**IMPACT OF ADMINISTERING PATIENT-REPORTED OUTCOMES (PROs) WITHIN HIV ROUTINE CARE:**

An Evidence Review & Summary

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# ABBREVIATIONS

|  |  |
| --- | --- |
| AOR | Adjusted odds ratio |
| ART | Antiretroviral treatment |
| AUDIT-C | Alcohol Use Disorders Identification Test Consumption Questions |
| CASI | Computer-assisted self-administered interview |
| CFAR | Centers for AIDS Research |
| CI | Confidence interval |
| CNICS | CFAR Network of Integrated Clinical Systems |
| CTCAE | Common Terminology Criteria for Adverse Events |
| EORTC-30 | European Organization Research and Treatment of Cancer Quality of Life Cancer – 30 |
| ED | Emergency Department |
| ESRA-C | Electronic Self-Report Assessment–Cancer |
| FACT-G | Functional Assessment of Cancer – General |
| FDA | Food and Drug Administration (US) |
| HADS | Hospital Anxiety and Depression Screening |
| HIV | Human immunodeficiency virus |
| HRQL | Health related quality of life |
| HUI2 | Health Utilities Index Mark 2 |
| HUI3 | Health Utilities Index Mark 3 |
| IOM | Institute of Medicine |
| IVR | Interactive Voice Response |
| MDASI | MD Anderson Symptom Index |
| OR | Odds ratio |
| PACE | Patient Assessment, Care and Education |
| PCM | Patient Care Monitor™ |
| PLWH | People living with HIV |
| PHQ-9 | Patient Health Questionnaire – 9 items (depression) |
| PRO | Patient reported outcome |
| PROM | Patient reported outcome measure |
| RCT | Randomized clinical trial |
| SCL-90 | Symptom Checklist-90 |
| SDS | Symptom Distress Scale |
| SDS-15 | Symptom Distress Scale-15 |
| SF-36 | 36-item Standard Health Form |
| STAR | Symptom Tracking and Reporting |
| SxQOL | Symptoms and quality of life |
| UK | United Kingdom |
| US | United States |

# EXECUTIVE SUMMARY

Antiretroviral therapy (ART) has dramatically altered the progression of HIV disease, reducing HIV-related mortality and increasing life expectancy for people living with HIV (PLWH)42-44. Despite this remarkable accomplishment, and the much higher prevalence of PLWH with successful viral suppression now compared to even a few years ago45, even among those who achieve suppression there remains the threat of neoplastic, cardiac, renal, liver, and neurocognitive and other complications. As a result, there has increasingly been a shift in focus from mortality to morbidity among PLWH including symptom burden and overall quality of life. Among those who are not virally suppressed (~20% in the US)45, important contributors include inadequate adherence to ART, substance use, and depression symptoms. Sexual risk behavior has important implications both for an individual’s risk of acquiring sexually transmitted infections as well as public health consequences in terms of possible HIV transmission. Not assessing sexual risk behavior allows missed opportunities in terms of offering partners pre-exposure prophylaxis (PrEP) to prevent HIV transmission and other potential support for individuals and their partners. Finally, across many populations of PLWH, rates of substance use, depression, intimate partner violence, homelessness, and other factors are higher than among many other populations. Many of the symptoms, health and risk behaviors, and life circumstances described above are not directly observable and best measured by direct patient report. Yet, many are not measured in most clinical care settings and therefore poorly addressed. Gaps in medical management are not unique to HIV. The Institute of Medicine (IOM)’s 2001 report *Crossing the Quality Chasm46* documented health system failures to provide organized, evidence-based, timely care of chronic health conditions and called for system designs that better incorporated patient preferences, and encouraged shared decision makers. Well-designed incorporation of patient reported measures or outcomes into HIV clinical care could be one important step to help address these shortfalls and provide better care for PLWH.

A **patient-reported measure or outcome** (PRO) is defined as “*any report of the status of a patient’s health condition that comes directly from the patient without interpretation of the patient’s response by a clinician or anyone else*” (FDA 2009)47. PROs may include one or more dimensions of care, including physical symptoms, mental health (e.g, depression, anxiety), health behaviors (e.g., medication adherence, substance use, sexual risk behavior), functioning (e.g., cognitive, physical), life circumstances (e.g., current housing, nutrition, family history of chronic illness, intimate partner violence), identity (e.g., sexual orientation, gender identity), social well-being (e.g., social support, HIV stigma), health-related quality of life (HRQL), and/or satisfaction with treatment/care or other factors. While PROs have long been used in research, the use of PROs in clinical care is expanding providing a complement to laboratory testing or physical examinations with standardized PRO assessments. Routine administration of PROs in clinical care has the potential to improve systematic detection of clinically relevant issues such as medication adherence or substance use, focus the visit by shifting the focus of provider discussions to areas of need rather than information gathering, improve health outcomes, and increase patient satisfaction with care.

This Evidence Dossier is designed to address PROs in the care of PLWH. It draws on evidence from published literature characterizing the impact of PROs in routine clinical care for patients with chronic comorbidities including HIV-related literature as well as other fields, particularly oncology.

We present a body of evidence regarding the potential impact of implementing PROs in routine clinical care for PLWH in the following areas:

Improves provider awareness and monitoring

* + Increases identification of mental health needs including suicidal ideation
  + Increases identification of adverse health behaviors historically prone to social desirability bias in reporting, such as inadequate ART adherence and substance use
  + Improves detection of quality-of-life issues including social functioning
  + Improves detection and management of symptoms

Improves patient-provider communication

* Yields information previously unknown to the provider
* Focuses clinical visits; helps both patient and provider identify or prioritize needs/concerns
* Increases frequency of discussions on a broad range of outcomes
* Builds rapport and reduces social desirability bias

Useful to providers

* Improves detection of issues
* Less acceptable or useful if high patient response burden, if impedes clinic flow, or difficult to access or interpret results
* Acceptable to patients across a broad range of populations and care modalities
* Most patients find completing PRO assessments such as on tablets easy to do

Improves patient health outcomes

* Improves survival rates among cancer patients due to closer monitoring
* Fewer emergency department visits and hospitalizations among cancer patients
* Improves symptom control
* Improves outcomes for mental health conditions
* Lowers symptom distress
* Improves overall quality of life as measured by PROs

Impact on health services delivery

* + Does not increase visit length or have a large negative impact on clinic flow
  + Saves time by focusing the appointment
  + Increases referrals
  + Reduces emergency department utilization and hospitalizations in some settings
  + Leads to more closely monitored treatment

Not all areas apply to all PLWH or clinical care settings or all approaches to PRO implementation and several areas would be strengthened by additional evidence specifically among PLWH rather than patients with other chronic conditions such as cancer however overall this is a very compelling body of collective evidence.

# I. INTRODUCTION

**A. What Are PROs?**

Patient-reported outcomes (PROs) are a subjective description by the patient of “*any report of the status of a patient’s health condition that comes directly from the patient without interpretation of the patient’s response by a clinician or anyone else*” (FDA 2009)47. In the context of this evidence review, we focus on brief PRO assessments useful for clinical care typically but not always collected on touch-screen tablets at the start of clinic appointments to improve care (see Appendix 1 [Add Link] for a discussion of paper vs. electronic approaches to PRO collection).

**B. PROs in the context of modern HIV care**

Advances in antiretroviral therapy (ART) over the past decades has increased the life expectancy of PLWH and transformed it from a fatal disease to a chronic manageable condition42-44. The associated decline in mortality since ART has been introduced has led to increased emphasis on managing comorbidities, including those associated with HIV and its treatment. Many of the symptoms, health behaviors, and life circumstances associated with living with HIV and these comorbidities cannot be measured by laboratory values or other directly observable approaches, are best measured by direct patient report, and are under-addressed in clinical care. In HIV care, examples include antiretroviral medication adherence, substance use, sexual risk behavior, and depression11. Reasons for this have included social desirability bias, time constraints, limited communication skills to convey symptoms or feelings, or linguistic and/or cultural barriers48-51.

