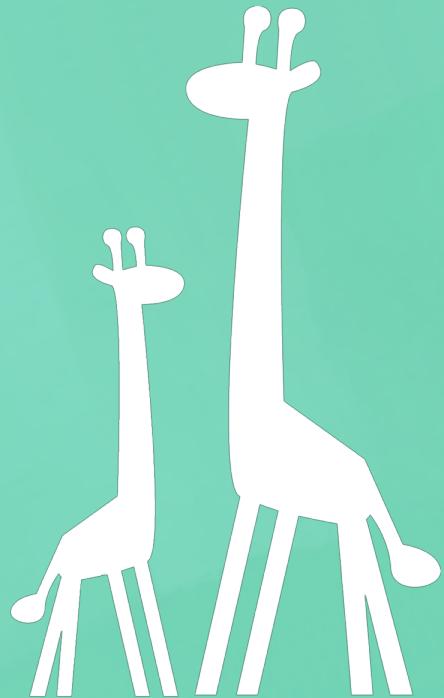


Reducing Vaccine Anxiety for Children

Nat DeMenthon





Sears Pediatrics

Needle fears reported in...

2/3 of children

1/4 of adults

1/12 reported
immunization
noncompliance and
healthcare avoidance
because of this fear



How might we...

- ◆ *Reduce patient anxiety during and before vaccination appointments, to lessen the possibility of children developing lasting needle phobias?*
- ◆ *Develop a specialized solution that would be accessible to smaller pediatric offices, and not just hospitals with more employees and larger budgets?*

INSPIRATION

interviews with stakeholders



Interview with Dr. Sears



Current struggles:

- ◆ 3-6 age group is the most difficult
- ◆ “Easy” vaccines: 5 minutes
- ◆ “Difficult” vaccines: up to 30 minutes before giving up and trying another day
- ◆ Most difficult part is convincing children to lie down for leg administration

Interview with Dr. Sears



Design criteria:

- ◆ Up to 3 minutes setting up a distraction method
- ◆ Parental participation and sufficient distraction work best for having vaccination go smoothly
- ◆ Not technologically savvy

Interview with 6-year old patient



- ◆ Didn't know what vaccines were for
- ◆ Favorite game is i-Spy
- ◆ Doesn't play games on parents' phones
- ◆ Likes the prize at the end of shots
- ◆ Doesn't like getting vaccinations on leg

Observation of vaccine administration

- ◆ Parents were active participants
- ◆ Child protested the most when set to lie down for the vaccine
- ◆ Child seemed least upset when distracted by iPhone
- ◆ No limb movement allowed
- ◆ iPhone was not visible during the vaccine administration

Additional research findings

- ◆ Customized pre-treatment simulations were effective in hospitals for reducing preoperative anxiety (Liguori 2016)
 - ◆ Were created by and for the specific hospital, however
- ◆ Digital distraction methods are more effective in reducing pain perception than non-digital methods (Li 2011, Windich-Biermeier 2007)
 - ◆ VR typically inaccessible to smaller pediatricians

IDEATION

Design session with youth



Design prompt:

