

EDUCATING SCHOOL-AGED CHILDREN ON HOW TO USE THEIR **ADRENALINE** **AUTOINJECTOR** THROUGH DIGITAL, AGE-APPROPRIATE TECHNOLOGY

APRIL 2022



COGNITANT
Whitepaper

Obuchinezia Anyanwu,
Medical Writer, Cognitant



"Hi, I'm Fizzmo the Cat. Let's look at how to use your EpiPen® or EpiPen® Jr (adrenaline) autoinjector"

Figure 1: Fizzmo the Cat virtual avatar as presented via the Healthinote app. Fizzmo was designed with the target audience in mind, intended to be a fun and engaging character to bring the subject area to life.

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EXECUTIVE SUMMARY

Patient-centric approaches to conveying health information can provide patients with the knowledge and the confidence that they require to manage allergic emergencies and prevent further medical complications.

For such an approach to be effective, the information being provided must be accessible, engaging and understood by the target audience. Digital approaches to healthcare information dissemination provide a great deal of flexibility in this regard as the mode and form of communication can be freely manipulated, allowing for information to be tailored accordingly for the receiving audience and improve health literacy as a result. This could encompass the use of animations, audio guides, interactive videos and virtual reality provisions.

The use of digital formats for dissemination of healthcare information can also help patients, parents and carers circumvent contemporary social challenges. The covid-19 pandemic, for instance, has disrupted healthcare systems significantly¹ and vulnerable patients may not be advised to attend a clinic. With digitised methods, there is an ability to remotely convey information that is conventionally only accessed within a clinical setting. Furthermore, remote provisions for healthcare information can help healthcare professionals and patients navigate logistical inconveniences such as travel. This in turn may potentially aid in improving the efficiency of healthcare systems through providing healthcare professionals with more time to pursue other clinical tasks.

This whitepaper will present:

- The importance of ensuring that pivotal healthcare information is accessible, age-appropriate, easily understood and retained by school-aged children
- Key outputs from a study jointly developed and managed by Cognitant, Cardiff University and the Children's Hospital for Wales where an interactive video was created to instruct school-aged children on how to use an adrenaline autoinjector

INTRODUCTION

Allergies and, in its acute form, anaphylaxis, are a great burden for many patients as these reactions can have a significant impact on health and overall quality of life.²

In an emergency, patients must be proficient in the use of their adrenaline autoinjector. Health literacy needs within an allergy management context has been highlighted by evidence of patients not having sufficient knowledge on how to use an adrenaline autoinjector as prescribed.^{3,4} This lack of pivotal knowledge could produce fatal consequence for patients and highlights the need for healthcare information that is accessible and understandable.

Within the UK specifically, an estimated **350,000 individuals** were recorded as carrying an adrenaline autoinjector in 2020.⁵ Where paediatric care is concerned, the largest number of hospitalisations due to anaphylaxis triggered by food allergies was observed in children who were under the age of 15 (1998-2018, UK).⁶ It is also important to note that within the UK, between **5-8% of children** have a food allergy,⁵ and **17% of fatal reactions** experienced by school-age children take place on the school premises.⁷ Whilst all children with a food allergy may not be susceptible to anaphylaxis, such demographic data provides reference values that may indicate the potential scale of the risk, and the environments where pertinent healthcare information could be concentrated. Overall, the data references display a sizeable portion of the UK population that could benefit from access to optimised instructional material for adrenaline autoinjector use.

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“We are really pleased with the results from this pilot study, as it showed that children can be taught how to use EpiPens® in a new way. They were also better able to remember to hold their EpiPen on the thigh for longer. We hope in the future that this novel way of delivering care will mean primary school children can be taught remotely about EpiPens®.”

“With anaphylaxis on the rise, sufficient child-friendly education into initial treatment for the condition is really needed. Being able to improve how children recall the information they are given is transformational.”

Dr David Tuthill, Consultant Paediatrician at the Children's Hospital for Wales

HEALTH LITERACY IS CRUCIAL FOR POSITIVE HEALTH OUTCOMES

Data published in 2020 showed that **14.1%** and **66.8%** of English school-aged children had health literacy rated as low and moderate, respectively.⁸ This suggests that there is room for improvement in the ways in which health literacy is approached in the UK.