Assessments of PROs implemented in HIV care settings if done well present an opportunity to measure several dimensions of care, including physical symptoms, mental health (e.g., depression, anxiety), functioning (e.g., cognitive function, physical function), health behaviors (e.g., medication adherence, substance use, sexual risk behavior, physical activity), life circumstances (e.g., current housing, intimate partner violence), identity (e.g., sexual orientation, gender identity), social well-being (e.g., social support, HIV stigma), HRQL, and/or satisfaction with care. The information can inform and direct dialogue between clinician and PLWH and uncover otherwise hidden patient needs, In particular, brief, validated instruments that result in interpretable results and inform action-oriented decision-making (e.g. depression screening) may be of particular value. While these are just some of the domains of potential interest, in most clinical settings a targeted subset must be selected to integrate into clinical flow (see LINK for information on successful implementation approaches).

In addition to improving HIV care, there are other reasons PROs have increased in relevance. These include demands from regulators, payers, professional organizations, and providers and increased reporting requirements in such areas as depression or substance use screening which can be systematically assessed with PROs52. Goals include making the most meaningful use of visit time, managing costs, and ensuring patient-driven care. Technological infrastructure has advanced rapidly, leading to expanded incorporation of touch screen tablets and internet-based applications, as well as electronic medical records in clinical settings52 which has increased the feasibility and decreased the burden of all but the briefest PRO assessment.

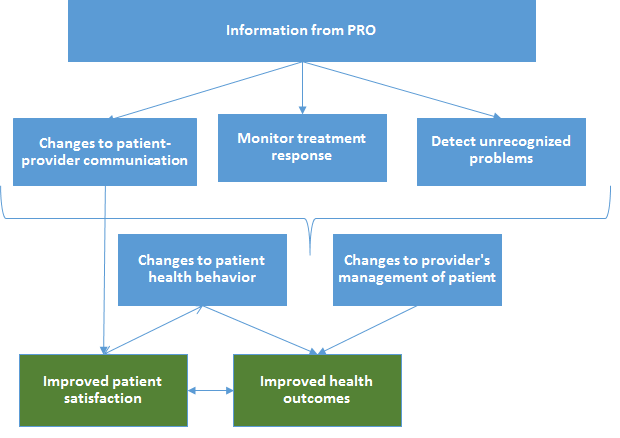
**C. Types of PROs**

Table 1 below describes several different types of PROs and how they might be used using examples from both HIV and other clinical settings.

|  |  |  |  |
| --- | --- | --- | --- |
| *Table 1.* Examples of Types of PROs | | | |
|  | Use | Example | PRO |
| **1** | **Needs assessment/Screening** | Depression screening to identify the need for a therapeutic intervention  At-risk alcohol use screening | Patient Health Questionnaire – 9 items for depression (PHQ-9)53  Alcohol Use Disorders Identification Test (AUDIT/AUDIT-C)54,55 |
| **2** | **Symptom management** | Outpatient symptom monitoring in cancer patients receiving chemotherapy treatment for unexpected adverse effects  Tracks intended and unintended treatment effects, and identifies symptom-management opportunities  Outpatient symptom monitoring in HIV patients | MD Anderson Symptom Inventory (MDASI)56  HIV Symptom Index57 |
| **3** | **Shared decision-making** | Acute care monitoring of current pain symptoms and physical function before scheduling knee replacement surgery to determine need or timing of surgery | Stage of Decision Making58 |
| **4** | **Quality improvement** | Assessment of symptom prevalence across all patients in clinic or hospital-setting  Provides population-level scores to evaluate clinical practice | Symptom Distress Scale (SDS)59  HIV/AIDS Targeted Quality of Life (HATQOL) measure60 |
| **5** | **Adherence** | Assessment of adherence to HIV medications on individual basis | Visual analogue scale, self-rating scale 61,62 |
| Adapted and expanded from52 | | | |

**D. Potential Impact of PROs**

Figure 1 describes the potential impact of PROs in clinical care63. Results from PROs are reviewed by clinicians, which prompts discussion of health issues with patients. This information enables clinicians to identify previously unrecognized problems or monitor the impact of treatment and the patients’ health status, allowing for more tailored, individualized care. The resulting information and response may lead to improvement in the patients’ health status or satisfaction with care63.

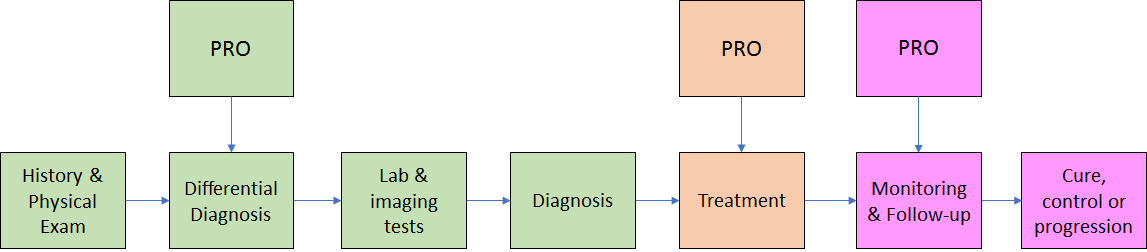
***Figure 1.* Theory of PROs Impact on Patient Health Outcomes**

Adapted from Greenhalgh et al. 200563

**E. Opportunities for Use of PROs in Routine Care**

Figure 2 outlines points at which PRO data might be used in care settings, from initial history and physical examination, to laboratory and imaging, during treatment, and during follow-up64. PROs may be administered pre-consultation using electronic data captured via tablet, for example, to enhance the identification of health issues before a provider sees the patient. PROs may be administered at the time of laboratory testing or imaging to obtain more insights into patient symptoms (i.e., pain).

***Figure 2.* PRO Use in Routine Clinical Care**



Adapted from Osoba 200764

**F. About the Evidence Dossier**

This document summarizes available real-world evidence supporting the integration of PROs within the routine HIV clinical care setting. A targeted literature review identified primary data sources in the published, peer-reviewed literature that reporting findings of the usability and utility of PROs in routine clinical care (see Appendix IX).

The studies discussed in this evidence review and summary put forth a variety of approaches and contexts to PRO implementation that render comparisons difficult; in general, however, they all provide PRO data to the provider prior to an appointment. Several methodological approaches are used, including randomized controlled trials, as well as observational or pre-test post-test comparisons. Numerous PROs and outcome measurements are also used, thereby rendering it difficult to compare results across the different studies.

Evidence is organized within each chapter, separating HIV care studies from studies of other types of care. Within HIV and non-HIV care sections, systemic reviews and meta-analyses are presented first, followed by intervention trials, mixed method qualitative/quantitative studies, quantitative surveys, and qualitative interviews, in that order. Within each of these groupings, evidence is presented in reverse chronological order.

A companion document, the PRO Implementation Toolkit, is a resource for health care practitioners considering implementing PROs in clinical care and can be found here. [Add Link]

# II. IMPACT ON PROVIDER AWARENESS AND MONITORING

***Summary*:**

The use of PROs:

* Improves provider ability to identify highly personal or stigmatizing symptoms or behaviors, including suicidal ideation, depression11,15, substance use11, inadequate ART adherence11, and sexual risk behavior8
* Results in information that providers did not know about their patients such as suicidal ideation, depression, and substance use, and furthermore occurred for patients with established relationship and therefore was unexpected by providers12
* Improves detection of a broad range of symptoms in several clinical populations and populations4,13,25-29
* Improves symptom management4,11,13,20,25-27,29
* Improves detection of quality-of-life issues including social functioning8,14,22,30

Strong evidence suggests the use of PROs improves provider ability to detect and monitor symptoms and health behaviors. However, it has been noted that the success of PROs depends on ease of provider access to data, quantity and presentation of data, quality of provider training on use of PROs, a minimal impact on workflow, and the benefit of directly actionable domains such as depression.12,24,29,48

These studies indicate that PROs are successful in increasing provider awareness of a variety of unrecognized problems (e.g., symptoms or risk behaviors) that patients may be experiencing. They demonstrate that for HIV care this is particularly valuable for domains they consider actionable such as depression/suicidal ideation and substance use. It demonstrates that the impact of PRO implementation on provider awareness may differ by approach with providers preferring easily interpretable, concise, and directly-actionable information in a timely manner. It further demonstrates the impact differs by domain therefore suggesting much more research is needed on benefits for less directly-actionable domains to either demonstrate their benefits or provide resources or education for providers as to how to use that information.

