely used electronic medical record system, will be adding a PRO module into a late 2012 release that will enable the administration and scoring of a library of questionnaires in the adult and pediatric care settings. The library includes Patient-Reported Outcome Measurement Information System (PROMIS) Short Forms that assess physical function, pain intensity, pain interference, ability to participate in social roles and activities, sleep disturbance, fatigue, depressive symptoms, and anxiety (R. Gershon, MD PhD, written communication, March 2012).

Symptom assessment is also increasingly recognized by major practice organizations as a component of high-quality care. The American Society for Clinical Oncology is supporting an oncologist-led, practice-based quality improvement program: the Quality Oncology Practice Initiative (QOPI).36 The QOPI quality measures call for the assessment of a number of common treatment issues that are reliably assessed as PROs. These include symptoms and toxicities related to chemotherapy, pain and symptom side effects of opioid analgesics, and emotional well-being. The American Medical Association is supporting a physician-led program for improving quality and patient safety: the Physician Consortium for Performance Improvement (PCPI).37 PCPI-approved quality measures in oncology currently include the assessment of pain and the development of a plan of care for pain. ePRO systems enable the
routine monitoring of patient symptoms in clinical care and can support the reporting requirements for national quality of care initiatives.

Conclusions

Although it is early in the history of integrating electronic PRO assessment into oncology clinical practice, the systems described here clearly demonstrate the feasibility and usefulness of bringing the patient perspective into practice. Moreover, the growing interest in PROs across the health care field suggests that this is just the beginning. Manufacturers of electronic medical record systems are beginning to add PRO assessment capability, quality assessment organizations are building models for considering PROs as performance indices, and clinical practice guideline writers are considering the routine assessment of symptoms as a basic clinical activity. In the future, clinicians may be able to reference PRO assessment for billing purposes. However, the most compelling argument in favor of implementing patient reporting into oncology practice is that it allows patients to actively participate in their own care by providing the information they know best.

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