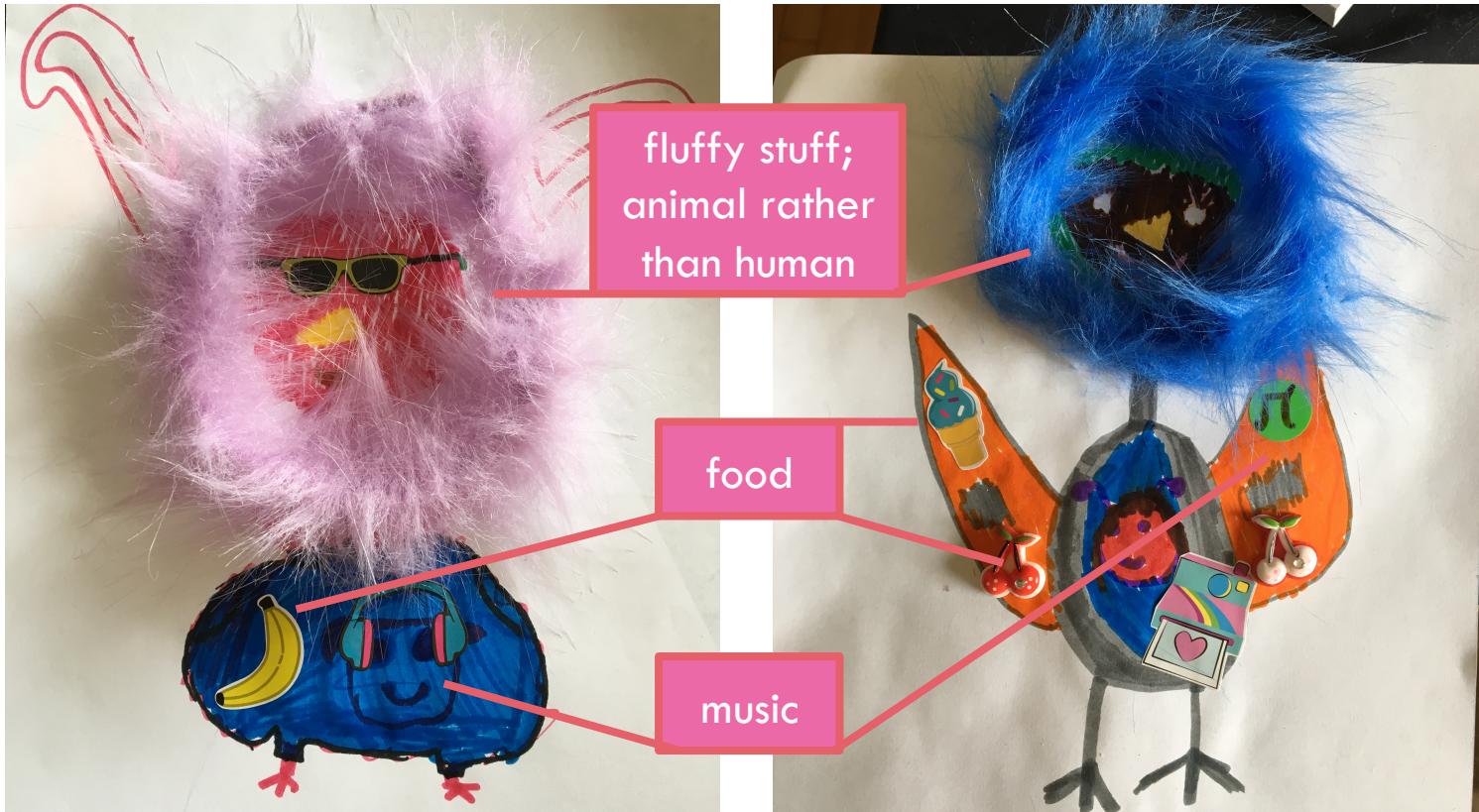
- ◆ “How could you help a friend who is sad or scared far away?”
- ◆ Make something or someone that could comfort them in your place.

Bags of Stuff

- ◆ Young age group so no writing
- ◆ Stickers were most effective storytelling tools



