Octo: An Educational Toy for Supporting Families Navigating Congenital Heart Disease (CHD)

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This research project harnesses the power of play to empower families navigating Congenital Heart Disease (CHD), impacting about 40,000 U.S. births annually. The primary objective is to transform Octo, a physical and digital toy prototype, into a play-driven educational caregiver. This transformation aims to elevate a child's health literacy by deepening their understanding of CHD, alleviate parental burden through accessible educational support, and enhance healthcare provider efficiency by minimizing the need for extensive education during visits, fostering seamless care coordination among all CHD stakeholders. Octo addresses critical gaps in pediatric care, including accessible knowledge, managing multi-stakeholders, overcoming usability testing challenges for child-focused interventions, and systematically integrating play into pediatric care. Developed in collaboration with the Department of Pediatrics, Octo's physical design has undergone iterative refinements from 2022 through 2024. The proposed research employs mixed methods, participatory design, and field deployment supported by pre/post assessments to evaluate Octo's impact on the multiple CHD stakeholders. This multifaceted approach aims to 1) gather stakeholder feedback on Octo's design, 2) incorporate children's perspectives into Octo's design, and 3) conduct a field deployment to optimize Octo's effectiveness, assessing its impact on children's increased health literacy.

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CONGENITAL Heart Disease affect nearly CHD

