Forum: Health Preference Research and Value Assessment Frameworks in Digital Health Technologies

Brought to you by the
ISPOR Health Preference Research Special Interest Group
Discussants

MODERATOR
• Axel Muehlbacher, PhD, Hochschule Neubrandenburg, Neubrandenburg, MV, Germany

SPEAKERS (30 Min)
• (10 min) Katarzyna Kolasa, PhD, PAREXEL and Kozminski University, Warsaw, MZ, Poland, will focused on the elicitation and integration of patient preference data in the valuation of DHT.
• (10 min) Panos Kanavos, PhD, London School of Economics and Political Science, London, England, UK, will give insights into a Value Assessment Framework (VAF) employed to evaluate provider-facing Digital Health Technologies (DHTs).
• (10 min) Volker Amelung, PhD, Private Institute of Applied Health Service Research (inav GmbH), Hannover, Germany, will share his experiences from Germany, providing a unique perspective on the valuation and implementation of DHT.

DISCUSSION (20 Min)
Aggregate Simulation Partworth Values
3D probabilistic model: value assessment

Mühlbacher, Sadler (2023)
How to redefine value creation in the era of digital health?

Katarzyna Kolasz, PhD
Digital Health Leader
Kozminski University
Until Q1’19, over 22,000 people with Parkinson’s disease enrolled, making Fox Insight the largest prospectively followed Parkinson’s disease cohort worldwide.
Healthier SG is a national initiative by the Ministry of Health (MOH) that aims to help all Singaporeans take steps towards better health and quality of life in the years to come.

- Subsidies of up to 87.5% for a selected chronic medications
- Subsidies of up to $360 per year for other components such as consultation and lab tests.

https://www.healthhub.sg/programmes/hsg
Digital health shifts focus from treatment to prevention

“Participants receive daily prompts via text message or email to check-in to the program to engage with educational content and motivational behavior change” activities.

Participants earn points for engagement and can redeem accumulated points for e-gift cards.”

https://healthprize.com/outcomes/significant-increases-in-copd-medication-adherence/
Approximately 30% of the world's data volume is generated by the healthcare sector today!
The era of digital transformation has arrived…
Nudge theory

Individual sovereignty is BACK

"I'M SORRY DOCTOR, BUT AGAIN I HAVE TO DISAGREE."
How to define value drivers for health technologies in the digital health era?

**Revealed preferences** – based on actual consumer’s observed market activities.

**Stated preferences** - derived from surveys allowing researchers to control the way in which preferences are elicited.
How to define value drivers for health technologies in the digital health era?
How to define value drivers for health technologies in the digital health era?

We can successfully study health preferences.
Proposed conceptual framework for health preferences studies

Social Welfare Function
distributional issues

Trade-off between different:
- objectives
- attributes
- course of action

- SWF allows to estimate the trade off between alternative course of actions.
- The intention is to define the importance (weight) to be assigned to potential gains achieved with one course of action relative to another.
- The marginal rate of substitution (MRS) along the relevant welfare curve. MRS is the rate at which some amount of one good can be exchanged for another good while maintaining the same level of utility (satisfaction).
Conflicting objectives in the healthcare sector - efficiency vs equity

In which case, in Your opinion, the state would take the most appropriate decision on extra fund dividing FOR THE PARTICULAR YEAR?

<table>
<thead>
<tr>
<th>Disease A</th>
<th>Disease B</th>
</tr>
</thead>
<tbody>
<tr>
<td>WITHOUT TREATMENT</td>
<td>WITHOUT TREATMENT</td>
</tr>
<tr>
<td>Life expectancy: Does not affect</td>
<td>Life expectancy: 6 months</td>
</tr>
<tr>
<td>Quality of life: Reduced by 50%</td>
<td>Quality of life: Reduced by 50%</td>
</tr>
<tr>
<td>TREATMENT</td>
<td>TREATMENT</td>
</tr>
<tr>
<td>Life expectancy: Does not affect</td>
<td>Life expectancy: 18 months</td>
</tr>
<tr>
<td>Quality of life: Full</td>
<td>Quality of life: Reduced by 50%</td>
</tr>
</tbody>
</table>

% of answers:
- 0: 11% 100%
- 100: 24% 75%
- 200: 38% 50%
- 300: 13% 25%
- 400: 14% 0%

For which group of patients, in Your opinion, the state should provide treatment IN THE FIRST PLACE (for the particular year)?