**Evidence from HIV Care24**

**Kjaer et al. (2018)25:** This study evaluated the clinical implementation and use of a web-based PRO symptom collection tool in a cohort of PLWH (n=262) in outpatient HIV care. PLWH completed the assessment on-line from home. Medical records were evaluated to determine whether the results from PLWH indicating high levels of symptom severity provided new information. In many cases, **PROs appeared to provide new information on cognitive (76%) symptoms, and on symptoms indicated by PLWH as “severe” in general (42%).**

**Crane et al. (2017)11:** In an outpatient HIV clinic after PRO implementation, a comparison was made of provider documentation in a period before and after providers started receiving PRO results. Chart documentation was reviewed in both time periods to determine if PRO feedback to providers resulted in greater awareness or actions as measured by chart documentation of depression, suicidal ideation, adherence to ART, sexual risk behavior, and substance use. PRO (n=2289) assessments were completed. **Results indicated that providers were significantly more likely to document depression (74% before vs. 87% after feedback, p=0.02), as well as, at-risk alcohol use (41% before to 64% after feedback, p=0.04), substance use (60% before vs. 80% after, p=0.004) and less likely to incorrectly document good adherence among patients with inadequate adherence (42% vs. 24%, p=0.02). Provider awareness increased (as measured by chart documentation) for all domains assessed, significantly so for all domains except one (sexual risk behavior) however impact on actions was smaller.**

**Fredericksen et al. (2012)48:** A needs assessment of PRO data was conducted in an HIV clinic. PLWH completed the PROs in the waiting room before their appointments. Providers did not receive the PRO results. Chart documentation from the visit from the same day that PLWH completed the PROs was reviewed and **notable discrepancies between PRO results and provider documentation were observed**. Among the 300 patients completing the assessment, chart review of 20 patients reporting severe depression symptoms on the assessment revealed no provider mention of depression for 9 (45%). Only 7 of these 20 (35%) had depression addressed in any way (medication initiated, dose increased, psychiatry or case worker referral, etc.). Among the 68 PLWH who reported current use of illicit drugsother than marijuana, providers either failed to document the issue at all or, documented the absence of substance use for 31 (46%) patients. Among 62 PLWH who reported missing multiple doses of antiretroviral medications in the prior 4 days, providers documented inadequate adherence for only 17 (27%), did not comment on adherence for 25 (40%), and reported good adherence (“missed no doses,” “>95% adherence,” and “perfect adherence”) for 20 (32%). **This demonstrates the value of PROs to evaluate outcomes such as adherence and mental health/substance use issues that otherwise may be overlooked by providers.** However, it is noted that **successful PRO integration in this case was dependent on high-level support from clinic management, selection of PROs clinically relevant to providers, and minimal disruption to clinic flow.**

**Fredericksen et al. (2016)12:** A qualitative study to elicit the views of 27 providers was conducted to understand views on PRO implementation from HIV and community health clinics. One benefit cited was that PROs help to identify less-observable and difficult-to-discuss behaviors and conditions. Two-thirds of providers described PROs as a useful tool to identify problems ‘that might have otherwise been minimized or omitted by the patient’. Almost all providers mentioned the identification of depression and suicidal ideation as a valued benefit of PROs. It was suggested that PROs helped patients to raise issues that may not be easily offered due to social desirability issues. One provider described how PROs are “triangulating the communication dynamic, allowing for reprieve from direct eye contact as both parties review the PRO results on a computer screen or on paper, creating a sense of objectivity and teamwork in discussion of the content.”

**Several providers described being surprised by the PRO results:**

*“Getting a printout that said “your patient is feeling suicidal” essentially was like “Whoa! I didn’t expect this!” (Physician, Seattle)”*

*“Today, the patient sat down [and] said, “Yeah, things are okay, I’m just not sleeping good.” But when I looked at the PROs that he had just answered, he was suicidal a couple of times last week. (Physician, San Diego)”*

Several providers interviewed described how they believed **PROs had provided an efficient inventory of recent substance use**, identifying nature and frequency of use, and acting as a conversation-starter:

*“Who has the time to ask about all of the types of drugs that people use? [The PROs] right away give you the spectrum of what people are using…from there you can structure the conversation. (Physician, San Diego)*

**Evidence from Other Disease Areas**

**Chen et al. (2013)29:** In this systemic review of 27 studies in cancer care, 16 studies reported results related to detection of unrecognized problems. **Of these 16, 15 reported either a strong or moderate positive impact on detecting unrecognized problems.** There was evidence that it **improved the monitoring of treatment response.** Of 17 studies with results of changes to patient management, 13 reported either a “strong or modest positive effect”, 4 found none. Some of the studies suggested that the success of PROs as an intervention may be dependent on the availability of “simple, clear, graphical and longitudinal meaningful interpretation of results”, the involvement of multiple stakeholders, and health professional training.

**Barr et al. (2020)24:** In this study of older adults in primary care in 14 clinics in the United States, patients (n=505) completed a 46-item health risk assessment. Physicians in the intervention clinics received the results, physicians in control clinics did not. **Despite capturing PROs, the information was only documented by physicians between 3-14% of the time. According to physicians interviewed (n=16), reasons for this included “poor access to data, high quantity of data, interruption to workflow, and lack of training on PROs”.**

**Berry et al. (2011)8:** In a randomized trial of oncology patients, Electronic Self-Report Assessment – Cancer (ESRA-C) was evaluated for effect on outpatient visit patient-provider discussion of symptoms and HRQL. Patients (n=660) were randomized to either an intervention group for whom providers received ESRA-C results in the form of a 2 page graphical summary, and a control group of providers that did not. Effectiveness was measured by whether the patient-reported issues identified in ESRA-C were mentioned during an audio-recorded visit. **HRQL and symptoms were more likely to be discussed in the intervention group (p = .03). In particular, there was a greater likelihood of discussions regarding impact of cancer on sexual activities and social functioning in the intervention group.**

**Cleeland et al. (2011)27:** In an outpatient thoracic surgery clinic, patients were monitored for symptom experiences: pain, distress, disturbed sleep, shortness of breath and constipation. In one arm, patients alerted providers when a certain symptom severity level was reached while in the control arm no alerts were sent. Both groups completed the MD Anderson Symptom Index (MDASI) via Interactive Voice Response (IVR). **The intervention group demonstrated fewer symptom severity events (19% vs. 8%) and faster improvement in symptoms than the control group; difference in average reduction of symptoms between intervention and control was -0.36 (SE, 0.078, p=.02).** The results suggest that monitored postoperative symptoms with clinician alerts can improve symptom management and lead to a reduction in symptom severity during the post-operative period.

**Ruland et al. (2010)26:** Patients (n=145) with leukaemia or lymphoma completed an interactive tailored patient assessment (ITPA) tool that included questions on patient care, symptom distress and need for symptom management support during treatment and rehabilitation. Patients were randomly assigned to two groups; an intervention group where the provider received ITPA data and a control group where the providers did not receive the data. **Significantly more symptoms and problems were addressed by providers in the intervention group (p<.001).** Over time patients assigned to the intervention group demonstrated less symptom distress than those randomized to the control group. Systematic elicitation and appraisal of symptoms/concerns appeared to increase provider awareness/monitoring and improve patient symptoms.

