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Increasing uptake of comparative effectiveness and patient-centered outcomes research among stakeholders: insights from conference discussion

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The goal of comparative effectiveness research (CER) and patient-centered outcomes research (PCOR) is to improve health outcomes by providing stakeholders with evidence directly relevant to decision making. In January 2017, the Pharmaceutical Research and Manufacturers Association Foundation, alongside the Academy for Managed Care Pharmacy, organized a conference aimed at engaging experts and opinion leaders representing clinicians, patients and payers to identify and discuss barriers and strategies to enhancing uptake and use of CER/PCOR. This report summarizes the conference discussion in the following sections: preconference survey; summary of barriers and strategies to the uptake of CER/PCOR identified by conference attendees; and future perspectives on the field.

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The Federal Coordinating Council [1,2] defined comparative effectiveness research (CER) as *"the conduct and synthesis of research comparing the benefits and harms of different interventions and strategies to prevent, diagnose, treat and monitor health conditions in real-world settings"*. Patient-centered outcomes research (PCOR) is defined by the Patient-Centered Outcomes Research Institute (PCORI) [3] as *"research that addresses questions important to patients and other healthcare stakeholders, and studies outcomes meaningful to patients and other stakeholders"*. Some, but not all, PCOR is focused on comparative effectiveness; likewise, not all CER is necessarily patient centered [4]. However, both CER and PCOR share a primary goal to improve health outcomes by providing stakeholders with evidence directly relevant to their decision making. In achieving this goal, CER/PCOR is expected to reduce decision uncertainty in the real-world and inappropriate variation in clinical practice [1].

However, for CER/PCOR to succeed, one cannot automatically assume that new findings with the potential to improve quality of care will be readily taken up by patients, clinicians and other healthcare stakeholders. There are known instances where high-quality evidence is not consistently adopted into practice [5]. Likewise, interventions without strong evidence that are prematurely embraced in practice can also be ineffective or even harmful to patients.

Therefore, it has become increasingly recognized that engagement of an evidence user must occur to better align research findings with stakeholder needs and goals to ultimately improve the quality of care. The Institute of Medicine (now the National Academy of Medicine) has stressed the importance of involving stakeholders in designing and implementing studies, as well as dissemination of findings [2]. The PCORI explicitly reviews

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funding applications for evidence of engagement in research, which it defines as *"meaningful involvement of patients, caregivers, clinicians and other healthcare stakeholders throughout the research process"* [3]. Through such engagement, it is believed that research will become more relevant to the real world needs of decision makers, and lead to more significant use and uptake by its intended users.

In January 2017, the Pharmaceutical Research and Manufacturers Association Foundation, alongside the Academy for Managed Care Pharmacy organized a conference, *"Comparative Effectiveness Research and Patient-Centered Outcomes Research: Enhancing Uptake and Use by Patients, Clinicians and Payers"*. The conference organizers sought to engage evidence users of CER/PCOR, defined for the purposes of recruitment as patients, clinicians and payers. The aim of including representation across these key stakeholder groups was to foster better understanding of challenges faced by each unique group and to encourage greater adoption of successful strategies across user groups. The 70 invited participants represented academic institutions, professional associations, healthcare provider groups, insurance companies and other payer organizations, patient advocacy groups, government agencies, research groups, pharmaceutical and biotech manufacturers and others in the CER/PCOR field. A more detailed description of the conference preparations and proceedings, including list of attendees, is available in the full conference report [6].

This report summarizes the conference discussion in the following sections: preconference survey; summary of barriers and strategies to the uptake of CER/PCOR identified by conference attendees through facilitated discussions; and future perspective for the field. This report intends to summarize the conclusions reached about the patient, clinician and payer perspective as discussed with several different types of evidence users, and not as a consensus of homogeneous discussion groups

Preconference survey

The planning committee developed a preconference survey to inform and appropriately frame conference breakout sessions. The general process for selecting, administering and using the preconference survey for informing the breakout discussions is illustrated in Figure 1. All conference invitees were given the opportunity to share their perceptions of barriers and strategies to enhance the uptake of CER/PCOR from the standpoint of knowledge users (patients, clinicians and payers). Developing the survey instrument involved three stages described below: a focused literature search; an iterative approach to revising the questionnaire; and pretesting.

A targeted literature search identified published studies relating to common barriers and strategies to the implementation of evidence-based practice. PubMed (January 2000–November 2016) search strings included: *"evidence-based practice"*, *"CER"*, *"barriers"*, *"strategies"* and *"implementation"*. Based on this search, an initial pool of potential survey items to address a specific barrier or strategy to CER/PCOR was formed. This item pool was reviewed by the planning committee and revised to remove any redundant, unclear and/or irrelevant items. The questionnaire instrument was independently pretested with three graduate students to identify any questions that were difficult to understand or answer, and then further refined.