Insufficient health literacy may result in poor health outcomes.⁹ Consequently, healthcare information needs to be packaged in a way where the target audience's literacy needs are catered for to reduce the risk of poor health outcomes. In order to ensure that positive health outcomes are achieved where allergy and anaphylaxis management is concerned, it is imperative that both children and parents/carers alike are sufficiently equipped with the right information. This means creating healthcare information that is accessible, relatable and therefore impactful. Such determinants of success are particularly impactful within a paediatric context when considering:

- **Attention span:** children generally have shorter spans than adults.¹⁰ Additionally, there is evidence which suggests that children may apply their attention in a way that is less focused, meaning that they could be more prone to taking in as much information as possible, as opposed to strategically filtering it.¹¹ With this in mind, healthcare communication with this audience must be engaging and succinct
- **Mode of communication:** animations in the form of cartoons are one of the most common forms of media consumed by children; as such, animations may be an appropriate way to make healthcare information more relatable for them. Animations have been shown to positively influence health-related choices that children make,¹² and may also benefit their general cognitive development¹³

COGNITANT'S APPROACH: FIZZMO THE CAT

Attention span and the mode of communication were identified as key factors in this study and addressed accordingly to make healthcare information more palatable for children. An interactive video starring a virtual avatar called “Fizzmo the Cat” was developed as part of an EpiPen® or EpiPen® Jr (adrenaline) training module within the Healthinote native app platform for children aged between 5 and 12 years of age.

The 3-minute video educated users on the importance of using their EpiPen rapidly, when needed, and walked through all of the steps required to administer it correctly, from the injection itself to calling an ambulance. Users were able to interact with the video and ‘communicate’ with Fizzmo the Cat as he guided them through the steps required for emergency self-injection. Branching throughout the video allowed users to return to information if they needed to, encouraging them to learn at their own pace.

This allowed children to:

1. Engage with healthcare information that was not text laden and easily digestible
2. Have healthcare information relayed to them through an animated avatar which they would find appealing
3. Actively engage with the avatar as prompted by on screen indicators to make for a more memorable experience

In order to reduce the risk of poor health outcomes, healthcare information needs to be packaged in a way where the target audience's literacy needs are catered for.