**Velikova et al. (2004)13:** In a prospective randomized controlled trial, oncology patients (n=286) wererandomly assigned to 1 of 3 three groups; intervention, who completed touch-screen PROs and whose providers received the results; “attention-control”, who did the same but with no results delivered to providers; and a control group that received usual care (no PRO). PROs included the European Organization Research and Treatment of Cancer Quality of Life Cancer – 30 (EORTC-30) and the Hospital Anxiety and Depression Screening (HADS) measures. The first two groups were administered PROs over a 6 month period. **When compared to the two control groups, number of symptoms identified and discussed during the provider-patient interaction was significantly higher (p=0.03).**

**Detmar et al. (2002)14:** In a 2-year prospective randomized cross-over trial, investigators examined the usefulness of increasing providers’ awareness of patient HRQL. Patients whose providers were in the intervention arm completed the EORTC-QLQ-30. Patients also completed a functional assessment questionnaire – and following their first and fourth study visit, completed a patient satisfaction questionnaire. Based on content analysis of audio-taped consultations **HRQL concerns were discussed significantly more often by providers in the intervention arm and moderate to severe HRQL concerns were more likely to be identified.**

**Dobscha et al. (2001)15:** In this study of U.S. Veterans in primary care, patients with an affirmative response to a single depression item were asked to complete a self-administered questionnaire (PHQ-9), which they turned in to their provider. A mental health nurse subsequently reviewed the records and contacted providers when depression was present as measured by the PHQ-9 but not mentioned in the visit note. As a result of this brief paper-based assessment combined with a contact when not address, this study found **a significant improvement in documentation of depression symptoms (72% vs. 48%; P < 0.001) and suicidal ideation (36% vs. 14%; p<0.001).**

**Taenzer et al. (2000)30:** In this outpatient cancer care study, patients (n=53) were randomized to self-administer a computerized HRQL questionnaire (EORTC QLQ-C30) before or a paper-based version after their appointment. **Significantly more HRQL items were addressed during the clinic appointment, compared with patients in the control group (49% vs. 24%, *p*<0.05).**

**Mazonson et al. (1996)28:** A 5-month prospective trial studied the impact on primary care provider decision–making of giving PRO information to on anxiety and other mental health symptoms and disorders to providers (n=75) in primary care. Randomization was to either a control group that received no PRO feedback, or to an intervention group that did. Patients (n=573) received the Symptom Checklist-90 (SCL-90) and the 36-item Standard Health Form (SF-36). **Providers receiving PRO feedback on patients with no previous anxiety were more likely to identify anxiety (32% vs. 19% control)**, adjusted odds ratio (AOR = 2.51, 95 %CI = 1.6-3.9**), and conducted more frequent visits with patients** (AOR = 1.7, 95 percent CI = 1.1-2.7)**.**

**Mark et al. (2008a) and Mark et al. (2008b)3,4:** Quantitative and qualitative approaches were used to evaluate providers’ impressions of the Patient Assessment, Care and Education (PACE) system™ which administered a symptom severity screening scale. **Over 60% of the providers rated the system as high value with regards to patient problem identification, focusing patient interviews, tracking changes in patient symptoms and providing documentation.**

# III. IMPACT ON PATIENT-PROVIDER COMMUNICATION

***Summary:***

The use of PROs can:

1. Improved detection of previously unrecognized problems11,12 (see Chapter II)
2. Builds rapport31 and reduces social desirability bias12,22,32
3. Empowers patients as partners in their own care7,33 and helps prioritize needs/concerns7,9,31,32
4. Helps providers prioritize discussion of patient concerns3,4,12,22
5. Increases frequency of discussions on a broad range of outcomes2,4-9,13,14,29,34-36

Evidence suggests PROs improve, and does not impede, patient-provider communication. Both patients and providers have found PROs useful for prioritizing concerns, as well as reducing social desirability bias experienced when discussing highly personal or potentially stigmatizing topics face-to-face. In addition to improved detection of issues that may have otherwise gone unaddressed, the discussion of PROs appears to add a depth of communication that legitimizes discussion of difficult topics, enriches rapport, focuses the visit, and empowers the patient.

**Evidence from HIV Care**

**Crane et al. (2017)11:** Increased documentation of discussions and other provider actions such as referrals in response to depression and inadequate adherence occurred after implementation of PROs in an HIV clinic, suggesting improved patient-provider communication regarding depression and medication adherence.

**Fredericksen et al. (2016)12:** As described in Chapter II, 27 providers were interviewed regarding the benefits and consequences of having had PROs integrated into routine HIV care at their clinics. **PROs helped providers set the agenda for the interaction.** Value was also reported in the **use of PROs to promote patient–provider collaboration** and to **improve patient involvement.** A key benefit reported by providers included the **identification of less observable behaviors that could be problematic including suicidal ideation and previously unknown at-risk alcohol use** that would have not been discussed without the PROs.

**Crane et al. (2010)65:** Stakeholder interviews with providers and patient usability interviews were conducted as part of an evaluation of PRO implementation into routine HIV clinical care. **Results indicated that both providers and patients viewed the PROs as extremely relevant to the clinical consultation. Providers found the PRO reports to serve as “conversational ice-breakers”. Patients noted PROs increased awareness of their own needs, focused the visit, and allowed them to be more honest.** The CASI (Computer Assisted Self-Interview) included PROs reporting on symptoms and behaviors including medication adherence.

**Evidence from Other Disease Areas**

**Greenhalgh et al. (2018)32:** This realist synthesis (a review of 39 studies) sought to understand whether PROs generate patient “self-reflection” and improve ability to communicate with providers. It also sought to understand whether PRO results lead to identification of issues and prompt action. The synthesis concluded that both hypotheses were true. They found that completing PROs to be “not a neutral act of information retrieval but can change how patients think about their condition”.

**Greenhalgh et al. (2017)31:** This systemic review of palliative care, mental health care, and oncology found that **PROs support patients in raising issues with clinicians**, and that **clinicians found PROs useful for rapport-building.**

**Kotronoulas et al. (2014)34:** This systematic review of cancer patients included 26 articles that reported on 24 unique controlled trials. PROs were associated with “improved symptom control, increased supportive care measures, and patient satisfaction.” Among those receiving palliative chemotherapy, PROs improved overall communication regarding dyspnea, social functioning, fatigue, sleep problems, constipation, diarrhea, and cognitive functioning. **Use of PROs increased the frequency of discussions with providers on relevant outcomes.**

**Chen et al. (2013)29:** This systemic review of 27 studies in cancer care showedstrong evidence that **well-implemented PROs improved patient-provider communication.** Among the 23 studies that reported on impact on patient-provider communication, 21 studies (91.3%) reported a positive effect, the studies included well-designed and conducted large RCTs. There was also evidence that PROs **improved the monitoring of treatment response and the detection of unrecognized problems.**

**Espallargues et al. (2000)35:** This systematic review of RCTs (n=21) from community health and outpatient clinics assessed the impact of PROs on the process and the outcomes of care to providers broadly “in clinical practice”. “**Eleven interventions that evaluated feedback information about the patient's mental health status showed a higher rate of diagnosis in the intervention group (combined odds ratio [OR]=1.91; 95% confidence interval [CI] 1.28 to 2.83).”**

**Berry et al. (2011)8:** As described in Chapter II, in a randomized trial of oncology patients the Electronic Self-Report Assessment – Cancer (ESRA-C) reporting system was developed to assess symptoms and HRQL in ambulatory oncology care settings. Among 660 patients, audio-recorded **patient-clinician discussions of symptoms and HRQL were significantly increased in the intervention group (p = .03) as were the odds of specific symptoms being discussed in the intervention group compared with the control group**.

**Takeuchi et al. (2011)36:** This goal of this study was to evaluate whether regularly collecting PROs with feedback to oncologists impacts patient-provider communication over four consecutive visits. Patients (n=198) were randomly assigned to intervention (regular completion PROs with feedback to providers), attention-control (PROs, no feedback to providers), and control (usual care) groups. Symptoms discussed were noted on a checklist based on a recording of the visit. **In the intervention group more more physical symptoms were discussed relative to the attention-control (p=.008) or the control (p=.04) groups.**

**Velikova et al. (2004)13:** As described in Chapter II, In a prospective randomized controlled trial, oncology patients (n=286) wererandomly assigned to 1 of 3 three groups; intervention, who completed touch-screen PROs and whose providers received the results; “attention-control”, who did the same but with no results delivered to providers; and a control group that received usual care (no PRO). PROs included the European Organization Research and Treatment of Cancer Quality of Life Cancer – 30 (EORTC-30) and the Hospital Anxiety and Depression Screening (HADS) measures. The first two groups were administered PROs over a 6 month period. **When compared to the two control groups, number of symptoms identified and discussed during the provider-patient interaction was significantly higher (p=0.03).**