The questionnaire was organized into three sections. The first section asked the respondent to describe their primary work setting and to indicate which of the three key stakeholder perspectives (patient, clinician, or payer) they represent while answering the rest of the questionnaire. In the second section, the respondent rated ten barriers (*". . . the extent that a barrier is an issue"*) and six strategies (*". . . effectiveness of the strategy"*) on a Likert scale, from '1' (indicating that a barrier was an issue *"none of the time"* or a strategy was *"not effective"*) to '4' (indicating that a barrier was *"always an issue"* or a strategy *"extremely effective"*). The final section provided an opportunity for respondents to provide free text suggestions for additional barriers and strategies. For analysis, summary scores were calculated using the Likert scale ratings for barriers and strategies and used to rank barriers and strategies by least to most frequently encountered and effective, respectively. Rankings were reported for the overall sample and stratified by stakeholder perspective.

An email was sent to conference registrants that included a link to the web-based survey questionnaire. A total of 46 attendees responded to the survey (73% of the 64 registrants to whom an email was sent). Out of these, 23 (50%) respondents adopted the clinician perspective, 12 (26%) and 11 (24%) respondents chose payer and patient viewpoints, respectively. The most commonly identified work settings were academia (54%), industry (11%), payer organization (8%) and patient advocacy and government (both 7%). Other work settings (13%) included policy research, technology companies, professional organizations and consultancies. No respondents identified clinical practice as their primary work setting.

Table 1 summarizes the rankings of barriers and strategies for the overall sample and by stakeholder perspectives.

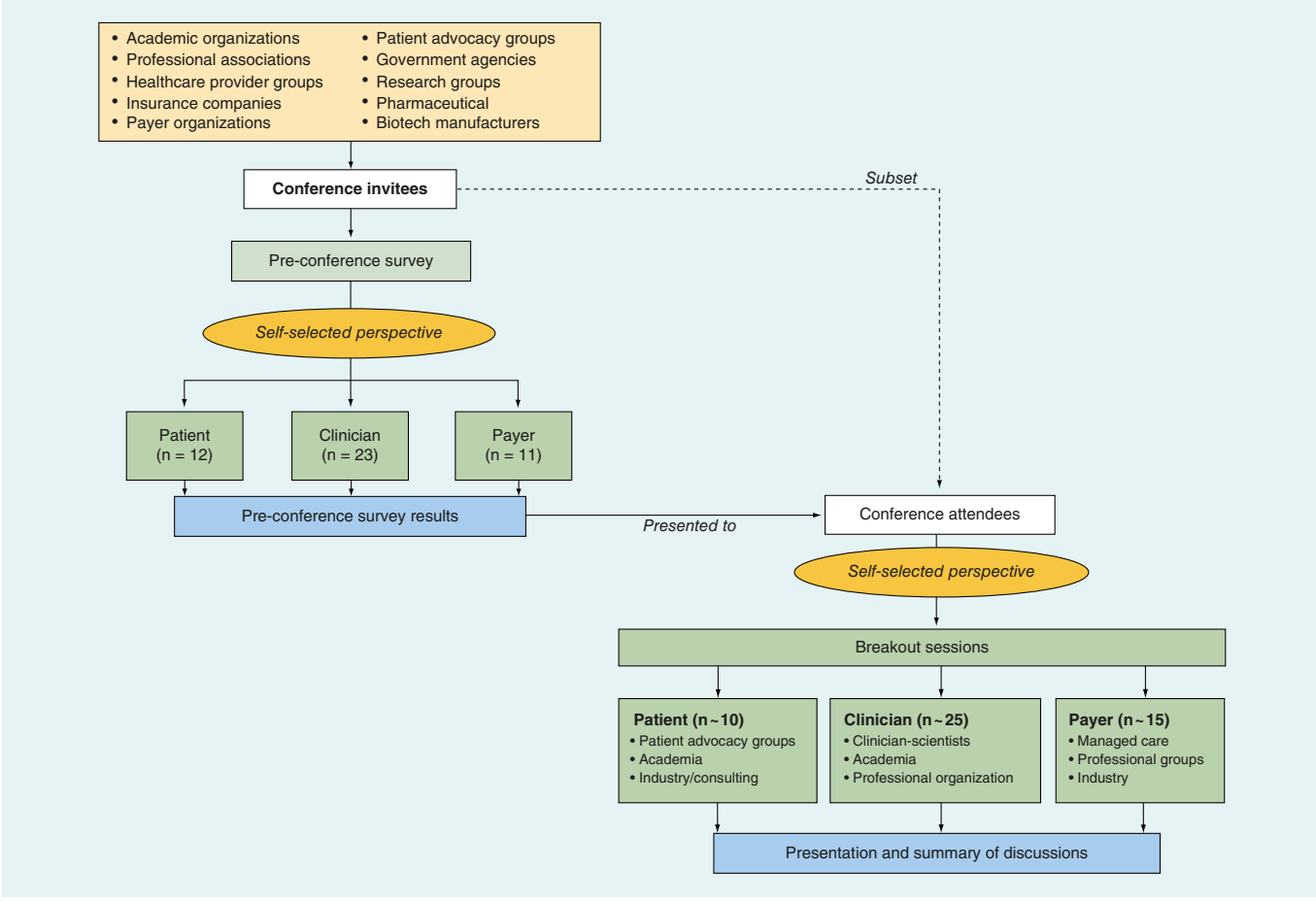

Figure 1. Conference flow, including preconference survey recruitment and breakout session organization.