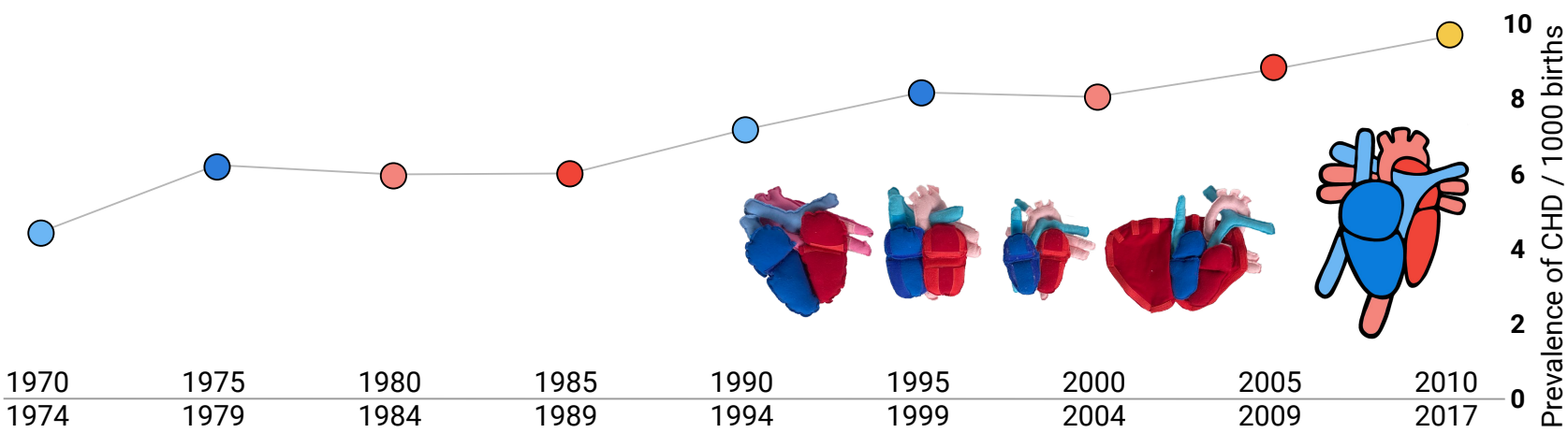
1% births per year in the United States

most common birth defects **40,000**

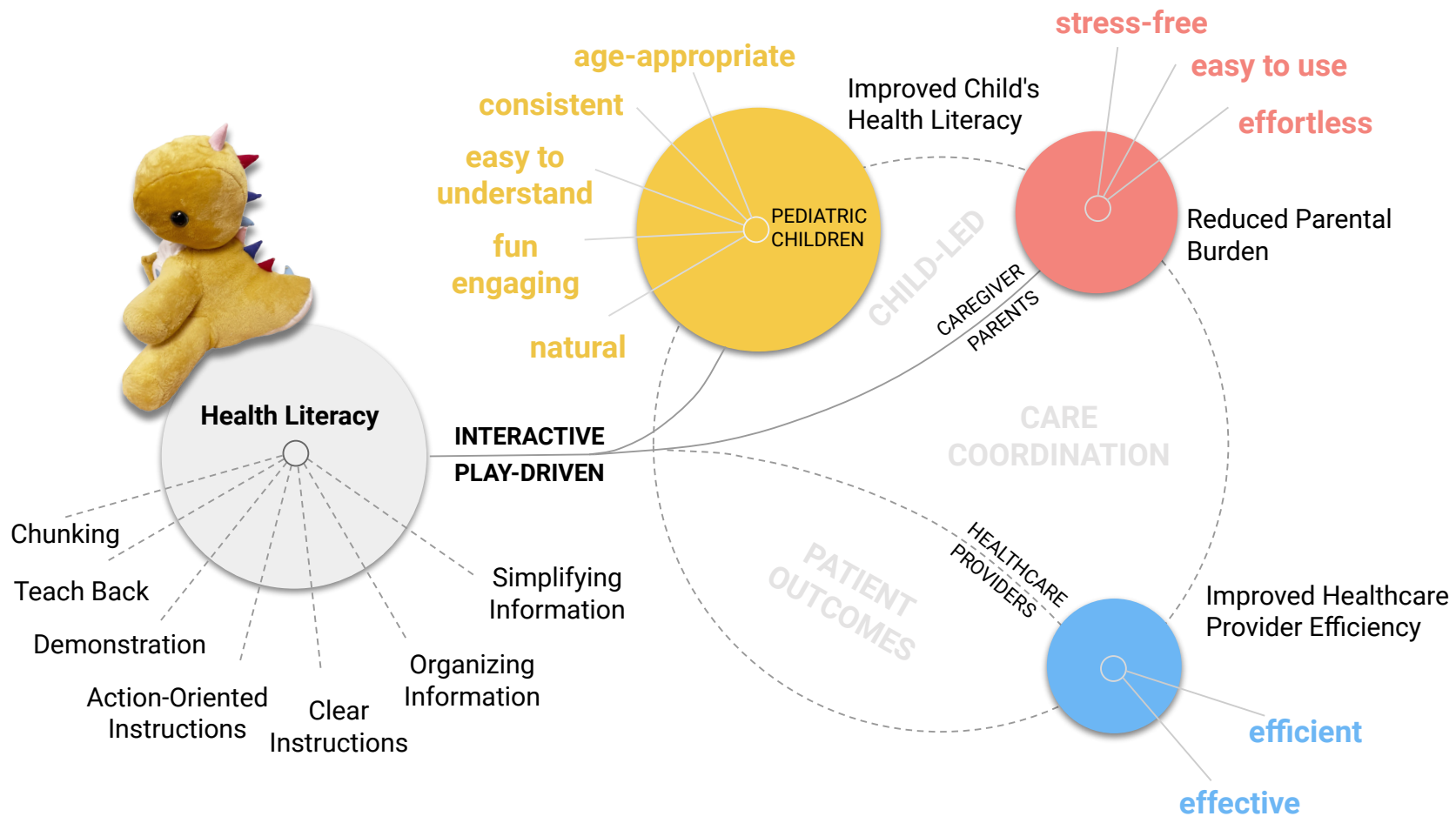
"There is a tendency to try and protect children from information. This continues as they grow, then all of a sudden they're leaving for college or starting their first job and have only a vague idea of their heart condition. Slow and early introduction is one of the best ways to become familiar with the medical information, but we don't have many child-friendly tools to facilitate this for CHD children."

- Amr El-Bokl, MD, MPH, MS

Electrophysiology Fellow
Boston Children's Hospital



Health literacy is essential for patients and caregivers to be actively involved in the development and execution of their care plan. Health literacy is more than an individual's capacity to read, encompassing the ability to read, interpret, understand, and retain health information. This has a tremendous impact on patient education, satisfaction, adherence, follow-up, and ultimately outcomes (Burns et al., 2022).



conventional interventions

Parent-centered
Family-centered
Not respecting children's rights as active participants in their care journey.

play-driven interventions

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2023-2026

from concept **to prototype**

1. Design Exploration
creative design process

Interdisciplinary collaboration with the department of pediatrics

from prototype **to toy**

2. Creative Engagement
stakeholder involvement

Adoption of a child-led approach for inclusive stakeholder voices

from toy **to caregiver**

3. Field Deployment
assessment and evaluation

Deployment in real-life Settings for uncontrolled pattern and interaction gathering

Project Initiation:
Concept Development
Iterative Prototyping

Research Design
IRB Approval

Pre-Assessment

Phase 1:
Prototype Development and Stakeholder Feedback

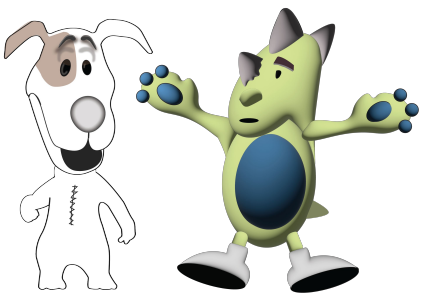
Phase 2:
Incorporating Children's Voice, Participatory Design

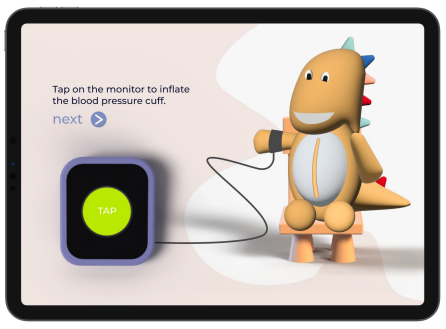
Phases 3:
Octo Deployment and Evaluation as an Educational Caregiver

Post-Assessment

Concept Development:
Octo, a plush octopus with removable 3D-printed hearts.