**Detmar et al. (2002)14:** In a 2-year prospective randomized cross-over trial, investigators examined the usefulness of increasing providers’ awareness of patient HRQL. Patients whose providers were in the intervention arm completed the EORTC-QLQ-30. Patients also completed a functional assessment questionnaire – and following their first and fourth study visit, completed a patient satisfaction questionnaire. Based on content analysis of audio-taped consultations 10 of 12 **HRQL concerns were more discussed by providers in the intervention arm than the control, and moderate to sever concerns more likely to be identified. PRO results increased discussion of less observable concerns such as social function and more long-term concerns such as fatigue.**

**Mark et al. (2008a) and Mark et al. (2008b)3,4:** Quantitative and qualitative approaches were used to evaluate providers’ impressions of the Patient Assessment, Care and Education (PACE) system™ which administered a symptom severity screening scale. **Over 60% of the providers rated the system as high value with regards to patient problem identification, focusing patient interviews, tracking changes in patient symptoms and providing documentation. Providers noted that the time they spent discussing symptoms was increased while the time spent on unimportant symptoms was decreased.**

**Basch et al. (2005)7:** The STAR is a web-based system that allows patients to enter and track their own symptoms, and generates longitudinal reports for clinicians. As part of a larger assessment patients completed a questionnaire assessing the system after 4-6 weeks of use. **Most patients found the PRO system useful for helping them remember their symptoms (94%), improved discussions with their provider (90%). Clinicians involved in the study believed that a primary benefit of STAR was the increased sense of empowerment in patients, with 77% of patients stating that STAR made them feel more in control of their own care.**

**Mejdahl et al. (2020)33:** This Danish qualitative study (n=23) of patients living with epilepsy and their providers found that **PRO use promoted patient involvement in terms of improved communication and increased “patient activation”.** Patients experienced communication with their provider as more personalized when based on PRO responses. Patients also reported feeling more comfortable discussing psychosocial issues. Providers found PROs enabled them to more easily raise sensitive and more personal issues.

# IV. PROVIDER ACCEPTANCE AND PERCEPTIONS OF VALUE OF PROS

***Summary:***

Providers find PROs:

1. Help identify less observable or infrequently discussed symptoms or behaviors2,3,12-14 including psychosocial issues
2. Help focus the agenda of the appointment and allow the provider to focus upon issues of most importance to both parties3,12,22
3. Useful for symptom monitoring6,13
4. Less acceptable or useful if high patient response burden, if impedes clinic flow, or difficult to access or interpret results13,24

Providers generally reported PROs as useful to their practice, particularly in identifying symptoms and behaviors that might otherwise have been undetected, especially mental health and suicidal ideation. However, providers noted that adoption of PROs in practice was dependent on minimal disruption to clinic flow, technological capacity, and manageable patient response burden.

**Evidence from HIV Care**

**Fredericksen et al. (2016)12:** As described in Chaper II, 27 providers were interviewed from four geographically diverse HIV and community health clinics that have integrated PROs into routine care to better understand provider views on PRO implementation at their clinic. **Perceived benefits included the ability of PROs to identify less-observable behaviors and conditions, especially suicidal ideation, depression, and substance use; usefulness in agenda setting at the beginning of a visit; and reduction of social desirability bias in patient-provider communication.**

**Evidence from Other Disease Areas**

**Mark et al. (2008a) and Mark et al (2008b)3,4:** Quantitative and qualitative approaches were used to evaluate providers’ impressions of the PACE system. **Over 60% of the providers rated the system as high value with regards to patient problem identification, focusing patient interviews, tracking changes in patient symptoms and providing documentation. Providers noted that the time they spent discussing symptoms was increased while the time spent on unimportant symptoms was decreased.**

**Barr et al. (2020)24:** In this study of older adults from 14 primary care clinics, patients (n=505) completed a 46-item health risk assessment. **However, the information was only documented by providers 3-14% of the time. According to physicians interviewed (n=16), reasons for this included “poor access to data, high quantity of data, interruption to workflow, and lack of training on PROs.”** This study highlights the importance of availing providers PRO results in a manner that is very user friendly and easy to use.

**Basch et al. (2007)6:** Providers receiving results of the PRO version of Common Terminology Criteria for Adverse Events (CTCAE) were asked about its usefulness in clinical decision making. **The majority of providers (89%) discussed reports with their patients and felt the system was useful for toxicity monitoring while 78% felt reports accurately represented the true clinical status of the patient**. The authors conclude that the studies conducted suggest provider acceptance, and willingness of staff to base management decisions on patient-reported information.

**Velikova et al. (2004)13:** Oncology providers (n=28) were asked to respond to a survey assessing the clinical usefulness of PROs given to patients prior to their appointment. **Providers reported finding the PRO information clinically “*very useful/quite useful*” in 43% of encounters, “*somewhat useful*” in 28%, “*a little useful*” in 21%, and “*not useful*” (or missing response) in 9%. Providers stated that PRO data “provided an overall assessment of patients (69%), additional information (33%), or identified problems for discussion (27%); PRO data contributed to patient management in 11% of encounters.”** During qualitative interviews providers expanded on these findings. **Providers reported PROs identified symptoms that might have been missed, and alerted them about symptoms prone to social desirability bias such as sexual side effects and mental health status. Providers also noted that receiving results from the PACE system helped them focus the appointment and saved time.** Providers indicated drawbacks including patient burden and technological difficulties.

**Stover et al. (2015)9:** This qualitative study among outpatient cancer care clinicians in the U.S. (n=12) found a web-based PRO assessing symptoms and functional status to be **easy to interpret (83%), and helpful for documenting symptoms (92%)**. Over 90% reported consultation time did not increase.

**Detmar et al. (2002)14:** A large-scale, randomized study in palliative care examined impact of PRO feedback delivery which included graphical display, with feedback delivery to an intervention but not the control group. Providers (n=10) participated in semi-structured interviews about the study afterward and **found it useful for better understanding patient symptoms, function, psychosocial topics.** All the providers indicated that they would like to continue use of the HRQL summary profile in their daily practice.

# V. PATIENT USABILITY, ACCEPTABILITY, AND VALUE OF PROS

***Summary:***

Patients find PROs:

1. Easy to use (electronic/computer-based)1-7
2. Acceptable across a broad range of populations and care modalities16-19
3. Help to recall and promote discussion of symptoms3,4,7,18
4. Enhanced their provider’s awareness of their needs6,7,14,23

Despite the breadth of content in PROs of the studies listed here, most patients found electronic PROs to be easy to use and highly acceptable, with many reporting its value in taking inventory of their health and in enhancing their provider’s awareness of their needs.

**Evidence in HIV Care**

**Sinha et al. (2020)1:** In this PRO usability study of PLWH, participants administered an electronic PRO (n=50) found the PRO questionnaire was easy to complete and understand (96%).

**Crane et al. (2010**)**65:** Patient interviews were conducted as part of an evaluation of a computer-assisted self-administered interview (CASI). The CASI included PROs reporting on symptoms and behaviors including medication adherence. The system was reported by patients to elicit information that is useful, relevant and important.

*“It’s all relevant to me, even though I had to swallow a few times before answering some of them.”*

*“The doctors don’t ask all these things in person – and some people might be more honest with the computer than the doctor.”*

Completing a CASI session was reported by patients as an inherently positive, useful, and valuable experience by heightening/promoting self-awareness, and challenging them to be honest with themselves and with others about health-related behaviors and symptoms

*“Oh I like these questions! It’s like this thing knows me!”*

*“This keeps me aware and keeps me focused and keeps me honest.”*

**Crane et al. (2007)17:**

The acceptability of a touch-screen-based PRO assessment (62 to 111 items) was evaluated among 136 patients presenting for routine care in a HIV clinic. Patients were invited to participate before their clinic appointment. After providing informed consent, they were given brief instruction on the use of touch screens and asked to complete the assessment which included instruments measuring depression, symptom burden, medication adherence, drug/alcohol/tobacco use, and HRQL. **The authors found that collection of PROs using touch-screen technology was feasible and “highly acceptable” by patients.** Outcome measures included refusal rates, patient completion times, completion rates, missing data rates, and the number of patients requiring assistance. Of the 136 patients approached to participate in the study, 106 patients (78%) completed the assessment, 6 (4%) started but did not complete it, and 24 (18%) refused to participate, most often due to time constraints. Most of the 24 patients who refused stated a willingness to be approached to participate on a different day. Of the 106 patients who completed the assessment, 3 required assistance (1 due to vision issues, 2 due to literacy). Median completion time was 11 minutes and 40 seconds, with a mean completion time of 12 minutes and 21 seconds. Missing data was minimal. Older patients did not take longer to complete the PROs. The authors note that with the prevalence of computers (and now smart phones and tablets) in the US, patients are likely more comfortable with technology. Use of touch screens has made PRO completion easier for the patient.

