Question 1: What Strategy will be Used for Integrating PROs in EHRs?

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Chapter 1 Organization

• Each integration option is presented individually with advantages and disadvantages
• Perspectives of the patient, provider, researcher, and administrator are provided
• Future research and useful references are summarized at the end.

NOTE: Some advantages and disadvantages may overlap integration options.
So You Want To Use Patient Reported Outcomes?

• Strategy Covers a Wide Range of Options

• Collection:
  – Paper
  – Electronic

• EHR Integration Strategies
  – Manual Upload
  – System Linkage
  – Native
PRO / EHR Integration Options

1. Minimal Integration (LOW)
2. Separate PRO Collection System (MED)
3. Full PRO-EHR/Native Integration (HIGH)
Minimal System Integration (LOW)

• Definition: Any mention or use in an EHR. Often paper and assessed in clinic.

• Collection Methods: Any

• Common Data Capture and Storage Options:
  – Scanned Paper Form
  – Manual Data Entry
  – Manual PRO Documentation in the Clinician Note
Minimal System Integration (LOW)

• Data Linkage
  • PROs pushed uni-directionally to EHR
  • No Bi-directional communication

• Data Reporting
  • Manual Scoring Common
  • Only Manual Feedback to Patients or Providers
Minimal System Integration (LOW): Patient Perspective

**Advantages**
- Paper-based collection may be easier for those less comfortable using technology
- Similar to current paper survey administration methods across research and practice

**Disadvantages**
- Paper-based collection has no option for screen reader or text size adjustment
- Possible redundancy in data captured between different clinics.
- May limit distribution of PRO findings across clinical care team
## Minimal System Integration (LOW): Provider Perspective

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Very low-cost up-front assessment</td>
<td>• Manual scanning or data entry could delay in-visit use</td>
</tr>
</tbody>
</table>
<pre><code>                                                                                   | • Without discrete data filing, PROs cannot be used for automated decision support |
                                                                                   | • PRO administration relies heavily on staff (manual process and workflows)    |
</code></pre>
## Minimal System Integration (LOW): Research Perspective

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
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</table>
| • Ability to establish PRO surveillance independent from the clinical care system  
  – Telephone (IVR)  
  – Mailed surveys  
  – Stand-alone electronic PRO collection | • PRO information may not be structured  
  – Limits data reuse for research  
  – Limits associated meta-data |
### Minimal System Integration (LOW): Administrative Perspective

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Less specialized technical support needed for:</td>
<td>• Manual identification of patient eligibility for PROs necessary</td>
</tr>
<tr>
<td>– Implementation</td>
<td>• Relies on staff to track PRO administration across multiple patient visits</td>
</tr>
<tr>
<td>– Integration</td>
<td>• Lack of continuity across clinical visits and settings</td>
</tr>
<tr>
<td>– Maintenance</td>
<td></td>
</tr>
</tbody>
</table>
Separate PRO Collection System (Medium)

• Definition: Electronic Assessments are conducted using a specialized system. Collected PROs linked to the EHR.
• Collection Method: Electronic Only
• The broadest category of PRO collection.
• Data Capture and Storage:
  – Stand-alone system
  – 3rd party vendor
  – Developed internally
Separate PRO Collection System (Medium)

- Data Linkage
  - EHR data may be pulled asynchronously to inform the PRO assessment
  - Data pushed to the EHR in real-time
  - Data can be linked to discrete EHR data fields
  - Specific interface required for communication between PRO collection system and EHR
  - Data mapping required for PRO data to flow discretely into EHR
Separate PRO Collection System (Medium)

• Data Reporting (Outside System)
  • Automatic Scoring Likely
  • Feedback and Score Interpretation Options Likely
## Separate PRO Collection System: Patient Perspective

### Advantages
- User interface is designed and used solely for PRO administration
- May provide patient-facing PRO reporting options and features
- Minimize redundant information collection by drawing on prior information

### Disadvantages
- Different interface may distance PRO collection from clinical care
- Alerts or email reminders are not integrated within care workflows
- Remote home access requires a unique user name and password
# Separate PRO Collection System: Provider Perspective

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Wide range of PRO content for specific clinic needs.</td>
<td>- Workflow integration may require more staff oversight and specific training</td>
</tr>
<tr>
<td>- Customized, real-time integration for clinical decision-making</td>
<td>- Missing PRO assessments (prior to visit) may not be easy to identify within the clinic workflow</td>
</tr>
<tr>
<td>- PRO collection both outside and during the clinical encounter</td>
<td>- Additional steps by the provider to access a PRO system may be necessary</td>
</tr>
<tr>
<td>- Many standard and customized report formats may be available</td>
<td></td>
</tr>
</tbody>
</table>
Separate PRO Collection System: Research Perspective

