Participatory design of transparent and understandable AI/ML-enabled medical devices

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AI/ML transparency is a hard problem

Data generated → Data curated, cleaned, questions posed, analysis designed → Analysis interpreted (redesigned, reanalyzed) → Application (redesigned, reanalyzed)

Transparent AI/ML development and implementation process
Understandable AI transparency is a design problem

Basic design principles
Derived from basic and applied science of what engenders trust and what makes information easy to understand and interpret

Context
Understanding user information needs and the context of use

Participatory and iterative design processes
Validation and iteration with users over increasingly high fidelity

Understandable AI transparency
AI trust and explanations

- **Trustworthy and useful AI**
  - Accurate
  - Transparent
  - Understandable
  - Fair
  - Secure
  - Private
  - Empowers patients

- **Explanation goodness**
  - Appropriate detail
  - Veridical (truthful)
  - Useful
  - Clear
  - Complete
  - Observable
  - Reveals boundaries

- **A sufficient explanation**
  - Balances detail and comprehensibility
  - Explains how and also: Why? Why not? What if?
Questions to answer

• What content should be included in labeling AI/ML-enabled medical devices:
  • Accuracy of models?
  • Population from which models are derived?
  • Frequency of model revision?
  • Testing methods?
  • Oversight responsibility?

• How do we present this content in a way that is both sufficiently transparent and easily understood?

"Labeling is defined as all labels and other written, printed, or graphic matters (1) upon any article or any of its containers or wrappers, or (2) accompanying such an article. Depending on the circumstances, labeling may include packaging, product inserts, Web sites, and other promotional materials."

Contextual interviews and focus groups

- Do you trust the information?
- Would you want to know about its accuracy?
- What data was used in development?
- How your data is used?
- Testing and oversight?
- ...
Participatory iterative design of AI transparency

**Concepts**
- High level ideas
  - Low fidelity sketches
  - Qualitative assessment
  - Representative participants (small numbers)

**Mockups**
- Many choices
- Narrow choices and improve on best options (more iterations)
- Qualitative and quantitative assessment
- Representative participants (small numbers)

**High fidelity prototypes**
- Few choices
- Quantitative and qualitative assessment
- Representative participants (medium numbers)
- Improve again (fewer iterations)

**Post deployment assessment and design iteration**

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**AI Facts**

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Health Innovation through Human-Centered Design

Optimizing user experiences and health outcomes with health technology and artificial intelligence

Inter-professional education, empathy, equity in university education and health professions

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