**Evidence from Other Disease Areas**

**Howell et al. (2015)16:** in this scoping review of 30 articles evaluating uptake of PROMs in cancer care, 3 studies evaluated patient acceptability of electronic computer-based PROMs. In all studies, **PROMs were found to be highly acceptable to patients with a high level of willingness for repeat use in their care.**

**Detmar et al. (2002)14:** As in Chapter II, a large-scale, randomized study was conducted in palliative care to evaluate the effectiveness of giving providers and their patients PRO feedback using graphical displays. **Patients in the intervention group reported a significantly higher degree of emotional support received from the provider.** **The majority (79%) of patients believed that the summary enhanced their provider’s awareness of their health problems**, **and 87% believed that it would be useful to introduce the intervention** as a standard part of the outpatient clinic procedure.

**Sharma et al. (2016)2:** Male prostate cancer patients (n=50) were administered the computerized Expanded Prostate Index Composite, a quality of life PRO, as well as a 6-item acceptability scale to evaluate satisfaction with the electronic format. **The majority (>90%) of respondents found the computerized QOL format easy to use.**

**Sarabia et al. (2015)66:** Pallative and curative cancer patients (n=202) found touch screen based questionnaires acceptable. **93% of palliative patients and 92% of curative patients were willing to complete the surveys on a touchscreen tablet at the time of the visit,** and 62% of patients were willing to complete surveys at every visit.

**Thewes et al. (2009)23:** This study evaluated the acceptability and usability of psychological screening PROs in rural cancer clinics in Australia among newly diagnosed patients. Ninety-six percent of patients were in agreement that the PROs were easy to understand, not too personal (86%), not upsetting (92%). Eighty-four percent ‘agreed’ or ‘strongly agreed’ that the PROs should continue to be asked and would encourage discussion of psychological issues. **Ninety-three percent appreciated questions about their emotional well-being.**

**Mark et al. (2008a)3:** 100 oncology patients were surveyed about satisfaction with their use of the PACE (PRO) system. **Fifty-five percent reported feeling satisfied or very satisfied with the system; 19% reported being very or somewhat unsatisfied**; and the remaining 26% were neither satisfied nor unsatisfied. **Forty-four percent reported that it encouraged them to discuss their symptoms with their provider while 43% said it did not promote additional discussion.** **Fifty-three percent of patients reported that it helped them remember their symptoms. Almost all (91%) said the system was easy to use including readability of the PROs and 79% of patients said that they would recommend the PACE system to other patients.**

**Wolpin et al. (2008)19: Oncology patients (n=342) utilized a symptom and quality of life PRO (ESRA-C) without difficulty and that were satisfied with it.** The study found the PRO to be easy to use and acceptable to a broad range of users.

**Basch et al. (2005)7:** Oncology patients completed a questionnaire assessing a PRO system after 4-6 weeks of use. **Most patients found the PRO system easy to use (96%), useful for helping them remember their symptoms (94%), improved discussions with their provider (90%) and would recommend it to others (98%). Seventy-seven percent of patients stated that STAR made them feel more in control of their own care.**

**Stover et al. (2015)9:** **This qualitative study of PRO acceptability found that patients in outpatient cancer care found** PROs helpful in discussing health issues with clinicians (92%), wanted to review their results with clinicians during future visits (82%), and would recommend it to other patients (87%).

# VI. IMPACT OF PROS ON DELIVERY OF CARE

***Summary:***

Use of PROs:

1. Did not increase visit length or consultation time8-10, or saved time by focusing the appointment13
2. Increased number of referrals11,15
3. Reduced emergency department utilization and hospitalizations20
4. Led to more closely monitored treatment20
5. Succeeds if goals for their use are clear, well-integrated into clinic flow, clinically relevant, easy to interpret, with minimal patient and data burden12,13,24,37-39

Use of PROs has helped identify the need for and increased number of specialty referrals, led to more closely monitored treatment, and reduced emergency department utilization and hospitalizations. Evidence suggests that PROs do not necessarily add length to the provider visit time, and may focus the content of the visit. However, providers and investigators across several studies note that the success of PROs appear dependent on several factors: clinical relevance of measures to provider and population needs, ease of interpretation, and, above all, minimal disruption to clinic flow.

**Evidence in HIV Care**

**Crane et al. (2017)11:** In routine screening of PLWH, providers **significantly increased referrals to adherence counselling or case management services** (from 23% of events prior to feedback and 38% after feedback) in response to inadequate patient medication adherence. **Providers significantly improved in documented action (e.g., treatment referral)** in response to substance use in 33% prior to feedback, and in 41% after feedback (Crane et al. 2017).

**Crane et al. (2007)17:** The acceptability of a touch-screen-based PRO assessment was evaluated among 136 patients presenting for routine care in a busy HIV clinic. Patients were approached in the waiting room before their clinic appointment and invited to participate. As part of the study, **the authors reported that collection of PROs using touch-screen technology reduced nursing workload**, who would otherwise ask questions about tobacco use, HRQL, and medication adherence at each visit.

**Fredericksen et al. (2016)12:** 27 Providers were interviewed from four geographically diverse HIV and community health clinics that have integrated PROs into routine care. While the use of PROs was highly valued for detecting adverse health behaviors and symptoms, the providers agreed **its usefulness depended on the quality of integration into clinic flow, inclusion of only the most clinically relevant content, and ease of interpretation**.

**Evidence from Other Disease Areas**

**Boyce et al. (2014)38:** In a systemic review of 16 qualitative studies, health care professionals from diverse settings found PROs to be a **valuable tool in the clinical decision-making process.** However, authors “concluded that 1) there were substantial practical barriers to the routine use of PROs unless there was infrastructure in place and their use was not disruptive to normal work routines; 2) technology can play a greater role in processing the information in the most efficient manner; 3) improvements to the interpretability of PROs should increase their use; and 4) attitudes to the use of PROs may be improved by engaging professionals in the planning stage and by ensuring a high level of transparency around the rationale for data collection.”

**Turner et al. (2020)37:** This study offers provider perspectives on challenges and benefits of PROs among providers currently using them. One hundred English primary care general practitioners (GP) participated in a survey, with 25 participating in an in-depth interview. Seventy-seven percent reporting using at least one PRO. **Providers “valued PROs for shared decision making and to direct patient discussions.”** Barriers included “**time constraints”; “insufficient knowledge”;” lack of integration into clinical systems”; and PROs that were “mandated without explanation or involvement”.**

**Basch et al. (2016)20:** Aweb based PRO assessing chemotherapy side effects as part of a longitudinal trial was evaluated. Patients were randomized to usual care or to receive the PROs. For the intervention patients, “**resource utilization declined compared to usual care as patients were less likely to visit the emergency department, be admitted to the the emergency department, or hospitalized.”** These patients also received significantly longer chemotherapy; authors believe that side effects may have been more closely monitored allowing for better treatment retention.

**Berry et al. (2011)8:** As described in Chapter II, the ESRA-C was developed to assess symptoms and HRQL of oncology patients. In an RCT **no significant difference was found between PRO intervention and control groups for the average length of clinic visits**. Authors note there was additional discussion regarding symptoms due to the PRO, yet still visit length was unchanged.

