Developing **computable knowledge** about **clinical performance feedback**

Towards a learning health system for contraception care: Representing knowledge for tailored clinical practice feedback

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Background

Learning health systems possess advanced knowledge management capabilities that refine knowledge, often in computable forms, through learning cycles[1]. A key step of the learning cycle is the transition from knowledge to practice (K2P), in which refined knowledge is used to generate interventions to influence healthcare professional practice. Clinical practice feedback, delivered via quality dashboards and reports, is a widely used strategy to change practice with a growing evidence base. Using the learning cycle as a conceptual framework, we explore the development of computable knowledge[2] for learning about clinical practice feedback interventions, applied to the implementation of a new practice of offering immediate postpartum long-acting reversible contraception (IPLARC) to patients (Figure 1). Clinical practice feedback about IPLARC includes hospital-level performance measures based on percentages of eligible women who are a) offered contraception, and b) provided with IPLARC at time of childbirth.

We draw from two domains to explore a foundation for computable knowledge in tailored practice feedback: *user stories* and *behavior change interventions*. In a prior study we explored the affordances in adopting user stories to manage requirements for the design of 11 tailored performance feedback messages with a collection of 9 user stories for IPLARC (Table 1). User stories associate a specific software function (what) with a specific user (who) and a rationale (why). *Behavior change interventions* are "policies, activities, services, or products designed to induce or support people to act differently from how they would have acted otherwise"[2]. Components of behavior change interventions are specified in the Behavior Change Intervention Ontology (BCIO)[2] (Figure 2). A message tailoring system could identify performance information and generate candidate messages with metadata from user stories and BCIO (Figure 3) to evaluate and rank feedback messages (Figure 4).

Objective

To understand the potential of user stories and BCIO for developing and managing computable knowledge about tailored feedback messages.

Methods

We conducted a preliminary mapping exercise that related IPLARC user stories with BCIO constructs.

Results

User stories were associated with the following BCIO constructs: Content (n=9); Population (n=7); Engagement (n=2) and Delivery (n=2). BCIO constructs were useful for organizing requirements and recognizing opportunities to create knowledge objects for tailoring feedback messages, based on professional role and performance difference characteristics captured in the user stories.

Conclusion

User stories and BCIO may be useful as a foundation for computable knowledge about tailored performance feedback reports in learning health systems. Future work will apply this knowledge in a message tailoring system for clinical performance feedback.

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References

1. Adler-Milstein J, Nong P, Friedman CP. Preparing healthcare delivery organizations for managing computable knowledge. Learning Health Systems. 2018:e10070.
2. Friedman CP, Flynn AJ. Computable knowledge: An imperative for Learning Health Systems. Learn Health Syst. 2019 Oct 6;3(4):e10203.
3. Michie S, Thomas J, Johnston M, Aonghusa P, Shawe-Taylor J, Kelly M et al. The Human Behaviour-Change Project: harnessing the power of artificial intelligence and machine learning for evidence synthesis and interpretation. Implementation Science. 2017;12(1).

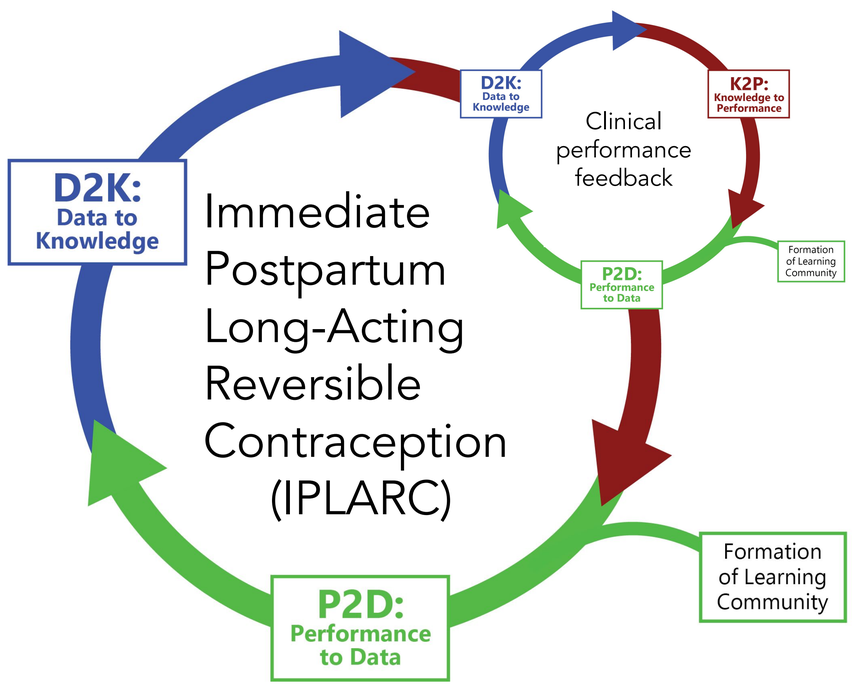

Figure 1. Learning cycles[1] for health system knowledge about clinical performance feedback, applied to immediate long-acting reversible contraception