<table>
<thead>
<tr>
<th>Group X</th>
<th>Group X</th>
</tr>
</thead>
<tbody>
<tr>
<td>of 100 patients</td>
<td>of 100 patients</td>
</tr>
<tr>
<td>WITHOUT TREATMENT</td>
<td>WITHOUT TREATMENT</td>
</tr>
<tr>
<td>Life expectancy: 2 years</td>
<td>Life expectancy: 4 years</td>
</tr>
<tr>
<td>Quality of life: Reduced just as in group Y</td>
<td>Quality of life: Reduced just as in group X</td>
</tr>
<tr>
<td>TREATMENT</td>
<td>TREATMENT</td>
</tr>
<tr>
<td>Life expectancy: 8 years</td>
<td>Life expectancy: 15 years</td>
</tr>
<tr>
<td>Quality of life: Does not affect</td>
<td>Quality of life: Does not affect</td>
</tr>
</tbody>
</table>

% of answers:
- Group X 2 years + 2 years: 49%
- Group Y 8 years + 8 years: 51%
- Group X 2 years + 4 years: 49%
- Group Y 8 years + 8 years: 51%
- Group X 2 years + 8 years: 57%
- Group Y 8 years + 8 years: 43%
Are responders willing to accept digital health against the opportunity of greater life expectancy?

\[ \frac{P}{1-P} = a + b_1 \times \text{marginal trade-off} + b_2 \times \text{relative difference} \]

- \( P \): Probability of choosing digital healthcare model
- marginal trade-off: Difference in minimal life expectancy between both models divided by the difference in maximum life expectancy between both models.
- relative difference: Percentage difference between max and min life expectancy in the digital model

In a cross-sectional study across 320 Polish responders aged 20-39, there was a strong preference towards digital solutions irrespective of life expectancy’s gains.

Preferences were mainly driven by past experiences and potentially predefined beliefs, less so by the value assessment of the digital solutions (efficiency gains as new value drivers?)
Are there any specific characteristics of digital health of greatest importance?

Majority of responders selected both medical exams and governmental certification for digital solutions.

HEALTHCARE 5.0

| Model selection (all scenarios together) | Digital model | Analogue model | Sex | Female | Male | Age | 20–29 | 30–39 | Education | Secondary or lower | Higher | Professional status | Employed | Unemployed | Respondent’s severe disease | Yes | No | Severe disease in the family | Yes | No | Subjective assessment of financial independence | Low rating – below median | High rating – above median | Subjective health self-assessment | Low rating – below median | High rating – above median | Assessment of the healthcare system in Poland | Low rating – below median | High rating – above median |
|-----------------------------------------|---------------|----------------|-----|--------|------|-----|--------|--------|-----------|---------------------|--------|----------------------|----------|-------------|-----------------------------|-----|-----|-----------------------------|--------|----------------|-----------------------------|--------|----------------|-----------------------------|--------|----------------|-----------------------------|
| VA is allowed to initiate contact anytime if health symptoms are required | 43%           | 26%            | 31% | 100%   | 100% | 100%| 26%    | 24%    | 43%       | 29%                | 32%    | 31%      | 100%     | 100%         | 100%                         | 43% | 26% | 31%                          | 100%   | 100% | 100%                         | 43%   | 26% | 31%                          | 100%   | 100% | 100%                         |
| VA is allowed to connect with you only in pre-agreed time slots | 40%           | 23%            | 31% | 100%   | 100% | 100%| 26%    | 23%    | 43%       | 31%                | 32%    | 31%      | 100%     | 100%         | 100%                         | 40% | 23% | 31%                          | 100%   | 100% | 100%                         | 40%   | 23% | 31%                          | 100%   | 100% | 100%                         |
| You are only able to connect to VA | 40%           | 23%            | 31% | 100%   | 100% | 100%| 26%    | 23%    | 43%       | 31%                | 32%    | 31%      | 100%     | 100%         | 100%                         | 40% | 23% | 31%                          | 100%   | 100% | 100%                         | 40%   | 23% | 31%                          | 100%   | 100% | 100%                         |
| Quantity | 320        | 186            | 134 | 160    | 160  | 110  | 100%  | 29%    | 100%      | 100%                | 100%   | 100%    | 100%     | 100%         | 100%                         | 320 | 186 | 134                          | 160    | 160 | 110                          | 100%   | 29% | 100%                         | 100%   | 100% | 100%                         |