Design session



ITERATION

Prototypes for solutions



CHARACTER CONCEPTS



mama mabel



mac



doctor dee dee

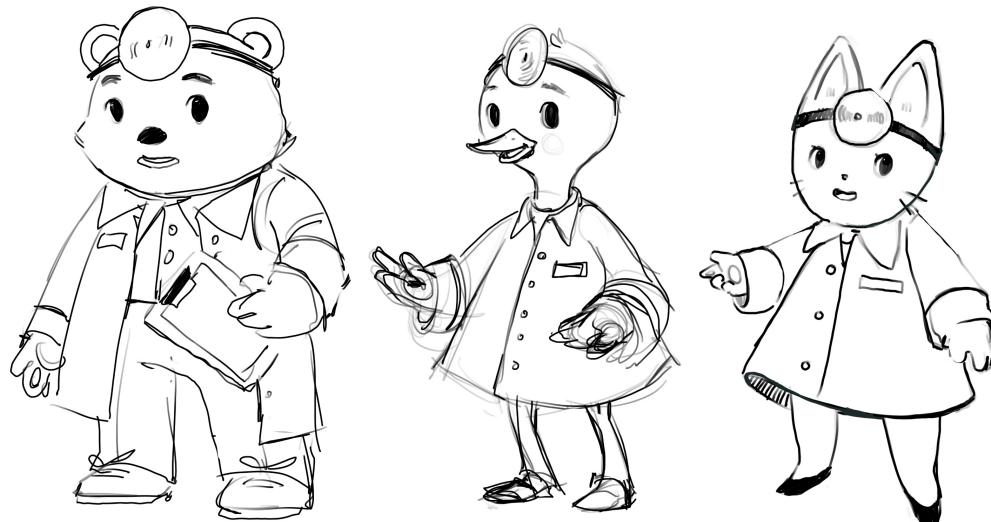
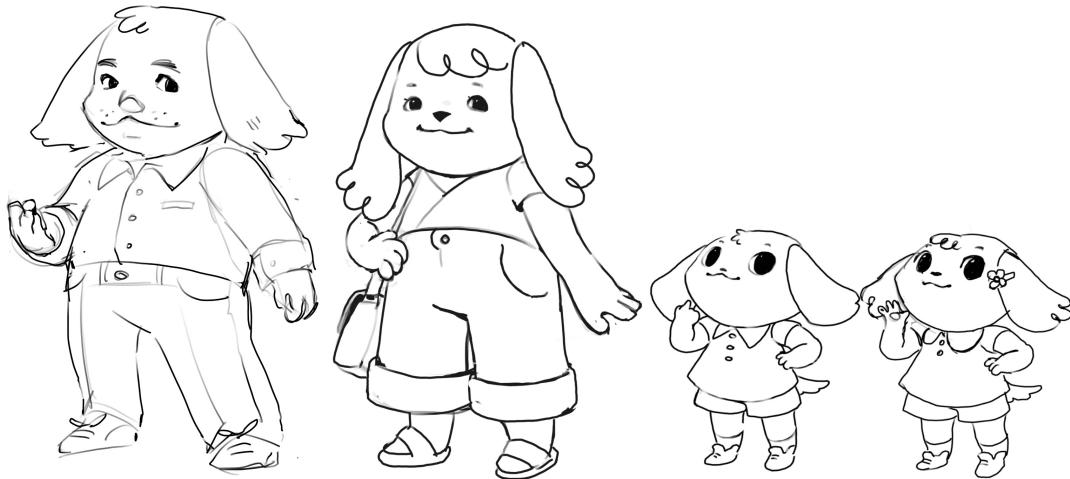


Patient feedback:

- “I like the cat!”
- “They make me feel happy!”
- “I like the colors!”

Dr. Sears' feedback:

- Didn't like doctor color (was originally blue)
- Doctor should be as tall as mom
- More options for doctors



Patient feedback:

- “The duck is my favorite of all of them!”

Dr. Sears' feedback:

- “The dad is handsome”
- She laughed at the duck doctor because he would be a “quack” (pun)

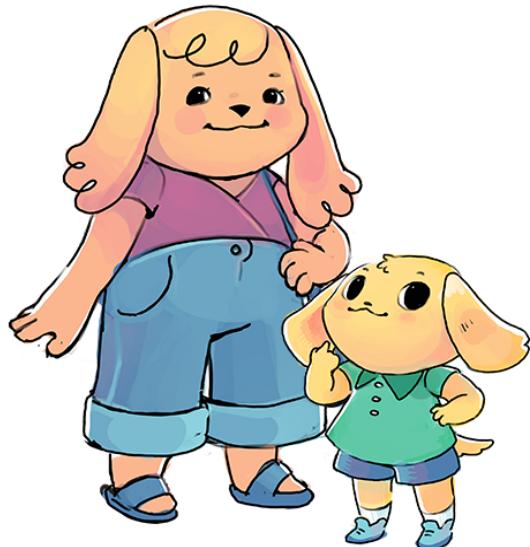
Prototype 1: Pre-treatment simulation

- ◆ Platform for doctors to quickly make customized simulations of vaccines fit to their practice
- ◆ Digital children's book format
- ◆ Mobile app or browser access
- ◆ Further expansions would accommodate other types of treatments and practices, like an MRI

Design criteria: Pre-treatment Simulation

- ◆ Quick setup by doctor
- ◆ Visual friendliness of a children's book
- ◆ Easily accessible to parents
- ◆ Effective, age-appropriate education on why vaccines are helpful
- ◆ Reduce nervousness about the treatment

I am a ...



parent



pediatrician

Welcome doctor!