Table 1. Example user stories (i.e. requirements) for performance feedback to healthcare professionals implementing Immediate Long-Acting Reversible Contraception (IPLARC)

1	*As a(n)*	attending physician,
	I want to	receive performance feedback about IPLARC counselling, placement and outcomes
	So that	I can evaluate my performance holistically
2	*As a(n)*	attending physician,
	I want to	receive performance feedback within the body of an email
	So that	I can spend less time opening attachments
3	*As a(n)*	attending physician,
	I want to	receive performance data from other clinics
	So that	I can compare my clinic to others

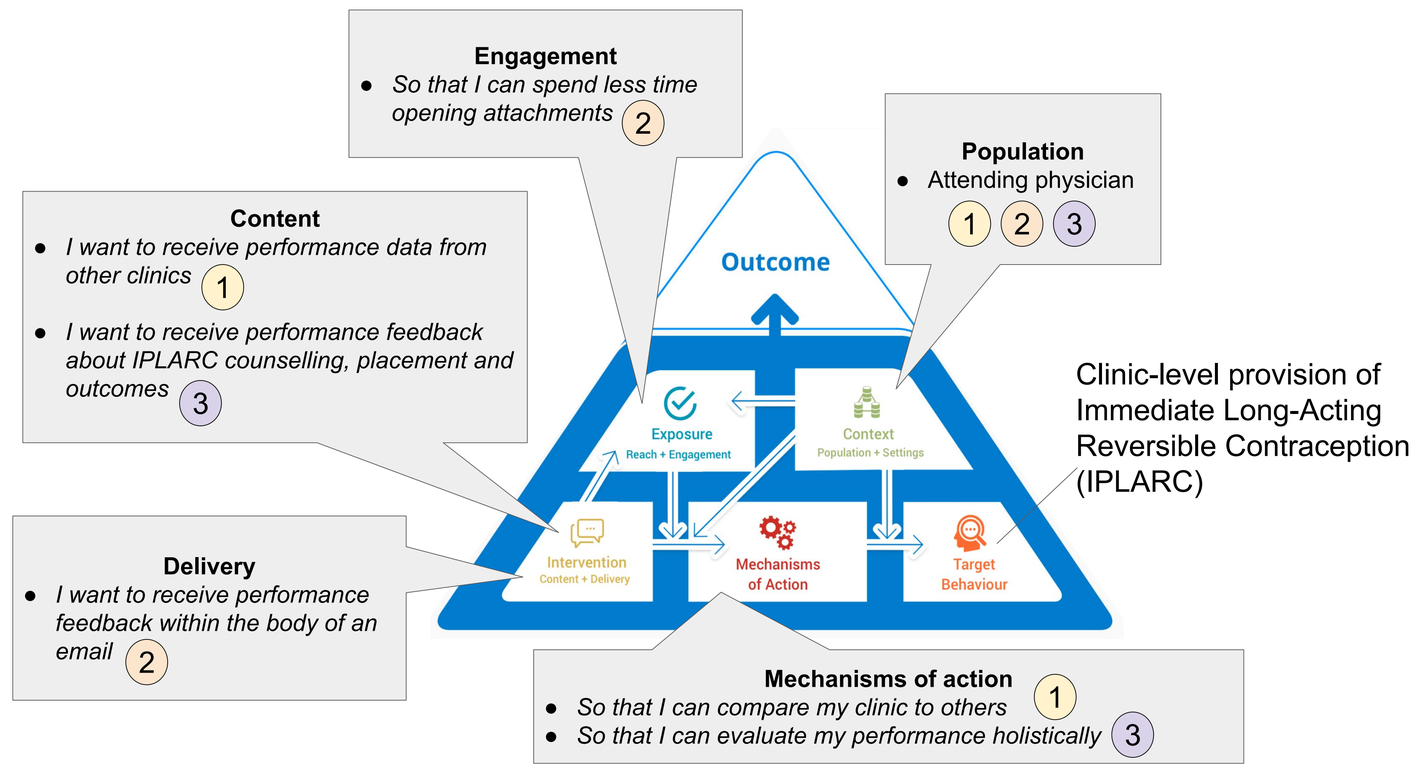

Figure 2. Specifying performance feedback requirements from user stories using the upper level of the Behavior Change Intervention Ontology[2] (BCIO)