While rankings for strategies were relatively consistent among all stakeholder perspectives, there were several barriers that were viewed discordantly:

- *"Access [to] CER related-studies"* was ranked as the ninth most encountered barrier by both clinicians and payers, but patients ranked this as third most encountered.
- *"Uncertainty around regulations around unpublished data for public use"* was considered the most frequently encountered barrier for payers, but ninth and seventh, respectively, for patients and clinicians.
- *"Lack of CER evidence applicable to relevant patient subpopulations"* was identified as the fourth most frequently encountered barrier by both patients and clinicians, but eighth for payers.
- *"Lack of tools to incorporate CER into decision-making"* was frequently encountered for clinicians (third) and payers (second) but less so by patients (seventh).
- *"Lack of high-quality CER studies to support decision-making"* was considered the most frequently encountered barrier for clinicians but sixth and seventh for patients and payers, respectively.

There were several limitations to the preconference survey. Eligibility to participate in the survey was dependent on being identified as a potential conference attendees by the selection committee; therefore, a degree of selection bias is inherent. Further, some respondents may not best identify with the role of a patient, clinician, or payer and therefore may have felt disingenuous representing one of these stakeholder perspectives. For example, no respondent identified clinical practice setting as their primary work setting, yet half of respondents selected the clinical perspective. However, this was likely indicative of invitees/attendees representing multiple perspectives (e.g., clinician-scientist who spends majority of time in academia but also maintains a clinical practice). Therefore, attendees having the potential to hold multiple viewpoints potentially adds to the breadth of the discussion and,

Table 1. Preconference survey summary rankings for barriers and strategies by conference attendees, overall and by key stakeholder perspective adopted by respondent in preconference survey.

Barrier	Overall	Patient	Clinician	Payer
There is a lack of high-quality CER studies to support decision-making	1	6	1	7
There is a lack of tools to incorporate CER into decision making (e.g., patient decision-aids)	2	7	3	2
There is insufficient education about how to interpret and apply results of CER studies	3	2	5	3
There is not enough CER studies to support decision-making	4	1	2	4
There is a lack of CER evidence applicable to relevant patient subpopulations	5	4	4	8
There is uncertainty around regulations around unpublished data for public use	6	9	7	1
There is a lack of trust or acceptance of CER methods and results	7	8	6	5
CER as a concept is poorly understood	8	5	8	6
It is difficult to access CER related-studies (e.g., journal publications)	9	3	9	9
CER evidence is not applicable, lacks relevance	10	10	10	10
Strategy				
Direct incorporation of CER-based recommendations into practice guidelines	1	1	1	2
More high quality and peer-reviewed summaries of CER that provide direct recommendations for decision-making	2	3	2	1
Creation of a registry/repository of CER evidence that is indexed and easily accessible	3	2	3	3
More outreach with face-to-face academic detailing sessions	4	5	4	5
Provision of direct-to-patient CER-based education materials that patients can use to help change practitioner behavior (e.g., educational material such as pamphlets, posters or audiovisual information in waiting rooms, patient decision aids)	5	4	5	6
More interactive workshops and conferences that explain the purpose, scope and application of CER to stakeholders	6	6	6	4

CER: Comparative effectiveness research.

arguably, representativeness of the results. However, it is a limitation in that the categories were not mutually exclusive.

Summary of conference discussion: barriers & strategies to uptake of CER/PCOR

Three breakout groups were organized by stakeholder perspective: patients, clinicians and payers (Figure 1). Attendees were assigned to each group based on their response to preconference response survey or self-selected during the conference. Approximately 10, 25 and 15 participants attended the patient, clinician and payer sessions. Each group was instructed to take into consideration the preconference survey results and other presentations and discussion at the conference, then identify the top barriers to CER/PCOR uptake and use relevant to their group. Another objective of the breakout groups was to identify effective strategies to improve the use of CER/PCOR. Each session was facilitated by two attendees who volunteered to be the group leader, who moderated the discussion, and a scribe, who recorded the major discussion points and recommendations made by the group. Following the breakout sessions, all conference attendees reconvened and heard summaries from representatives of each group (Table 2). The sections below summarize and discuss the presentations for each stakeholder view. References cited throughout were raised during conference or meant to provide the reader with additional background.

Patient barriers

The patient breakout session consisted of approximately ten participants from multiple backgrounds, including: patient advocacy, academic research and industry/consulting. Agreement that patients were a key audience for CER/PCOR was quickly achieved. CER/PCOR was deemed a natural component of patient's routine decision making (*"Really, the only evidence that patients are interested in is comparative evidence"*) though it was very unlikely to be identified by that term in this context. Much of the discussion focused on two themes: avoiding assumptions about patients' willingness to consume and engage with CER/PCOR, and challenges caused by the inaccessible nature of much of the available data.