**Santana et al. (2010)10:** In a RCT with lung disease patients studying usefulness of HRQL assessment into routine care, patients were randomized to take PROs either with or without provision of feedback to providers. The authors found “statistically significant differences…between the groups including **greater mean number of issues discussed per encounter and mean management composite score (i.e. a summation of the medication changes, number of referrals and tests ordered)”** favoring the intervention group. **No statistical differences were found with mean time of duration of the clinic visit between the intervention and control group.**

**Dobscha et al. (2001)15:** As described briefly in Chapter II, U.S. veterans in primary care were screened with a single depression item, and if they affirmed symptoms, asked to complete the full PHQ-9 which was then given to their provider. A mental health nurse reviewed patient records notifying providers when depression existed per the PHQ-9 but not mentioned in the visit note. Documentation of depression symptoms was higher after adding the PHQ-9 intervention, and **“post-intervention patients were also more likely to begin receiving antidepressants (23% vs. 12%; P < 0.05) and to be referred for mental health services (28% vs. 9%; P < 0.001).”**

**Velikova et al. (2004)13:** Oncology providers (n=28) were asked to respond to a survey assessing the clinical usefulness of PROs given to patients prior to their appointment. In interviews, **providers explained that PROs identified symptoms that might have otherwise been missed, such as symptoms prone to social desirability bias (mental health, sexual side-effects). Providers also noted that receiving PRO results helped focus the appointment and saved time.**

**Cleeland et al. (2011)27**: As described in Chapter II, a post-operative symptoms monitoring study with provider alerts demonstrated **fewer symptom severity events and a more rapid improvement in symptoms** in the intervention arm. However, the **alerts generated 35 provider phone calls to the patient to provide education, confirm prescribed symptom management or provide new medication prescriptions** suggesting this home-based PRO assessment was not without impact on care delivery.

**Stover et al. (2015)9:** This qualitative study among outpatient cancer care clinicians using PROs in the U.S. (n=12) found a web-based PRO assessing symptoms and functional status. **90% thought it did not increase consultation time.**

**Mazonson et al. (1996)28:** As described in Chapter II, a trial on anxiety and mental health symptom feedback to providers demonstrated that **providers receiving PRO feedback on patients with no previous anxiety were more likely to make referrals to mental health specialists** (AOR = 3.86, 95 percent CI = 1.63-9.16)**, and see patients for more frequent visits** (AOR = 1.73, 95 percent CI = 1.11-2.70)**.** No difference was found in the use of psychotropic drugs or hospitalization rate.

# VII. IMPACT ON PATIENT OUTCOMES

***Summary:***

In systemic reviews, impacts of PROs on patient outcomes are mixed, and primarily from cancer care. PROs are associated with:

* Increased survival rates among cancer patients due to closer monitoring20,21
* Fewer emergency department visits and hospitalizations among cancer patients20,21
* Improved symptom control34
* Improved outcomes for mental health conditions40
* Lower symptom distress26,27,41
* Improved health-related quality of life13

**Note: consider putting domain specific screening impact literature in this section vs. an appendix**

**Evidence from HIV care**

As described in Chapter II, evidence from HIV care includes studies demonstrating that providers are more likely to identify depression, substance use, and inadequate adherence11 when patients complete a clinical PRO assessment at the start of clinic visits with PRO results to the provider in an easily digestible manner in real time; and providers are more likely to address depression and inadequate adherence in some way (e.g. referral, antidepressant prescription), etc.11 While it might be reasonable to assume that care is better when providers are aware of issues such as depression, substance use, etc, data on long-term outcomes demonstrating that increased awareness or actions by providers to address depression and other domains improves clinical outcomes is lacking.

**Evidence from other disease areas**

**Kotronoulas et al. (2014)34:** This systemic review of 26 RCTs investigated impacts of PROs in cancer care. Though effect sizes were small, routine PRO use increased frequency of discussion of patient outcomes during visits. PROs were associated with “improved symptom control, increased supportive care measures, and patient satisfaction” in some of the studies. Across studies, authors found that **patients in the experimental groups reported greater reductions in “symptom-threshold events and symptom interference with functioning, severity of menopausal symptoms and sexual dysfunction, frequency of constipation and vomiting, incidence of painor fatigue, debilitating symptoms, and distress associated with symptoms/problemscompared with those in the control group, irrespective of cancer type or stage.”**

**Boyce et al.** **(2013)67:** This systemic literature review of controlled intervention trials examined the impact of providing healthcare professionals with feedback on PROs on patient and practice-level outcomes. Although 16 studies were identified and only 1 study found an overall significant difference in the PRO score. an additional **6 studies found a significant result favoring the intervention group for a particular subgroup or domain.** The studies demonstrating the greatest impact primarily used PROs as a management tool in an outpatient setting on a specialized patient population.

**Chen et al. (2013)29:** Systematic review of 27 studies (see also Chapter II) in oncology settings showed improvements in patient-provider communication, ongoing symptom monitoring, and detection of unrecognized problems, and treatment response. **However**, **there was a “weak to non-existent evidence-base regarding the impact on changes to patient management and improved health outcomes” and health behavior changes.**

**Valderas et al. (2008)68:** In this systematic review of RCT of the impact of PROs, which included studies individual physicians, groups of physicians (e.g., hospitals, practices), or patients were randomly allocated to one or more intervention groups and to a control group. Articles (n=34) for the most part were from primary care settings assessing adults. Although the impact of using PROs appeared limited, “15 of 23 studies (65%) measuring process of care observed at least one significant result favoring the intervention, as did eight of 17 (47%) that measured outcomes of care.” The strength of findings was limited by methodological issues, and the authors concluded that “results suggest great heterogeneity of impact.”

**Marshall et al. (2006)40:** This review of 38 primarily RCT studies from a mix of primary and specialty care practices (particularly mental health and cancer care) found that the health status of patients with mental health conditions appears to be most responsive to the improved care associated with PROMs feedback. In a trial by Lewis et al. (1996)69, for instance, **patients who completed a computerized depression screen had improved depressive symptoms at 6 weeks compared with control patients.**

**Espallargues et al. (2000)35:** This systematic review of RCTs (n=21) from community health and outpatient clinics assessed the impact of PROs on the process and the outcomes of care to providers broadly “in clinical practice”. O**f 11 trials that assessed patient outcomes, 4 (36%) detected significant improvements.** In the 8 interventions that provided general health status information, authors observed a smaller trend with lower percentages. Notably provision of PRO feedback regarding mental health status showed a higher rate of diagnosis in the intervention group (combined odds ratio [OR]=1.91; 95% confidence interval [CI] 1.28 to 2.83).

**Basch et al. (2017)21:** This study assessed overall survival associated with electronic PRO symptom monitoring vs. usual care during routine cancer treatment, comparing patients whose providers received PRO feedback vs. usual care. “**Median overall survival was 31.2 months (95% CI, 24.5-39.6) in the PRO group and 26.0 months (95% CI, 22.1-30.9) in the usual care group (difference, 5 months; *P* = .03).** In the multivariable model, results remained statistically significant with a hazard ratio of 0.83 (95% CI, 0.70-0.99; *P* = .04).”

**Basch et al. (2016)20:** Aweb based PRO assessing chemotherapy side effects as part of a longitudinal trial was evaluated. Patients were randomized to usual care or to receive the PROs. The intervention patients **demonstrated significantly improved HRQL, reduced emergency department (ED) visits, fewer hospitalizations, a longer duration of palliative chemotherapy, and superior quality-adjusted survival.** Side effects were monitored by nurses who received email alerts based on PROs, and were able to intervene; authors believe this close monitoring may have led to improved outcomes.

**Berry et al. (2014)41:** Cancer patients randomized to an intervention arm of a trial which included an intervention that monitored depression, symptoms, and quality of life issues via electronic PROs and had a component to help patients communicate with providers showed **significantly lower depression (p=.04) at the study end, compared to controls.**

**Cleeland et al. (2011)27:** As in Chapter II, patients from an outpatient thoracic surgery clinic with home based symptom monitoring with provider notification demonstrated **fewer symptom severity events and a faster improvement in symptoms** than the control group who completed the same assessment but without alerts to providers suggesting the opportunity for home-based symptom PRO assessments to lead to better outcomes during the post-operative period.