Character Evolution:
From plush dog to dinosaur, Introducing an 'Open-World' digital app.





Removable Heart
Plush heart inside a chest cavity with velcro- connected pieces for the chambers, inflows and outflows. It can be rearranged to show different CHD states.

Echo Wand
Plush Echo wand triggers Echo activity in the app. Fits in the doctor bag.

Blood Pressure Cuff
Plush blood pressure cuff can be put on any of the limbs.

Doctor's Bag & Tools
Comes with a doctor's bag with four different tools to help prepare for CHD experiences through pretend play that pairs with experiences in the app.

EKG Stickers
EKG stickers can be moved and placed across the chest and limbs.

Toothbrush
Plush toothbrush to brush Octo's smile!

Octo's Evolution:

journey from conception to present

Prototype 1

Prototype 2

Prototype 3

Prototype 4

Octo’s Evolution:

4 plush dinosaur prototypes

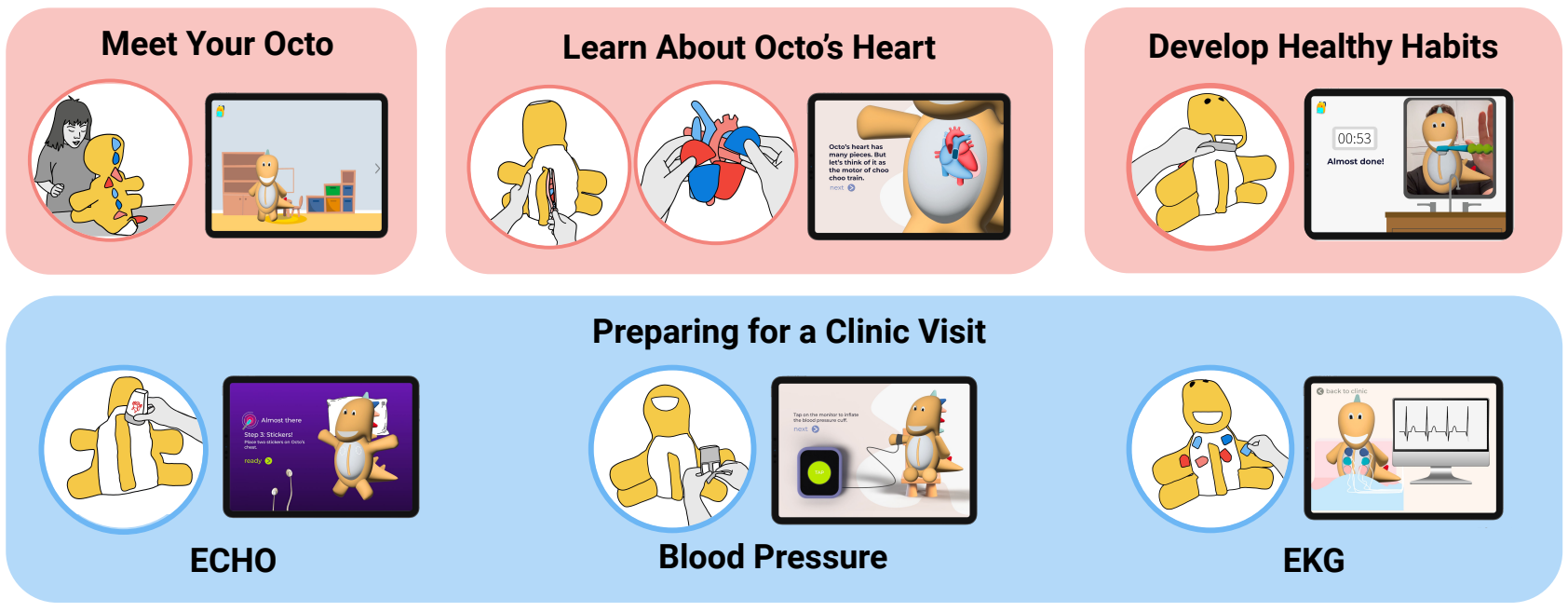
35% individual
28% PARENTS
U.S. adult population
PARENTAL
HEALTH **LITERACY**
CHILDREN

“In CHD, affected patients and families experience unique circumstances and care that require understanding health literacy. This process of learning foreign and complicated subject matter under significant duress represents immense challenges in assuring adequate information delivery and understanding in the limited opportunities associated with learning for families.”

- (Burns et al., 2022)

Health literacy in CHD
Cambridge University Press

This storyboard illustrates key interactions between a parent and child engaging with Octo, an educational toy comprising both a digital app and a physical plush toy. The narrative unfolds with the initial introduction to Octo, followed by learning about Octo's heart, cultivating healthy habits such as brushing teeth for dental hygiene, and preparing for clinic visits.



App Experiences & AR Prototypes