Table 2. Summary of selected barriers and recommendations to increasing comparative effectiveness research/patient-centered outcomes research uptake by stakeholder perspective.

Barriers	Strategies
Patients	
Need for more understanding of patient needs and preferences by other stakeholders	Researchers and policy makers should leverage patients' desire to be involved in decision-making on system- and group-levels
Need for CER/PCOR findings that are more easily understood by patients	Publically available summaries for CER/PCOR results, presented in lay terms and contextualized to specific patient population, in actionable and achievable recommendations
Lack of research that is readily accessible on platforms frequently used by patients – *"how do we know what information sources to trust?"*	Development of tools that can be used to reconcile fragmented or conflicting information in CER/PCOR
Patients are *"more than one disease at a time"* – need for evidence that adequately addresses specific patient subpopulations	Increased patient engagement in the research process
Clinicians	
Lack of time for clinicians to effectively seek out and apply CER/PCOR	Advancement of clinical decision-support systems that increases use of CER/PCOR in routine care
Lack of high-quality evidence to address clinically relevant questions in specific patient subpopulations and heterogeneity of clinicians treating these conditions	Introduction of quality-of-care metrics that reflect best practice and are linked to reimbursement
Research does not help to increase clinician self-efficacy	Increase patient empowerment and shared-decision making
Practice setting culture can be a barrier to implementation of best evidence	–
Payers	
Lack of tools to incorporate CER into decision-making, resulting in inconsistent evaluation of the evidence	Use of study registries to help identify evidence relevant to decision-making
Concern that some decision will be perceived as discrimination, depending on the CER results used	Provide more training opportunities for decision-makers, for example, formulary committee members experienced with CER/PCOR
Difficulty accessing high-quality CER/PCOR that reflect relevant subpopulations in decision-making in a timely fashion	Central outcomes organization that coordinates CER/PCOR dissemination for greater knowledge translation and outreach to members

CER: Comparative effectiveness research; PCOR: Patient-centered outcome research.

The risks of making overly broad assumptions regarding the patient perspective, and patient's willingness as an individual (or group) to be activated or engaged with CER/PCOR, quickly became apparent. Activation was reported by discussants to be higher than expected by nonpatient groups, and care should be taken to avoid assumptions based on socio-demographic characters of the patient. Other factors (e.g., health literacy) may play a larger role, and common implicit assumptions may not reflect reality [7–9]. Multiple participants highlighted the significant heterogeneity among the category 'patients'. Not all patients have the same evidence and resource needs, nor do all patients make decisions the same way [10]. Identifying the needs of a particular patient type or group may allow for more appropriate, targeted, dissemination of CER/PCOR.

The 'unintelligible' nature of much academic CER/PCOR evidence was also identified as a barrier to use. Three particular aspects were discussed: the struggle to identify if and when a study applied to a particular patient's situation, the lack of translation available from technical language used in academic papers to patient-interpretable findings, and the role pay-walls play in restricting access. For example, the intradisease nature of many CER/PCOR studies does not necessarily reflect the complex reality of patients who live with multiple health conditions [11]. For a patient who has to balance decision-making across their entire set of healthcare needs, a disease-specific study may fail to account for the full set of comparators/alternatives. In addition, discussants reported patients receiving conflicting messages from different providers, or across sources of information (e.g., social network, lay media and internet).

The challenges to obtaining relevant information for decision making was considered and have also been echoed in recent studies [12]. Accessible tools for sorting through and identifying trustworthy, relevant evidence are an unmet need. However, caution should be taken in developing such tools; examples of past tools developed from a nonpatient perspective that fell short of addressing the needs of patients were discussed. Such efforts, while well-intended, may create new barriers, for example through the use of terminology that does not reflect the patient's own understanding of their situation, or by centering attributes that may matter less to patients, compared with other stakeholders [12].

Clinician barriers

The clinician group (~25 attendees) was composed of individuals representing several perspectives, including those of clinician-scientists, academicians and professional organization leaders. In general, participants were in agreement that CER/PCOR was an important component of evidence-based practice, approving of its intent and goals.

However, the group discussed several limitations related to CER/PCOR use that were generally focused on inadequate knowledge translation efforts. First, CER/PCOR is not focused on maximizing clinician self-efficacy. More specifically, CER/PCOR is not synthesized to readily address personal, emotional and affective needs of clinicians. Second, CER/PCOR is not designed to address heterogeneity among clinicians, including their beliefs about CER/PCOR. For example, participants reported that negative beliefs and attitudes of clinicians toward 'real-world' or nonrandomized trials was an impediment toward implementation. Third, CER/PCOR is generally not designed to account for the unique logistical challenges that a clinician faces in practice. The group described a lack of interactive tools that could be used at the bedside to help ease the burden of decision fatigue and facilitate care by incorporating the best possible evidence. Finally, there is a perception of low quantity and quality CER/PCOR studies for specific clinical areas/indications (e.g., rare diseases). With respect to other specific barriers, the group was surprised to see that lack of time was not raised in the preconference survey results, as many felt that resource-related constraints are an important category of barriers.