username or email

password

[I forgot my password](#)

sign up

sign in

back



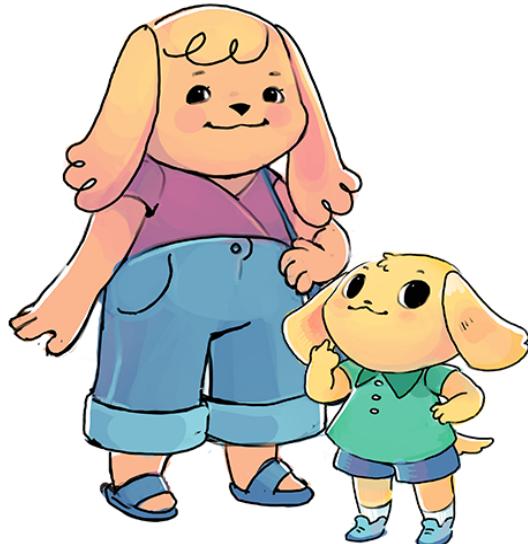
- Doctors log in or sign up to access customizable portion
- Get hyperlink and customizable code to simulation
- Fill out questionnaire to make simulation catered to their practice

Welcome!

Please enter your pediatrician's
7-character code.

I don't have a code

submit



back

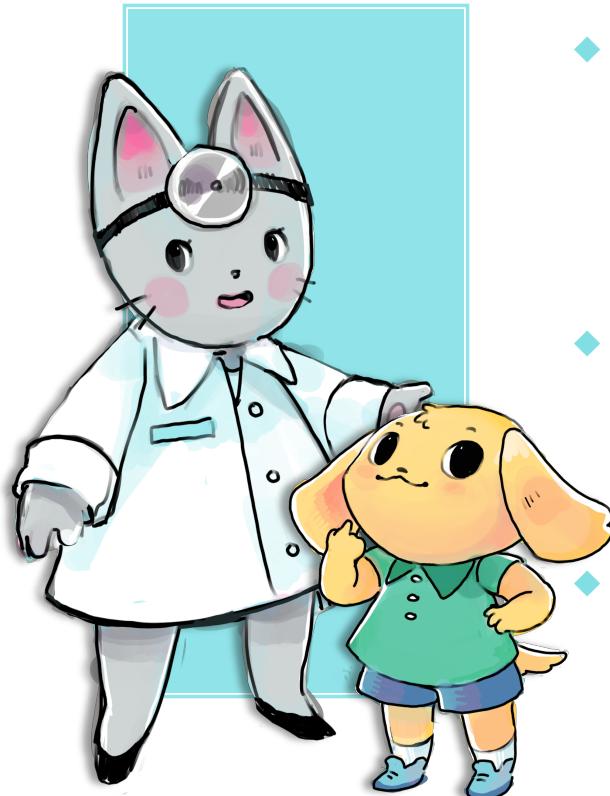
- Parents access through doctor's link or code
- Can view non-customized simulations
- Can select parent and twin to display in simulation
- Can enter patient's name