Kolasa K. The Digital Transformation of the Healthcare, System Routledge 31 July 2023
AlValue4Health

- Under the patronage of the Polish Parliamentary Commission of Innovation and the National Chamber of Physicians, Kozminski University is organizing a public dialog about the role of AI in the healthcare system:

So far

- Three systematic literature reviews,
- Two workshops with experts,
- Two presentations at the Polish Parliament
- Two DCEs based studies about physicians and general public preferences towards AI
Cross-sectional study across the representative sample of 1000 Polish responders. The hypothetical scenarios with DCE revealed mixed attitudes towards the use of AI in the healthcare.

"Which of two visions are closer to yours…" 60% (40 %) chose digital (analog) approach to take care of the health. The preferences did not change significantly even if doctor’s safety guarantee or bonus payment were added.

*Digital – wearables & apps*

*Analog – direct F2F consultation with physicians*

"Would you prefer Virtual Assistant if it is faster and safe…" 50%/50% chose YES/NO and NO was change into YES only for every 4th responder provided external validation with doctors and positive feedback from peers.
QALY is always a QALY…really?

• We assume that two people cannot occupy the same health state and yet experience different utilities

• Is it still fair to assume so in the digital health era?
Usefulness - product enables user to achieve their goals - the tasks that it was designed to carry out and/or wants needs of user.

Effectiveness (ease of use) - quantitatively measured by speed of performance or error rate and is tied to a percentage of users.

Learnability - user's ability to operate the system to some defined level of competence after some predetermined period of training. Also, refers to ability for infrequent users to relearn the system.

Attitude (likeability) - user's perceptions, feelings and opinions of the product, usually captured through both written and oral communication.

In contrast to clinical value drivers, digital health value drivers rely more on patients’ preference.

Patient centric healthcare

Conclusions

- Digital health re-introduces individual sovereignty (freedom of choice)
- Social and cultural aspects play an important role in the AI technologies implementation
- Conducting more health preference studies is crucial for advancing our understanding of value drivers for health technologies
Creating a Value Framework to assess digital health technologies for chronic disease management

Panos Kanavos, PhD
Department of Health Policy & LSE Health - Medical Technology Research Group
London School of Economics, London, UK
Background & hypotheses

• Traditional HTA pathways are unsuitable for assessing the value of digital health technologies (DHTs)
  – DHTs must be held to different evidence standards due to the nature of the solution: fast-paced innovation, high volume of solutions, limited ability for RCTs, nature of risk vs. benefits, etc.
  – DHTs pose risks largely unperturbed by health systems due to big data collection and analytics.

• Alternative assessment pathways are need to holistically assess the value of DHTs
  – This involves value assessment domains beyond economic and clinical effectiveness as well as multi-stakeholder involvement.
Overview

Aim
To understand key stakeholder* sentiments on where value lies in innovative health technologies used in chronic disease management in the UK, USA and Germany.

To create a value framework for digital health technology (DHT) assessment.

Method
Secondary research via a literature review to propose an initial value framework statements and understand key issues surrounding the assessment of DHTs.