**Ruland et al. (2010)26:** As described in Chapter II, 145 patients with leukaemia or lymphoma completed a PRO assessment that included questions on patient care, symptom distress and need for symptom management support during treatment and rehabilitation. **Significantly more symptoms and problems were addressed by providers in the intervention group (p<.001) who received the assessment results than in the control group where they did not. Over time patients assigned to the intervention group demonstrated less symptom distress than those in the control group.**

**Velikova et al. (2004)13:** As described in Chapter II, a prospective randomized controlled trial, oncology patients (n=286) wererandomly assigned to 1 of 3 three groups; intervention, who completed touch-screen PROs and whose providers received the results; “attention-control”, who did the same but with no results delivered to providers; and a control group that received usual care (no PRO). Patients in the intervention and attention-control groups had better HRQL than the control group (P =.006 and P =.01, respectively), but the intervention and attention-control groups were not significantly different. PROs were associated with a positive impact on emotional well-being (P =.008), as well as significant improvements in reports of physical and functional well-being.

# VIII. SUMMARY AND DISCUSSION

**A. Summary**

Advances in antiretroviral treatment in the past two decades have led to dramatically improved survival rates, affording PLWH longevity similar to their HIV-uninfected counterparts, albeit with increased morbidity for aging-related chronic conditions. As a result, health care for PLWH has shifted to focus on addressing co-morbidities, promoting healthy behaviors, and elevating quality of life. Many of the health domains within this scope rely heavily on patient report in order to meaningfully address in care: examples include mental health and other symptoms, functioning, substance use, social well-being, sexual functioning, sexual risk behavior, and HRQL. Routine PRO collection in primary HIV care offers the unique opportunity for comprehensive yet targeted inquiry into patient health status, helping prioritize issues important to both patients and providers, based on a clearer picture of patients’ daily lives. In doing so, PRO collection amplifies and articulates the patient’s voice in their ability to advocate for their own health.

Technical advances?

The evidence provided here supports integration of PROs into HIV care. While it is difficult to link the use of PROs in care directly to long-term patient outcomes, PROs have been shown to lead to increased provider awareness and action for domains important for care of PLWH. PROs have clearly led to their increased documentation, and to improved and more frequent patient-provider communication, improved monitoring, treatment, and referral. The improved outcomes summarized in this review, such as lower symptom distress, less ED utilization, and better cancer survival rates are likely due to these actions and may allow generalizable insights to be gleaned despite being from non-HIV care settings.

From the patient perspective, PROs allow for an inventory of their current health and health behaviors, an opportunity to organize their agenda for the appointment, and provide a preview of possibilities for discussion. Patients find PROs easy to use in several computerized contexts, and report that PROs open an avenue to discuss highly personal or potentially embarrassing behaviors or issues with their providers that they might not have done otherwise. Providers value insight into less observable symptoms or behaviors that might have gone unreported in an in-person interaction, particularly depression, suicidal ideation, and substance use. Its impact on consultation time appeared minimal, and those that adopted PROs in their practice found it helped structure the appointment agenda around a truer picture of priority needs. However, the experiences of providers and authors in this review urge caution: PROs require a specific context in order to ensure success. Specifically, this context requires inclusive clinic leadership that actively considers the needs of stakeholders; selection of PROs that are clinically relevant, brief, and easy for providers to interpret; minimal disruption to clinic flow; low overall patient burden; and ease of access and integration into EMR.

This evidence review has focused primarily on individual patient outcomes, that is, improving the clinical management of individual patients. One area not discussed here but of importance nonetheless is the use of PROs to measure quality of care in larger settings such as within hospitals, across hospitals, or within regions such as states. Changes in clinical care and even in health care policy could be supported by PRO evidence. In the US, outcome measures have been used to evaluate the clinical and cost effectiveness of interventions, to monitor population health, or to audit health care systems and guide quality improvement plans70-74. In the aggregate, PRO data could be used to assess variations in patient care across hospitals or regions. In addition, costs could be compared across institutions to help with a better understanding of staffing needs. In the UK, PRO use has focused on comparing the performance of providers in the hopes of avoiding unnecessary treatments and using the data to assist with service redesign75. PRO use has been mandatory since 2009 in patients undergoing selected elective surgeries (hernia repair, varicose vein surgery, and hip or knee replacement). More work is needed to understand how to best use PROs in the larger arena of clinical and policy decision making, but there appears to be consensus across therapeutic areas on the added benefit of using of PRO data in individual patient care.

**B. Gaps in the HIV Literature Around PRO Use**

Overall evidence regarding the value of PROs within routine HIV care is still emerging and there is a limited breadth of information across the areas of focus reported in this document. The primary published data relates to the screening and monitoring of health problems, the value in improving patient-provider communication, and acceptability by patients and providers. Additional evidence to complement this data in a variety of settings would build further strength to the case for widespread implementation, including evidence generated from sites with limited prior exposure and limited resource. The HIV data identified and presented in this evidence review is primarily taken from studies conducted within the CFAR (Center for AIDS Research) Network of Integrated Clinical Systems (CNICS).

Other disease areas, notably oncology, provide supplementary insights to this document and they add further indications of the value of PROs. This includes evidence regarding improved symptom management and treatment outcomes. There is some positive evidence of a minimal logistical impact upon a clinic’s operation but this is another area in which further research is needed to ensure that any value of PROs to patient care can be successfully integrated within workflows in a range of settings.

**Potential smaller scale studies that could be designed to supplement information in this Evidence Review and Summary.**

1. Little is known about how HIV providers use PRO information. For example,
   1. Where PROs highlight unmet need, what actions does this initiate for different PROs?
   2. Where PROs highlight unmet need, to what extent is this information viewed by providers as indicative of fact, and to what extent is it further probed in detail? Is there an acceptance of the result or is it viewed as a discussion guide only?
   3. Where PROs do not highlight an unmet need, to what extent are these issues still explored by providers?
   4. While some domains clearly impact providers…do other domains? If not, what are the reasons? Lack of intervention? Wrong care team members? Other reasons?
2. Do PRO led consultations lead to changes in patient behaviors?
   1. Adherence
   2. Sexual risk behavior
   3. Alcohol use
   4. Substance misuse
   5. Entry into drug treatment
   6. Attendance at referral appointments
3. Do patients who complete PROs report higher levels of care satisfaction than those patients who do not complete PROs?
4. Do patients find it easier to report socially stigmatizing and risky behaviors through PROs than raising directly with providers?
5. What information do providers want to see in PRO feedback summaries? How would they like it presented? What format and how would they want the information organised? How much detail? How much interpretation/scoring is wanted?
6. How has the introduction of PROs changed the way in which a patient-provider appointment is managed by the provider?
7. How has the introduction of PROs changed the way in which a patient engages the provider in their appointment? To what extent does PRO completion help patient to focus their agenda and/or raise issues?

# IX. APPENDIX 1. PAPER VS. TABLET-BASED ASSESSMENT

Several reasons for a move to tablet-based vs. paper based administration.

Ease of administration has increased with the availability of electronic PRO data collection software and Web-based data entry options, allowing for immediate scoring that can be displayed for review during clinical encounters.

# X. APPENDIX 2.

**METHODS**

**Overview**

The targeted literature review conducted for this document identified primary data in peer-reviewed literature that report on the use of PROs in routine clinical care. Studies in multiple disease conditions including HIV/AIDS were identified and reviewed for inclusion. The studies of interest were identified by the methods and inclusion criteria described below.

**Search Strategy**

A referral sampling technique was used for this literature whereby relevant references were identified from reference lists of sampled articles.

1. A list of evidence topics and sources was generated from a ViiV literature review (ViiV Healthcare, 2017) and consultation with several PRO stakeholders, including CNICS colleagues of the authors.
2. References were reexamined for relevance and to identify further source articles of value compared to the inclusion/exclusion criteria below.
3. A non-time limited PubMed/Medline search was conducted to identify primary source articles that may support the review. Keywords/phrases used: patient reported outcomes, patient reported outcome measures, patient reported outcome assessment, outcome assessment health care, patient based measures.

**Inclusion Criteria**

1. Outpatient clinical care settings
2. PRO outcomes reported
3. Primary data (not secondary source)
4. HIV adult patient population or other adult clinical outpatient population
5. Topic area specific to Evidence and Review Summary

**Exclusion Criteria**

1. Non-clinical care settings
2. PROs not specified
3. PRO data not reported
4. Secondary source data

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