Part 1: Introducing doctor and space

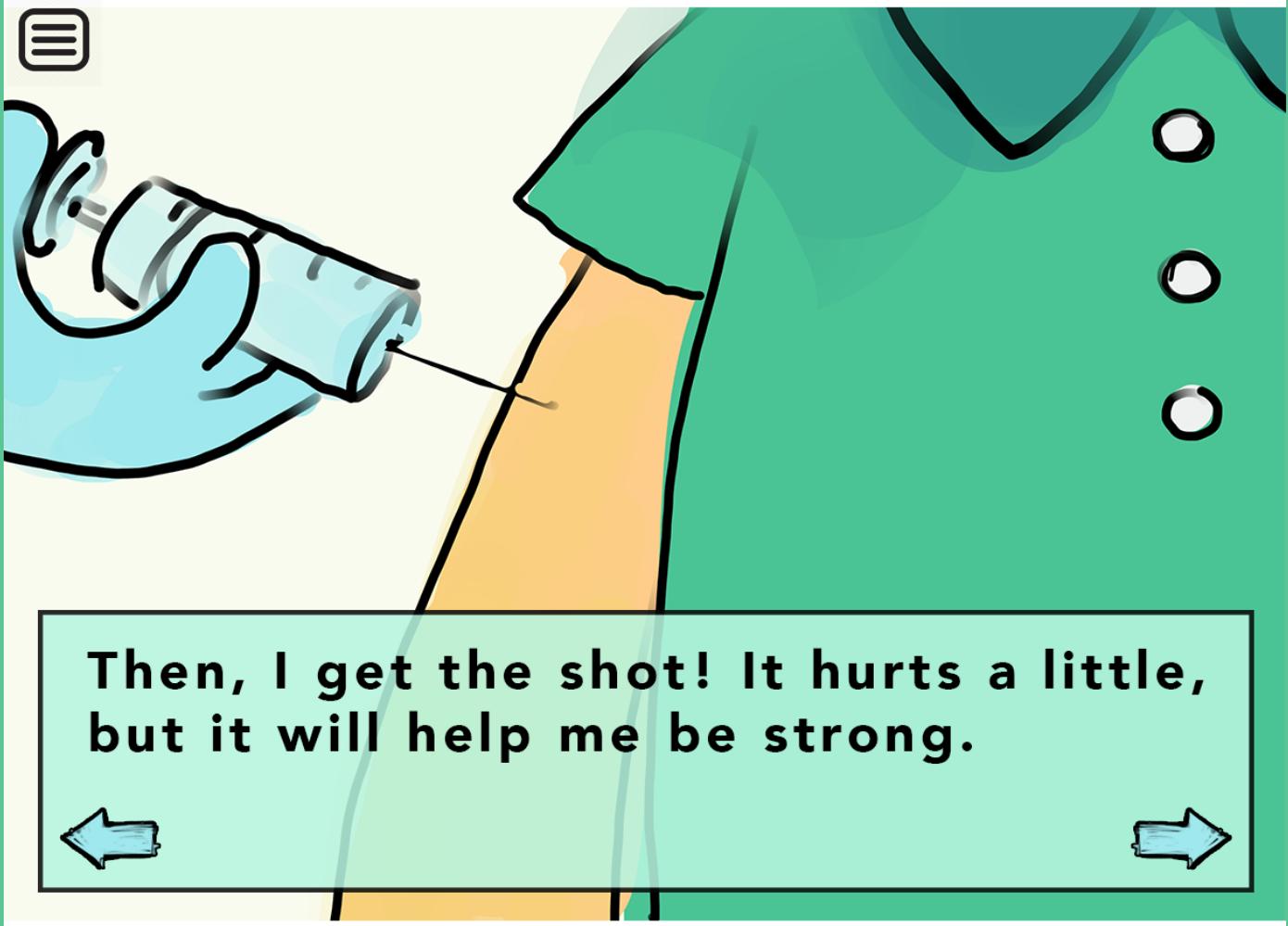
- ◆ Introduction of Dr. Deedee
- ◆ Picture & introduction of actual doctor
- ◆ A few fun facts about doctor to humanize them
- ◆ Pictures of practice, waiting room, etc.



Part 2: Vaccination process and education



- ◆ *"I heard you were going to get a shot soon, (patient name)! Mac here is also about to get a shot too. Shots can hurt a little, but they make us strong against feeling sick!"*
- ◆ *"Hi, I'm Mac! I'm going to get a shot today! Shots used to make me scared, but now I know that they can protect me from scarier sicknesses. Let me show you."*
- ◆ Different simulations depending on arm or leg administration selected in questionnaire



**Then, I get the shot! It hurts a little,
but it will help me be strong.**

Treatment

Multiple pages for
full process:

- Taking temperature
- cleaning area

Visualization of
what the vaccine
does:

- “helps the body beat up bad guys”
- “like getting a superpower”



The shot hurts a little, so we sing a
song! We all sing together.





I get a pretty bandaid! It makes me feel better.



- "It only took a second! It was over faster than I thought. I stayed calm and still, so it was easy!"



I get to choose a prize. I did a great job!



- "We say thank you to Dr. Deedee! Mama and I are going to get lunch."
- Dr. Deedee comes back: "Mac did a great job, I'm sure you can too, (Patient name)! We'll see you at (office name) soon!"