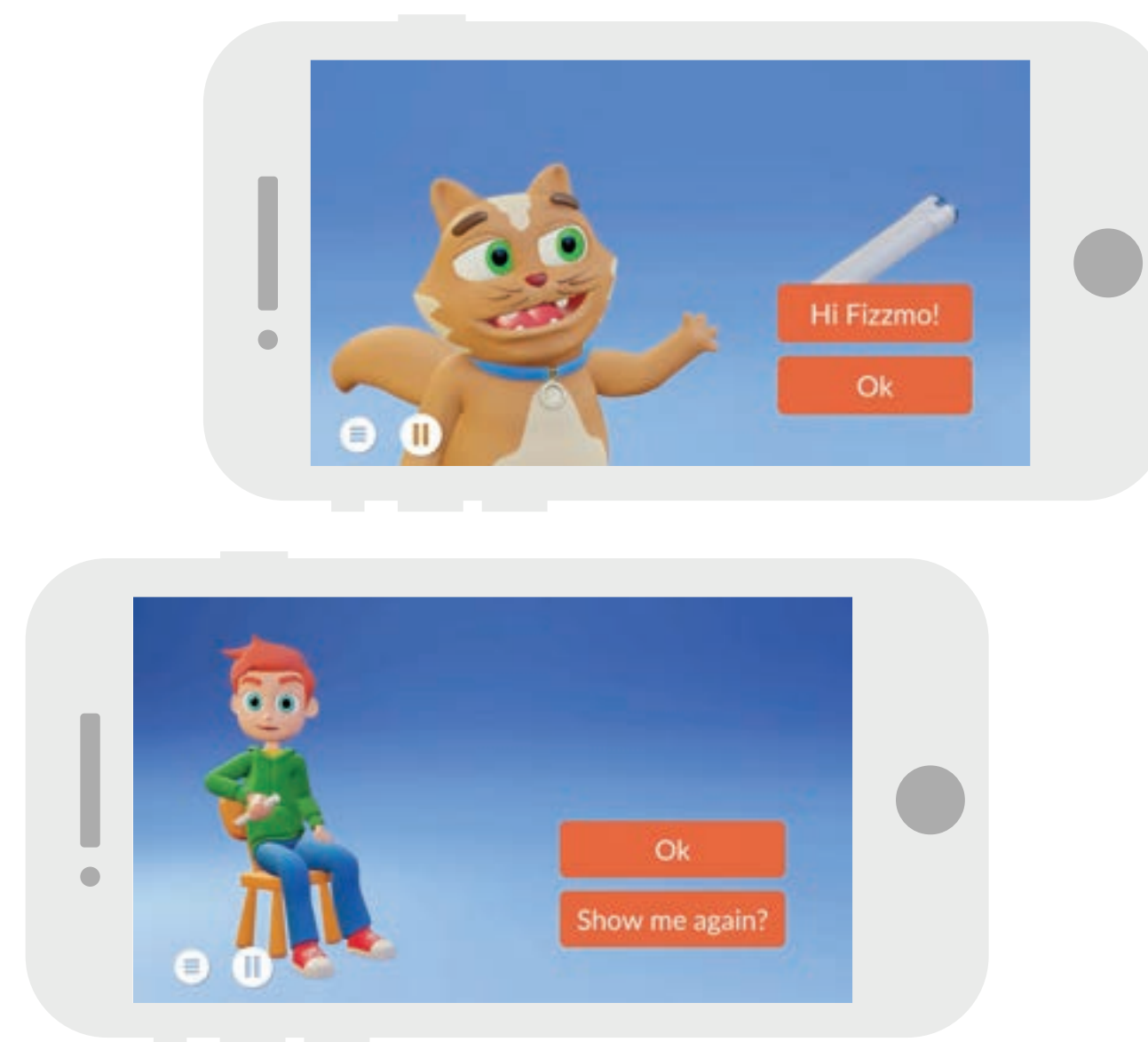


Figure 2: Healthinote app user interface. Users were able to interact with the video and ‘communicate with’ Fizzmo the Cat as he guided them through the steps required for self-injection. Users were able to return to information if they needed to, learning at their own pace.

STUDY METHODOLOGY

Based on: E Balls et al. Can Fizzmo the Cat teach primary school children how to use an EpiPen® as well as a face-to-face demonstration? Presented at British Society for Allergy & Clinical Immunology (BSACI) Annual Conference 7-9 October 2021, UK

Purpose

The study compared the effectiveness of the Healthinote educational intervention with the traditional EpiPen training programme, which is usually delivered by a healthcare professional in person. The two approaches were compared to determine which approach was more effective in instructing children on how to use an EpiPen.

Demographics

60 EpiPen-naïve children aged between 5 and 12 (32 females and 28 males) from Cardiff, South Wales, were recruited to take part in the study.

All participants				Group 1			Group 2		
Gender	n	Median age	Age range	n	Median age	Age range	n	Median age	Age range
Male	28	9	5-12	14	9	6-12	14	8	5-12
Female	32			16			16		

Table 1: Study participant demographics

Study grouping

The children were split into two groups of 30 in accordance with the following criteria:

- 1. **Group 1:** used the traditional in-person EpiPen training programme
- 2. **Group 2:** made use of the interactive video provided through the Healthinote app. The app was used under the supervision of healthcare professionals.