Primary research via the Delphi method to:
- Validate and create the DHT value framework
- Understand key stakeholder thoughts and opinions on where value lies in user-facing and system-facing DHTs used in chronic disease management; therefore, 2 Decision Contexts (DCs)

* Stakeholders: users (patients), healthcare professionals, supply-side actors, decision-makers, influencers
Creating the Framework: 5 stakeholder groups in 3 rounds of Delphi

**Delphi Round 1:**
32 original value constructs proposed by LSE.
Participants were able to comment and suggest new constructs.
129 invited
101 participated
78.3% participation rate
LSE researchers conducted a thematic analysis to incorporate participant comments and suggestions.
Result: 45 value constructs

**Delphi Round 2:**
45 value constructs from Round 1.
Participants made value judgements on a Likert scale in two separate decision contexts.
129 invited
91 participated
70.5% participation rate

**Decision Context 1:**
A user-facing technology

**Decision Context 2:**
A system-facing technology

**Delphi Round 3:**
Participants who completed Round 2 were shown average responses across all stakeholder groups and given the opportunity to change their answer, if desired.
91 invited*
79 participated
86.8% retention rate
61.2% overall participation rate
Result: 8 value constructs were removed due to a lack of consensus.

* Participants could only move onto the next round if they completed Likert judgements in both decision contexts.
Publications: a value framework for patient-facing DHTs and a value framework for provider-facing DHTs

References


<table>
<thead>
<tr>
<th>Themes from R1 Qualitative Data</th>
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</thead>
<tbody>
<tr>
<td><strong>Clinical characteristics</strong></td>
</tr>
<tr>
<td>Evidence requirements</td>
</tr>
<tr>
<td>Health system improvement</td>
</tr>
<tr>
<td>Outcomes</td>
</tr>
<tr>
<td>Patient Centeredness</td>
</tr>
<tr>
<td><strong>Data rights and governance</strong></td>
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<tr>
<td>Access</td>
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<tr>
<td>Commercialization of data</td>
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<tr>
<td>Consent</td>
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<tr>
<td>Data ownership</td>
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<tr>
<td><strong>Economic characteristics</strong></td>
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<tr>
<td>Affordability</td>
</tr>
<tr>
<td>Health system integration</td>
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<td><strong>Technical characteristics</strong></td>
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<tr>
<td>Connectivity</td>
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<td>Data uploads</td>
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<td>Data validity</td>
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<tr>
<td><strong>User preferences</strong></td>
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<td>Convenience</td>
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<td>Customization</td>
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<td>Impact</td>
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<tr>
<td>Wellbeing</td>
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<tr>
<td><strong>Health inequalities</strong></td>
</tr>
<tr>
<td>Access</td>
</tr>
</tbody>
</table>
Interrater agreement within stakeholder groups: DC1 – User-facing technologies

Table 2. Interrater agreement within stakeholder groups in Decision Context 1

<table>
<thead>
<tr>
<th>Stakeholder group</th>
<th>Round 2</th>
<th>Benchmark Interval</th>
<th>Round 3</th>
<th>Benchmark Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ky</td>
<td>95% CI</td>
<td>Ky</td>
<td>95% CI</td>
</tr>
<tr>
<td>Users</td>
<td>0.71***</td>
<td>0.67 - 0.76</td>
<td>0.74***</td>
<td>0.70 - 0.79</td>
</tr>
<tr>
<td>Health care</td>
<td>0.61***</td>
<td>0.57 - 0.66</td>
<td>0.67***</td>
<td>0.63 - 0.72</td>
</tr>
<tr>
<td>professionals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply side</td>
<td>0.61***</td>
<td>0.55 - 0.67</td>
<td>0.69***</td>
<td>0.63 - 0.74</td>
</tr>
<tr>
<td>Decision Makers</td>
<td>0.66***</td>
<td>0.62 - 0.70</td>
<td>0.70***</td>
<td>0.65 - 0.74</td>
</tr>
<tr>
<td>Influencers</td>
<td>0.57***</td>
<td>0.52 - 0.63</td>
<td>0.66***</td>
<td>0.60 - 0.71</td>
</tr>
</tbody>
</table>