Feedback from Dr. Sears



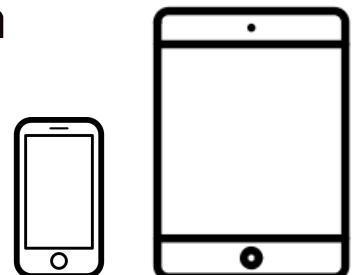
- ◆ Meets all design criteria
- ◆ Would be very marketable to hospitals if other treatments were added!
- ◆ Doctors would have no time for customization beyond the initial questionnaire, most likely

Limitations

- ◆ I am not a children's book writer
- ◆ Multiple treatment options will take a long time to make art for and animate
 - ◆ 3D assets can lessen this
- ◆ Customization → can't be fully voice acted

Prototype 2: During-treatment distraction

- ◆ Distraction app
- ◆ Pediatrician sets up on smartphone or tablet
- ◆ All activities are hands and motion free
- ◆ Mounted to wall for leg administration



Design criteria: Treatment distraction

- ◆ Accessible to small practices
- ◆ Visually appealing
- ◆ Quick setup
- ◆ Requires little to no bodily movement
- ◆ Self-explanatory with little to no instructions
- ◆ Will incentivize children to lie on their backs, and must be visible
- ◆ Must not get in the way of treatment
- ◆ Fun and effectively distracting to reduce pain perception

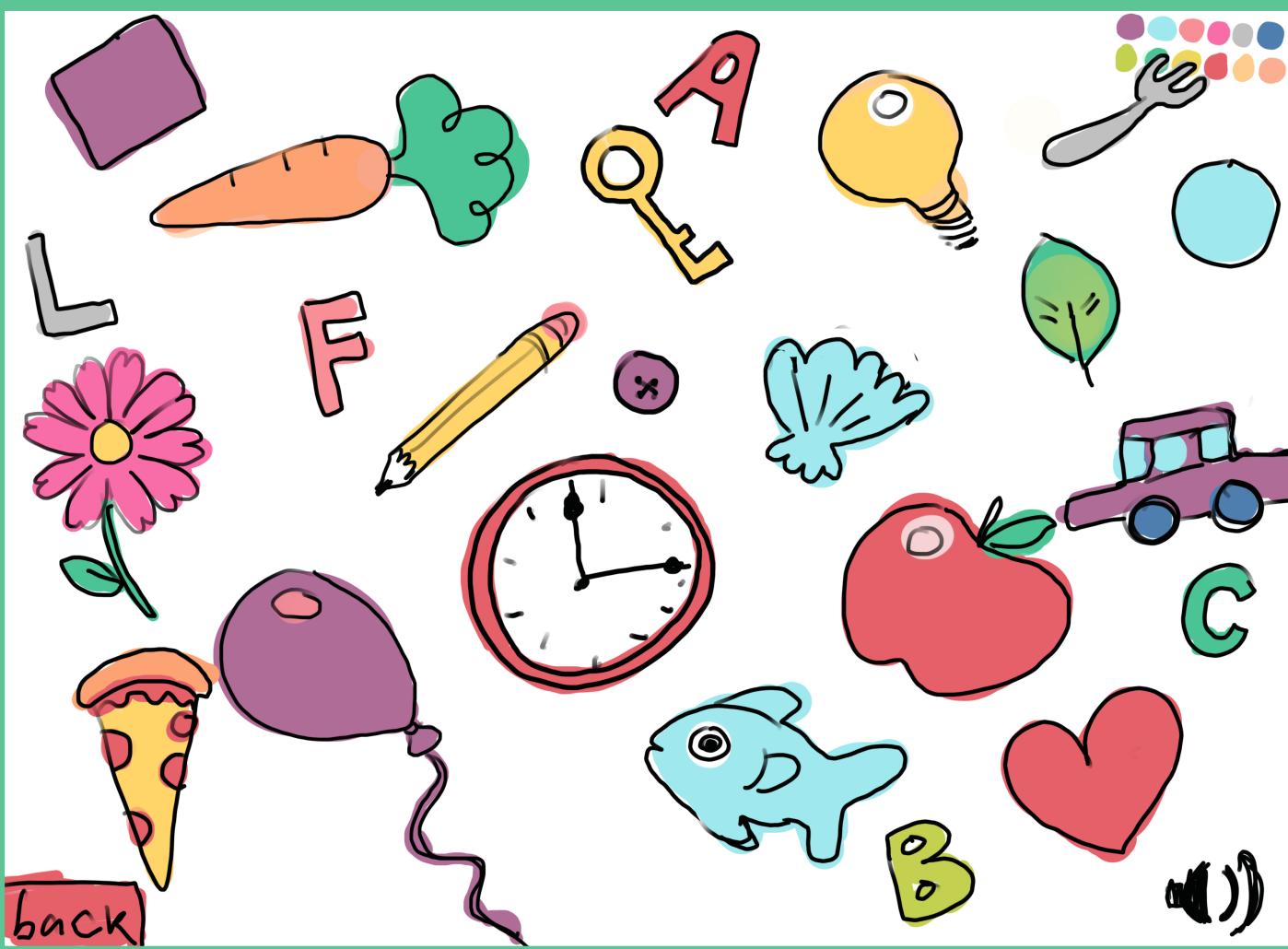
Let's Play!