**Advantages**

- Assessment Meta-data is available
- Can be extracted alongside other EHR data
  - Laboratory tests
  - Procedures
  - Events

**Disadvantages**

- Complete data may require extracting data from 2 systems
- Linking multiple data sets can be complex
## Separate PRO Collection System: Administrative Perspective

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<tr>
<th><strong>Advantages</strong></th>
<th><strong>Disadvantages</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>System may have dedicated technical support</td>
<td>Data integration requires additional IT resources &amp; expertise</td>
</tr>
<tr>
<td>Configuration is not dependent on EHR IT teams (or a specific EHR system)</td>
<td>Cost to maintain an independent PRO system may be higher than an integrated system</td>
</tr>
<tr>
<td>New technology-based options (e.g., mobile) may be more quickly implemented</td>
<td>Updates or enhancements to PRO system may require changes to EHR system or integration tools to maintain compatibility</td>
</tr>
<tr>
<td></td>
<td>Additional security concerns</td>
</tr>
<tr>
<td></td>
<td>Additional vendor agreements are necessary</td>
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</tbody>
</table>
Full PRO Integration within the EHR

• Definition: PRO assessment is collected as an integral part of the EHR
• Collection Method: Electronic Only
• PRO information is pulled from and pushed to the EHR in real-time to:
  1. Inform or tailor PRO assessment
  2. Make integrated PROs available for broad use within the EHR including:
     a. Decision support
     b. Longitudinal tracking in conjunction with symptoms and treatments
     c. Seamless feedback to patients
• PRO scoring can be automated
Full PRO-EHR Integration: Patient Perspective

**Advantages**

- PRO data are collected in a singular patient portal
- Flexibility of assessment locations based on EHR vendor support
- Real-time reporting of PROs to patients may be possible
- Minimizes redundant information by drawing information from prior PROs or patient information

**Disadvantages**

- Limited ability to change administration format
- Remote home access requires a patient portal account with user name and password
  - As distinct from paper collection, where this is not required
Full PRO-EHR Integration: Provider Perspective

**Advantages**

- One place for all PRO assessment actions
- Results presented alongside other clinical data
- Real-time scoring and reporting
  - Automated workflows for actions and follow-ups
  - Alerts for actionable scores
- Standardized report formats include longitudinal scores
- Integration for EHR data for reports
- Can initiate long-term follow-up based on trigger event
- PRO completion can be done within the same workflow as other patient-facing data collection
- Real-time integration of content for clinical decision-making
- Time-saving for provider and staff over paper collection

**Disadvantages**

- Customized PRO assessment beyond current available content and features requires local EHR IT team
- Presentation of PROs to patient and provider is limited by the capabilities of the EHR
  - Customization may require involvement of local EHR IT team or additional external product
Full PRO-EHR Integration: Research Perspective

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>• PROs can be extracted alongside other EHR data</td>
<td>• Implementation of PROs may be focused on clinical utility</td>
</tr>
<tr>
<td>• Possible to have extensive assessment-specific meta-data</td>
<td>• May not be designed for staff to identify and monitor missing PRO data</td>
</tr>
</tbody>
</table>
Full PRO-EHR Integration: Administrative Perspective

Advantages

• Part of EHR system—may be no additional contracts or costs
• Standardized list of validated PROs to select and use
• Easier aggregation of PROs alongside other standard performance measures
• Automated reminders to complete PROs can be added to standard in-clinic workflow and within patient portals

Disadvantages

• May be difficult to customize PRO assessments across clinical settings
• May have restrictions on launching additional, non-standard PROs
• System may not easily allow for monitoring of missing PRO data
Information Gaps & Research Questions

• What drives patient perception of benefit from PRO collection?
• Does greater system integration matter more than a targeted, customized PRO collection system?
• Do PROs collected within or outside of a clinical encounter facilitate patient care?
• Do providers prefer EHR-integrated PRO reporting or PRO-specific systems?
Information Gaps & Research Questions

• What system features facilitate and sustain PRO use by patients and providers?

• Which system design is more feasible and sustainable...
  – In community-based settings?
  – For multi-morbid patients?
  – By care setting?

• What features in PRO collection and reporting are preferred by...
  – Patients?
  – Providers?
  – Researchers?

• Do feature preferences differ by sociodemographic characteristics of patients?
Useful References/Resources