Payer barriers

The payer breakout session was attended by individuals (~15 participants) representing managed care organizations, professional groups and the pharmaceutical industry. Central to the discussion was uncertainty around use of unpublished study data. Unpublished data is often submitted to payer organizations by pharmaceutical manufacturers in each product submission review. However, several in the group reported the need to assess unpublished data to ensure data is robust and unbiased. Ideally, payer organizations would use their own data to assess manufacturer claims, but this is not feasible for smaller or regional payers because there is insufficient data available. This issue is magnified in submissions around special populations and rare disease where the small patient population makes data especially scarce. The lack of integrated and operable data sharing agreements that utilize real-world data to conduct studies leaves payers with a sense that there is no other choice but to use manufacturer data. The US FDA has released several draft guidance documents on manufacturer communication. However, there is currently no understanding of when this guidance will be finalized and there were fears stated that this issue will have already evolved by the time the final guidance is released, leaving the guidance outdated and unable to ultimately provide actionable recommendations [13].

Another need identified by the payer group was to develop and/or improve existing tools for decision making. A structured approach to incorporating CER/PCOR data into decision-making is lacking, and current payer evaluation processes may not be well-suited to incorporating new CER/PCOR evidence as it emerges. This challenge was felt not just for new therapies, but also (perhaps more strongly) for those where a previous decision may need to be re-evaluated (e.g., those products already on formulary). Existing tools to evaluate CER/PCOR are available, such as the CER collaborative CER literature assessment tools released by *Journal of Managed Care Pharmacy* and the International Society for Pharmacoeconomics and Outcomes Research (ISPOR), but some believed there are improvements to be made. Existing tools are still cumbersome to use, are not user friendly and take too much time to complete (e.g., >1 h per study evaluated). Further, many tools need to be more broadly promoted to ensure awareness of their existence and consistency of application.

Patient strategies

Ideally, CER, as a component of PCOR, is intended to help individuals and their caregivers make the right healthcare decisions for them [14]. Recommendations for filling the gaps from the patient perspective can be summarized into five areas. First, participants reaffirmed that CER/PCOR should be relevant to the concerns of patients and caregivers, as opposed to researchers. Second, it was felt that evidence should be presented in a way that is understandable to one of its target audiences: patients. Third, evidence should be actionable and achievable by the patient. Fourth, the healthcare choices offered to the patient should align with other information they are given, as well as that given to clinicians. Fifth and finally, participants emphasized the need for CER evidence to be useful in patient decisions making. The main mechanism to overcoming patient-perspective barriers will likely be found through patient engagement throughout the research process, from research question formation to dissemination,

something true PCOR requires. This can ensure the question is one of the interest to patients, the right outcome end points are being studied, and there is a patient-centered approach to translation and dissemination.

In summary, the content of discussion in the patient session is consistent with the definition and intent of PCOR. However, work in PCOR is new, and further refinement of the tools and methods that help improve patient engagement throughout the research continuum and improve the use of information by patients in decision making is needed. These are continued areas for research, not for patients but with the patient community. Recent practice examples provide positive encouragement for future efforts, and a number of organizations have integrated patient engagement into their goals and activities [15–17].

Clinician strategies

There are several strategies that can be used to improve the use of CER/PCOR in clinical settings. First, given the growing role of health information technology in clinical delivery systems, there is a perceived need to develop clinical decision support tools that encourage and assist clinicians with making choices based on the best-available evidence. These tools should leverage technologies in ways that are highly scalable and minimally disruptive to the clinical workflow. Vendors invest energy into building the interfaces, or 'scaffolds'. But, it is up to evidence-generators such as researchers and end-users, namely patients, to work together to ensure it is married with useful content and operationalized as executable recommendation [18,19].

Second, interventions based on 'nudging' clinicians toward recommending more effective therapies, using the principles of behavioral economics should be explored. There are several examples demonstrating the effectiveness of such programs, which could be simple and cost-effective to implement. For example, poster-sized commitment letters to avoid inappropriate antibiotic prescribing hung in outpatient examination rooms reduced inappropriate prescribing for acute respiratory illness [20].

Third, not all CER/PCOR need be relayed or enacted by clinicians, and indeed removing clinicians from the equation may at times be not only reasonable, but desirable, to maximize the speed and efficiency of information diffusion and behavioral change. Many of the major determinants of health are not found in healthcare, but rather are a function of the social and physical environment as well as individual behaviors such as alcohol use, injection drug use (needles), unprotected sex and smoking. In such cases, policy-makers can better act on relevant CER data. For example, the Healthy People 2020 program, originally initiated by the Department of Health and Human Services in 1979, aims to increase quality of life, healthy development and health-promoting behaviors across all ages by creating of social and physical environments that encourage good health [21]. One of its mission statements is to *"engage multiple sectors to take actions that are driven by the best available evidence and knowledge"*.