i-SPY

fish tank

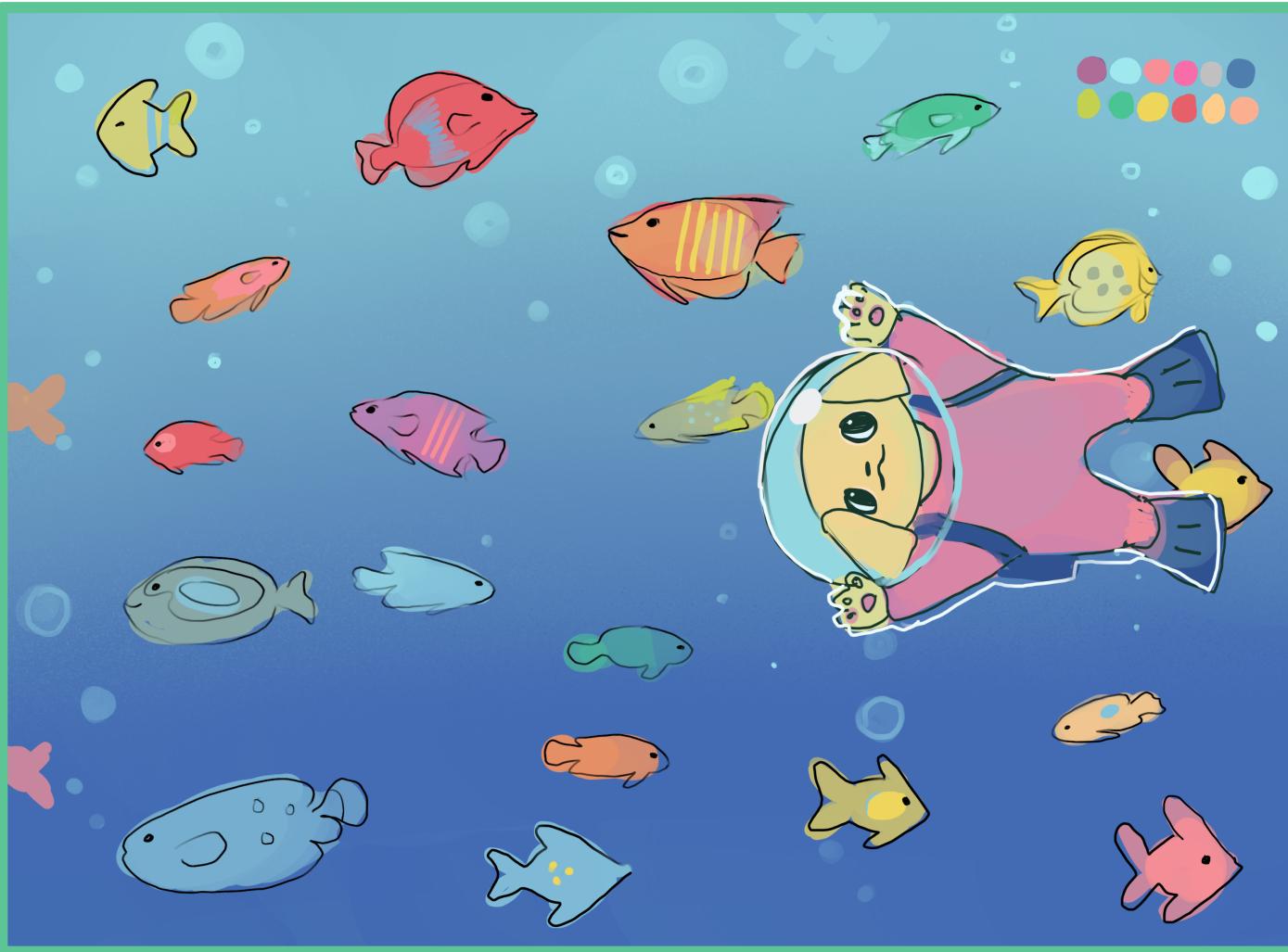
song





Activity 1: hands free game

- Mentioned as favorite game
 - Often played in waiting room
 - Most effective in projection format so parents can see
 - Parental participation