Notes: Interrater agreement measured by the Oren’s agreement coefficient with linear weights. Benchmark scale of the level of agreement as suggested by Landis and Koch (1977): Coef. < 0.00 Poor agreement; 0.00 > Coef. ≤ 0.20 slight agreement; 0.20 > Coef. ≤ 0.40 Fair agreement; 0.40 > Coef. ≤ 0.60 Moderate agreement; 0.60 > Coef. ≤ 0.80 Substantial agreement; 0.80 > Coef. ≤ 1 Almost perfect agreement [1].

SO WHAT?
As expected, individuals within the same stakeholder groups have similar sentiments to value. When testing for differences between stakeholder groups, the first requirement is to ensure individuals within the same groups are in agreement.

- This table shows the level of agreement within each stakeholder group for each round in DC1.
- There was substantial agreement for all stakeholder groups in their round 3 responses.
Interrater agreement within stakeholder groups: DC2 – System-facing technologies

SO WHAT?
Although there are still relatively good levels of agreement for all stakeholder groups – the lower levels of agreement in comparison to user-facing technologies may indicate that there is less clarity regarding the value of system-facing technologies.

- This table shows the level of agreement within each stakeholder group for each round in DC2.
- Compared to DC1, there are lower levels of agreement within the HCP and Supply Side groups.

### Table 3. Interrater agreement within stakeholder groups in Decision Context 2

<table>
<thead>
<tr>
<th>Stakeholder group</th>
<th>Round 2</th>
<th>Benchmark Interval</th>
<th>Round 3</th>
<th>Benchmark Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$k_y$</td>
<td>95% CI</td>
<td></td>
<td>$k_y$</td>
</tr>
<tr>
<td>Users</td>
<td>0.72***</td>
<td>0.68</td>
<td>0.75</td>
<td>Substantial Agreement</td>
</tr>
<tr>
<td>Health care professionals</td>
<td>0.40***</td>
<td>0.32</td>
<td>0.48</td>
<td>Fair Agreement</td>
</tr>
<tr>
<td>Supply side</td>
<td>0.52***</td>
<td>0.42</td>
<td>0.63</td>
<td>Moderate Agreement</td>
</tr>
<tr>
<td>Decision Makers</td>
<td>0.62***</td>
<td>0.56</td>
<td>0.67</td>
<td>Substantial Agreement</td>
</tr>
<tr>
<td>Influencers</td>
<td>0.58***</td>
<td>0.52</td>
<td>0.65</td>
<td>Moderate Agreement</td>
</tr>
</tbody>
</table>

Notes: Inter-rater agreement measured by the Gwet’s agreement coefficient with linear weights. Benchmark scale of the level of agreement as suggested by Landis and Koch (1977): Coef. < 0.00 Poor agreement; 0.00 > Coef. ≤ 0.20 slight agreement; 0.20 > Coef. ≤ 0.40 Fair agreement; 0.40 > Coef. ≤ 0.60 Moderate agreement; 0.60 > Coef. ≤ 0.80 Substantial agreement; 0.80 > Coef. ≤ 1 Almost perfect agreement [1].

*p<0.1; **p<0.05; ***p<0.01
The policy response required includes a combination of a regulatory approach and aligned incentives through value assessments.

- Some value indicators are not reflected in regulation or assessment frameworks.
  - Dependent on the decision context: i.e. In the patient-facing context (DC1) “data is user owned” has consensus, but this sentiment is not reflected in any study country’s regulations nor frameworks. This indicator has dissensus in DC2, where the patient is not the primary user but is still the data subject.

Clear agreement that data privacy is highly valued

- but policy work still needs to be done to define what that privacy looks like in practice. Regulations need to be updated to match technological advancements.

Issues around data custody do not have consensus and need further investigation in multi-stakeholder settings.