Patient empowerment was identified as a potential win–win scenario, since empowered patients are more likely to participate in their care actively, and subsequent clinical encounters may begin further along in the shared decision-making process, allowing the clinician to focus on forming the treatment and monitoring plan with the patient. Finally, economic incentives that reward focus on CER/PCOR-based recommendations should be explored. There is no way around the reality that clinicians take notice of which services are billable or claims, and ensuring that these services align with the best available evidence is vital for implementing CER/PCOR results.

In summary, the gaps that exist in implementing CER/PCOR from the clinician perspective are, like many things in healthcare, driven by the complexity of the clinical environment. The number of possible decisions that arise and the rapidity of the expanding evidence base are an inevitability. Many clinicians are acutely aware of the patient- and system-level gaps in the implementation of the best available evidence, and the impact of these challenges on care is felt in practice.

Payer strategies

The challenges faced by payers to incorporating CER/PCOR into decision-making are numerous, but several themes emerge when describing effective strategies to reduce barriers: education, centralized resources and coordination.

First, a concerted effort is needed to educate payer decision-makers in CER/PCOR to assist them in understanding the ways this evidence can inform decisions in healthcare. Targeted education must be adapted toward decision-makers with no healthcare background (e.g., financial administrators), and should be brief, describing what CER is, its purpose, and how it is beneficial. A central research organization should step in to fill the void that exists in collating, evaluating, and disseminating CER/PCOR research results. More specifically, this organization would synthesize high-quality study summaries that are produced in a timely fashion, to be readily incorporated into decision-making. This organization should be an interdisciplinary group that identifies the principles of, and

guidelines for, use of CER/PCOR in decision-making for or key stakeholders. These guidelines should align, reconcile and update existing guidelines developed and released by various organizations [22]. However, the critical challenge is who would fund and establish such an expert and unbiased organization.

Second, payer organizations should consider recommending (or requiring) pharmacy & therapeutics committee membership include an individual with formal CER/PCOR training. This may be facilitated by a major payer organization (e.g., Centers for Medicare and Medicaid Services) updating their requirements for pharmacy & therapeutics committee member selection to encourage buy-in from other organizations resulting in general movement among payers. This would increase the likelihood that scholarship funds would be allocated to support training requirements/recommendations.

Third, a central repository is needed to support coordinated dissemination efforts. The European Network of Centres for Pharmacoepidemiology and Pharmacovigilance, a network composed of volunteer members from public institutions and contract research organizations coordinated by the EMA, was discussed as a potential model for establishing a similar initiative in the USA [23]. European Network of Centres for Pharmacoepidemiology and Pharmacovigilance also creates a collaborative environment wherein members can access resources for conducting research in pharmacovigilance and pharmacoepidemiology (such as code of conducts, checklists and standard for methodological rigor), communicate with members in online forums, and register studies in a publically available database of noninterventional, postauthorization studies. An added benefit of such a system is increased transparency of study methods and procedures.

Fourth, payers should collaborate to form distributed research networks, which leverage internal data, and aggregate data across multiple health plans [24]. Networks could be used to independently generate CER/PCOR research findings and reduce reliance on proprietary (manufacturer or commercial) data. Further, large databases could support analyses that serve to fill the research gaps existing with specific patient subgroups (e.g., those with rare diseases). An example of developing networks include initiatives by Harvard Pilgrim Healthcare [24].

In summary, the strategies discussed have a great potential to improve the way in which payers serve their members. However, it is clear that considerable will, leadership and resources are required to move forward with any of the strategies suggested. Payers will need to be flexible and adaptable to evolve with the USA healthcare environment as it moves toward value-based system. Some organizations are already reforming their formulary processes, incorporating streamlining their formulary designs and incorporating noninterventional evidence (i.e., CER/PCOR) [25]. However, these innovations are relatively recently, it remains to be seen whether these changes will be effective in improving outcomes, and the outcomes patients care about.

Future perspective

Patients, clinicians and payers are faced with making choices about treatments that range from those that only marginally improve health outcomes to those that can profoundly alter the clinical practice landscape, disease prognosis, or function and quality of life of patients. In doing so, each stakeholder group needs to be armed with the best possible evidence to be accountable to themselves and their own constituents. On the surface, one may expect that each stakeholder group will have different goals and priorities, and therefore face unique challenges and solutions to incorporating CER. The discussion from this conference supports this expectation to a certain degree. Patients express the need for nontechnical tools and education materials to fully understand the spectrum of treatment alternatives available and supported by CER/PCOR. Clinicians welcome technology that can quickly and accurately facilitate decision-making under the barrage of information faced in practice. Payers are often working with unpublished data and short timelines for making coverage decisions make incorporation of CER a unique challenge.