Activity 2: calming activity

- Fish tank missed in waiting room
- Calming music that can be muted
- Animated fish
- Mac the dog swims across the screen in new outfits



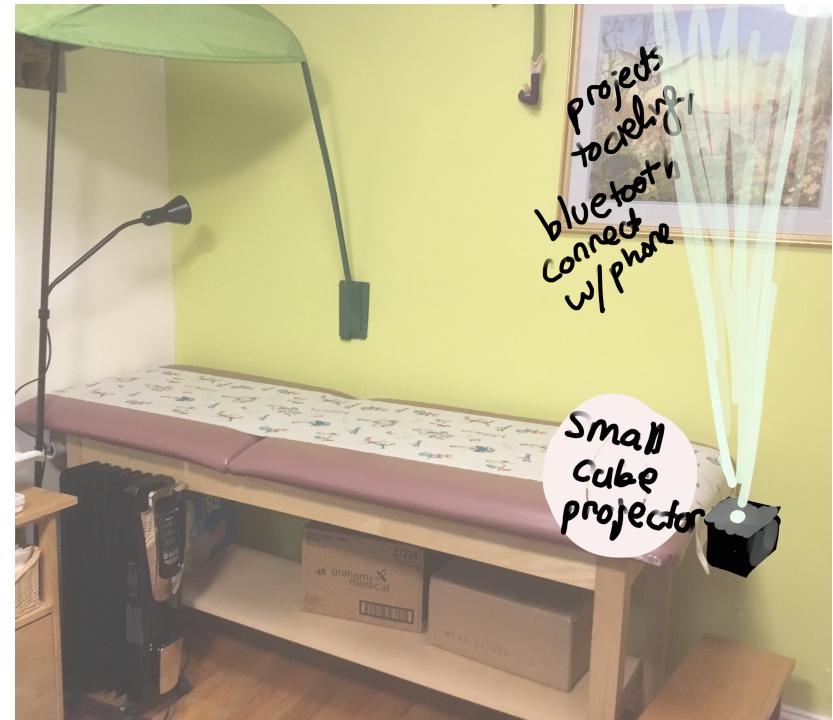
Activity 3: song

- “Wheels on the bus” often sung
- Encourages participation from all stakeholders
- Animated video

Physical format options: Sears Pediatrics



Adjustable swivel wall mount for iPad



Small cube projector to ceiling

Feedback from Dr. Sears



- ◆ Activities would all be effective distraction methods and met the design criteria
- ◆ Wall swivel mount format would be much better
 - ◆ Could keep iPad there at all times
 - ◆ Secure to wall out of child reach when not in use
- ◆ Projector too much to set up during appointment
 - ◆ Could get knocked down

Limitations

- ◆ i-Spy not as effective on iPad as it is on projected ceiling
- ◆ Swivel mount not obvious solution for other doctors who do leg administration

Works cited

- ◆ Li, A., Montaño, Z., Chen, V. J., & Gold, J. I. (2011). Virtual reality and pain management: current trends and future directions. *Pain management*, 1(2), 147-157.
- ◆ Liguori, S., Stacchini, M., Ciofi, D., Olivini, N., Bisogni, S., & Festini, F. (2016). Effectiveness of an app for reducing preoperative anxiety in children: a randomized clinical trial. *JAMA pediatrics*, 170(8), e160533-e160533.
- ◆ Taddio, A., Ipp, M., Thivakaran, S., Jamal, A., Parikh, C., Smart, S., ... & Katz, J. (2012). Survey of the prevalence of immunization non-compliance due to needle fears in children and adults. *Vaccine*, 30(32), 4807-4812.
- ◆ Windich-Biermeier, A., Sjoberg, I., Dale, J. C., Eshelman, D., & Guzzetta, C. E. (2007). Effects of distraction on pain, fear, and distress during venous port access and venipuncture in children and adolescents with cancer. *Journal of Pediatric Oncology Nursing*, 24(1), 8-19.