Issues around health inequalities are frequently raised…

- … But there is not consensus around the value of DHTs reducing socioeconomic health inequalities.
- More multi-stakeholder discussions are needed about DHTs and their relationship to health inequalities.
Discussion (cont.)

- **New evidence standards must be considered in value frameworks.**
  - DHTs need RWE to prove value.
  - Assessment approaches must shift from the traditional pre-market entry data collection and post-market entry pharmacovigilance towards continual data collection and assessment pre- and post- market entry.
    - This highlights why digital HTA must be different from traditional HTA: the inability to meet traditional evidence standards increases the need to use RWE to prove value; so, whose intellectual property is the collected data?
    - This also reinforces the need for a shift in assessment from economic and clinical indicators to a multi-criteria decision making analysis (MCDA) approach.

- **There is wide variation in types of DHTs, so multiple assessment approaches are needed.**
  - Varying levels of risk and benefit, varying levels of technical innovation, varying abilities to prove value using traditional methodologies, varying impact on the system.
Key Takeaways

• **Value domains**: clinical characteristics, economic characteristics, health inequalities, data rights and governance, technical and security, user preferences

• **Consensus**: there was Consensus on several/no consensus on other criteria

• **Preferences**: Different types of stakeholders have considerably different opinions on value.
  - E.g. Users are keen on the ability to own and input their own data while supply-side actors disagree.

• **Value judgements**: Across all stakeholders, value judgements differ considerably between decision contexts.
  - i.e. The context with *user-facing technologies* was more stable and had more indicators with consensus than the context with *system-facing technologies*.

• **Policy-making**: Create innovative policies to satisfy value preferences of all stakeholders based on what is important to each
Health Preference Research and Value Assessment Frameworks in Digital Health Interventions – a Political Perspective

Prof. Dr. Volker E. Amelung
Medical School Hannover
Value for Money
GEMEINSAM DIGITAL
Digitalisierungsstrategie für das Gesundheitswesen und die Pflege
Key-Elements:

- Opt-out for EHR
- eRx and medication management
- Interoperability
- Use of data (registries (Denmark), claim data and EHR) für research
- Participatory approach
Digital Therapeutics (DTx) - Examples ...
Structured Market Access ...
... First Results ...

**Results of the assessment by the BfArM up to now**

- **Applications submitted by manufacturer**
- **Assessment by the BfArM**
- **Positive decisions**: 47
- **Negative decisions**: 16
- **Withdrawn**: 94
- **Currently being processed**: 8
- **Deleted from Directory**: 6*

*of which 2 DiGA on application of the manufacturer

**But how to convince doctors?**

Graphic updated on: 05/17/2023
Discussion or Questions & Answers section (pick)
Value Equation

Mühlbacher, Fischer, Jordan (2023)
It’s time for a Poll! ... again

• In your opinion, what specific outcomes or benefits should be included in the assessment of value for digital health interventions? (e.g., improved health outcomes, enhanced patient experience, reduced healthcare costs, increased convenience)

• What factors influence your acceptance and willingness to engage with digital health interventions? (e.g., ease of use, privacy and security, integration with existing healthcare services, trust in the technology)

• In your experience, what barriers or challenges do you face when adopting or using digital health interventions? (e.g., technical difficulties, lack of support or guidance, concerns about privacy)

• What recommendations would you give to improve the assessment and evaluation of value dimensions in digital health interventions?
Thank you
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- Nutrition Economics
- Oncology
- Open-Source Models
- Patient-Centered
- Precision Medicine & Advanced Therapies
- Rare Disease
- Real World Evidence (RWE)
- Statistical Methods in HEOR
Health Preference Sessions Later Today

13:45 - 14:45
• Workshop 227: Every Patient Matters: Introduction to Multi-Dimensional Thresholding in Health Preference Research

17:00 - 18:00
• Issue Panel 250: How to Assess Patient Preferences for Use in Decision-Making Along the Medical Product Life Cycle? Learnings from Patient Preference Studies across Diverse Disease Domains
Thank you!

For questions:
healthpreferencesig@ispor.org