However, this conference also illuminated barriers and strategies shared across the three perspectives. All groups expressed the need for more research that clarifies treatment effects in specific patient populations not typically included in pivotal clinical trials. Further, research should be presented in high-quality summaries and/or decision-making tools that can be readily applied in the real world. All groups also perceived a central registry/repository or CER/PCOR evidence that is easily accessible to be of high importance. Therefore, it appears CER/PCOR researchers should engage several stakeholder groups together early in the study design, before implementation and clearly before disseminating results. Such an engagement process may begin by sharing and clarifying perceived needs within each group, then identifying together research priorities held by all parties to proactively align relevant study objectives. This approach would help clarify and streamline research goals, create 'buy-in' from all stakeholders, and generate momentum that can propel research forward all the way through to implementation.

In summary, discussion among conference attendees representing the perspective of patient, clinicians and payers suggest that patient-centeredness is in alignment with the overall goals of each stakeholders. However, conference attendees still expressed continued challenges to translating contemporary CER/PCOR for immediate use. CER/PCOR is not equally applicable to all stakeholders to ensure evidence-based decision making is truly tailored to the end-user. While current organizations such as Patient-Centered Outcomes Research Institute, Agency for Healthcare Research and Quality and others have moved us toward a more patient-centered, evidence-based healthcare environment open to the uptake of comparative effectiveness data, there is still room for improvement. Deeper engagement with the patient and provider community, and more focused outreach into the payer and health systems communities, will help us achieve better integrate CER/PCOR into the real-world setting and ultimately improve the healthcare experience.

Executive summary

- Comparative effectiveness research (CER) and patient-centered outcomes research (PCOR) aims to facilitate improved real-world decision-making and health outcomes from the perspective of key stakeholders.
- Key stakeholders include patients, clinicians and payers – each with their own unique needs and potential solutions.
- In January 2017, the Pharmaceutical Research and Manufacturers Association Foundation and Academy of Managed Care Pharmacy hosted a conference to identify and discuss both gaps in the uptake and use of CER/PCOR, and approaches to enhance the uptake and use of CER/PCOR evidence by stakeholder group.
- This special report highlights the discussions that took place at the meeting, including a preconference survey and breakout sessions, while highlighting relevant research, and provides perspective on the common issues and potential strategies for addressing barriers to uptake of CER/PCOR.

Discussion

- Discussants taking the patient perspective reported two major barriers to using CER/PCOR: nonpatient groups making overly broad assumptions about willingness of an individual (or group of) patient(s) and their willingness to engage CER/PCOR and challenges related to access to usable CER/PCOR information.
- The patient perspective group recommended several strategies, including ensuring that research is relevant to patient concerns (as opposed to researchers'), that evidence is presented in a comprehensible manner, and the research is actionable.
- The clinician perspective discussants reported CER/PCOR as not maximizing clinician efficacy, lacking effort in addressing heterogeneity among clinicians and their beliefs about CER/PCOR, and adapted to the numerous complexities faced in clinical decision-making.
- The clinician perspective group called for a several strategies, including a need to develop robust clinical decision-support tools, exploring the potential for behavioral interventions (e.g., 'nudging') and increasing patient empowerment.
- The payer perspective discussants stated numerous major barriers for using CER/PCOR, including timeliness of available data, reliance on commercial/manufacturer data and analyses, and need for CER/PCOR awareness and expertise within payer organizations.
- The payer perspective group offered several strategies, including the development of an evidence repository of high-quality CER/PCOR study summaries to support in decision-making, establishing distributed research networks between payer organizations (e.g., health insurance plans) to facilitate pertinent analyses, and increased support for CER/PCOR knowledge/skill development within payer groups (e.g., pharmacy & therapeutics committees).

Conclusion

- Conference attendees generally felt that increased engagement with evidence generators (i.e., researchers) and evidence-users (i.e., stakeholders) is necessary to facilitate successful dissemination and implementation of CER/PCOR research, with the ultimate goal of improving health outcomes.
- This conference illuminated barriers and strategies unique to each stakeholder group but also those shared across the three perspectives.
- CER/PCOR researchers should engage several stakeholder groups together early in the study design, before implementation and before dissemination of the results.

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References

Papers of special note have been highlighted as: • of interest

1. Conway PH, Clancy C. Comparative-effectiveness research – implications of the Federal Coordinating Council's report. *N. Engl. J. Med.* 361(4), 328–330 (2009).
2. Sox HC, Greenfield S. Comparative effectiveness research: a report from the Institute of Medicine. *Ann. Intern. Med.* 151(3), 203–205 (2009).