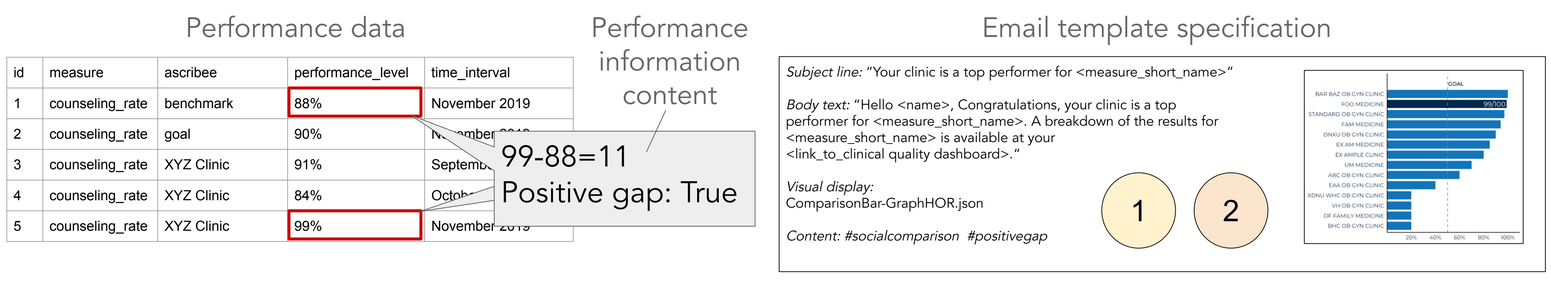

Figure 3. Performance data, information content and email template for a candidate performance feedback message

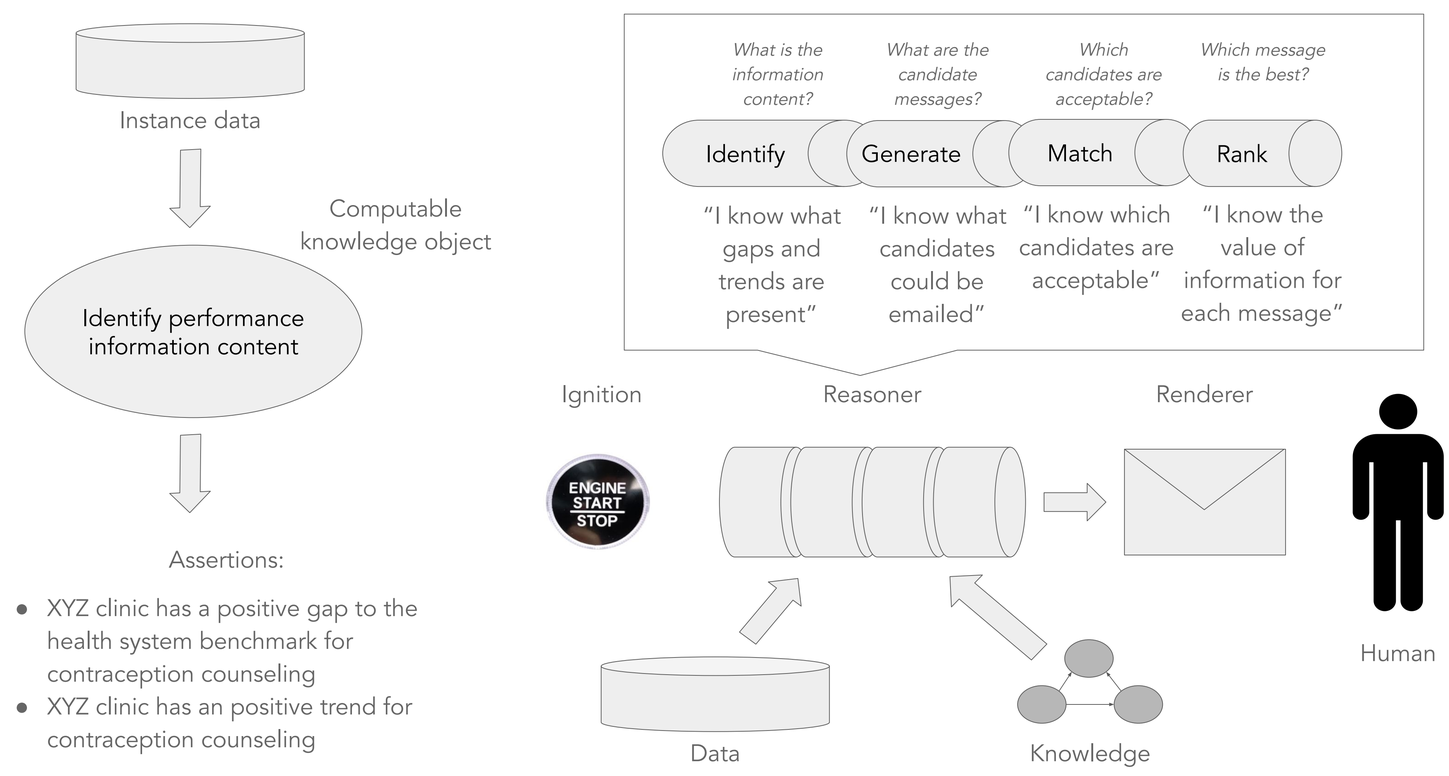

Figure 4. Computable knowledge[2], architecture and reasoning steps in a knowledge-based message tailoring system