• **Provides an overview of the report from the Institute of Medicine about the definition of comparative effectiveness research (CER), national priorities, general CER methods and recommendations for knowledge transfer.**

3. Selby JV, Beal AC, Frank L. The Patient-Centered Outcomes Research Institute (PCORI) national priorities for research and initial research agenda. *JAMA* 307(15), 1583–1584 (2012).
4. How does PCOR relate to comparative effectiveness research (CER) and does PCORI fund CER? PCORI help center. https://help.pcori.org/hc/en-us/articles/213717137-How-does-PCOR-relate-to-comparative-effectiveness-research-CER-and-does-PCORI-fund-CER
5. Lenfant C. Clinical research to clinical practice – lost in translation? *N. Engl. J. Med.* 349(9), 868–874 (2003).
6. PhRMA Foundation. Events. www.phrmafoundation.org/events/
7. Gwynn KB, Winter MR, Cabral HJ *et al.* Racial disparities in patient activation: evaluating the mediating role of health literacy with path analyses. *Patient Educ. Couns.* 99(6), 1033–1037 (2016).
8. Eneanya ND, Winter M, Cabral H *et al.* Health literacy and education as mediators of racial disparities in patient activation within an elderly patient cohort. *J. Health Care Poor Underserved* 27(3), 1427–1440 (2016).
9. Blakemore A, Hann M, Howells K *et al.* Patient activation in older people with long-term conditions and multimorbidity: correlates and change in a cohort study in the United Kingdom. *BMC Health Serv. Res.* 16(1), 582 (2016).
10. Benbassat J, Pilpel D, Tidhar M. Patients' preferences for participation in clinical decision making: a review of published surveys. *Behav. Med.* 24(2), 81–88 (1998).
11. Tinetti ME, Studenski SA. Comparative effectiveness research and patients with multiple chronic conditions. *N. Engl. J. Med.* 364(26), 2478–2481 (2011).
12. Heath N, Castillo WC, Majid T *et al.* Patient engagement in observational pharmacoepidemiology research: where are we, where do we need to be, and what are the steps for getting there? *Pharmacoepidemiol. Drug Saf.* 25(Suppl. S3), Abstract 74 (2016).
13. Ahlstrom A, Behm A, Blanchette CM *et al.* AMCP Partnership Forum: enabling the exchange of clinical and economic information pre-FDA approval. *J. Manag. Care Spec. Pharm.* 23(1), 105–112 (2017).

• **Discusses issues around information exchanged between biopharmaceutical manufactures and payers and policy-makers, including its implications for decision-making and health technology innovation.**

14. Burke JG, Jones J, Yonas M *et al.* PCOR, CER, and CBPR: alphabet soup or complementary fields of health research? *Clin. Transl. Sci.* 6(6), 493–496 (2013).
15. Harrington R, Hareendran A, Scott A *et al.* Patient engagement in outcomes research: a snapshot from the ISPOR community. *Value Outcomes Spotlight* 2(5), 11–14 (2016).
16. Perfetto E, Gomel R. Engaging patients at multiple levels (2016). www.pharmacy.umaryland.edu/media/SOP/wwwpharmacyumarylandedu/centers/PROEM/summer-institute/2016/engaging-patients-on-multiple-levels.pdf
17. Patient-Centered Outcomes Research Institute. PCOR training: a program for rare disease patient advocates. Accessed 4 April 2016 (2016). www.pcori.org/research-results/2015/pcor-training-program-rare-disease-patient-advocates
18. Kawamoto K, Houlihan CA, Balas EA, Lobach DF. Improving clinical practice using clinical decision support systems: a systematic review of trials to identify features critical to success. *Brit. Med. J.* 330(7494), 765 (2005).
19. Miller A, Moon B, Anders S, Walden R, Brown S, Montella D. Integrating computerized clinical decision support systems into clinical work: a meta-synthesis of qualitative research. *Int. J. Med. Inform.* 84(12), 1009–1018 (2015).

20. Meeker D, Knight TK, Friedberg MW *et al.* Nudging guideline-concordant antibiotic prescribing: a randomized clinical trial. *JAMA Intern. Med.* 174(3), 425–431 (2014).

21. Fielding J, Kumanyika S. Recommendations for the concepts and form of healthy people 2020. *Am. J. Prevent. Med.* 37(3), 255–257 (2009).

22. Cole SW, May JR, Millares M, Valentino MA, Vermeulen L, Wilson AL. ASHP guidelines on the pharmacy and therapeutics committee and the formulary system. *Am. J. Health Syst. Pharm.* 65, 1272–1283 (2008).

23. Andrews EB, Moore N. A description of the European Network of Centres for Pharmacoepidemiology and Pharmacovigilance as a global resource for pharmacovigilance and pharmacoepidemiology. *Mann's Pharmacovigilance*. Goedecke T, Arlett P (Eds). John Wiley & Sons, NJ, USA, 403–408 (2014).

- **Describes the European Network of Centres for Pharmacoepidemiology and Pharmacovigilance as a Global Resource for Pharmacovigilance and Pharmacoepidemiology as a potential model for a CER registry which has been implemented in Europe.**

24. Popovic JR. Distributed data networks: a blueprint for big data sharing and healthcare analytics. *Ann. NY Acad. Sci.* 1387(1), 105–111 (2017).

25. Sullivan SD, Yeung K, Vogeler C *et al.* Design, implementation, and first-year outcomes of a value-based drug formulary. *J. Manag. Care Spec. Pharm.* 21(4), 269–275 (2015).