Proficiency criteria

The following criteria were used to assess how well the children in both groups 1 and 2 used the EpiPen:

- 1. Thigh identification
- 2. Fist grip around pen
- 3. Removal of the blue safety cap
- 4. Place and Press (P&P) technique with “click”
- 5. Holding pen for 3 seconds

KEY STUDY OUTPUTS

Use of the EpiPen adrenaline autoinjector

Use of the interactive video was shown to be as effective as the traditional in-person training programme. Discrepancies between the two groups were observed, showing that more children in the group using the interactive video were capable of implementing the instructions for the following parameters within the proficiency criteria (group 1 vs group 2, respectively):

- 1. Removal of the blue safety cap (25 vs 30; p=0.052)
- 2. Place and Press (P&P) technique with “click” (26 vs 28; p=0.67)
- 3. Holding pen for 3 seconds (17 vs 24; p=0.007)

Proficiency criteria parameter	Number of children meeting proficiency criteria per parameter		Statistical analysis (Fisher's Chi Squared p value)
	Group 1: traditional in-person EpiPen training programme (group 1) n=30	Group 2: Fizzmo the Cat interactive video (group 2) n=30	
Thigh identification	28	28	1.00
Fist grip around pen	29	29	1.00
Removal of the blue safety cap	25	30	0.052
Place and Press (P&P) technique with “click”	26	28	0.67
Holding pen for 3 seconds	17	24	0.007

Table 2: Adapted from E Balls et al, 2021. Number of children meeting proficiency criteria per parameter. Data analysed using Fisher's Chi Squared test statistical test, with the threshold for significance set at α=0.05.

Comparison of study participants in groups 1 and 2 meeting proficiency criteria for use of their EpiPen

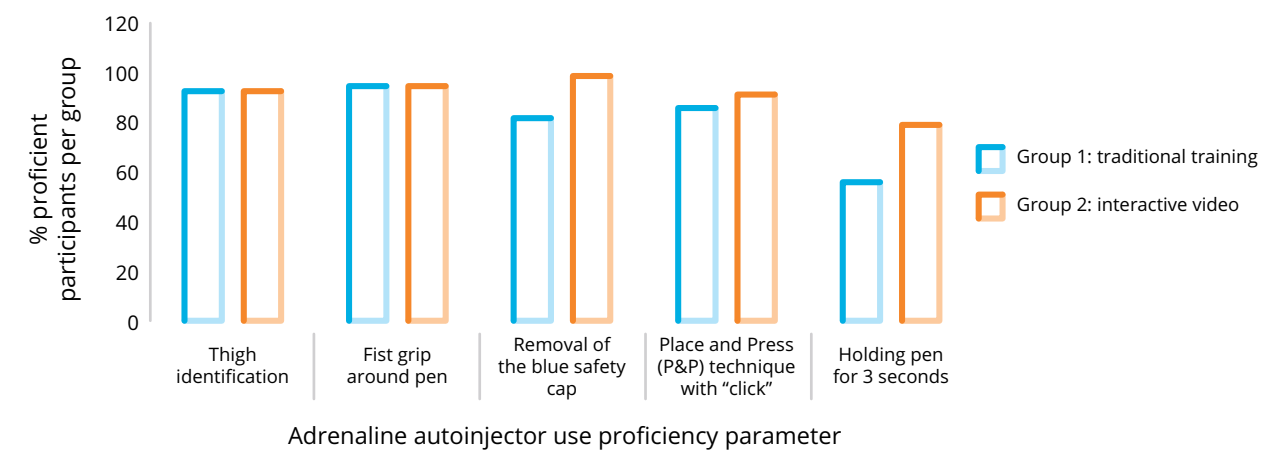


Figure 3: Adapted from E Balls et al, 2021. Percentage of children in groups 1 and 2 meeting adrenaline autoinjector use proficiency criteria per parameter.

User experience

The children’s experience with the Healthinote interactive video was also assessed across five domains. These were:

- 1. Enjoyment
- 2. Visual appeal
- 3. Engagement with video (knowledge retention)
- 4. Perceived competence with using their EpiPen
- 5. Willingness for future use of similar technology

The following information was derived from the children’s experiences with the interactive video (n=27):

- All respondents enjoyed the contents of the video and found it visually appealing
- 89% found the content engaging and beneficial to their learning
- 85% indicated that they understood how to use an EpiPen after watching the video
- 96% were willing to continue accessing health-related information in a similar video format

Participant user experience

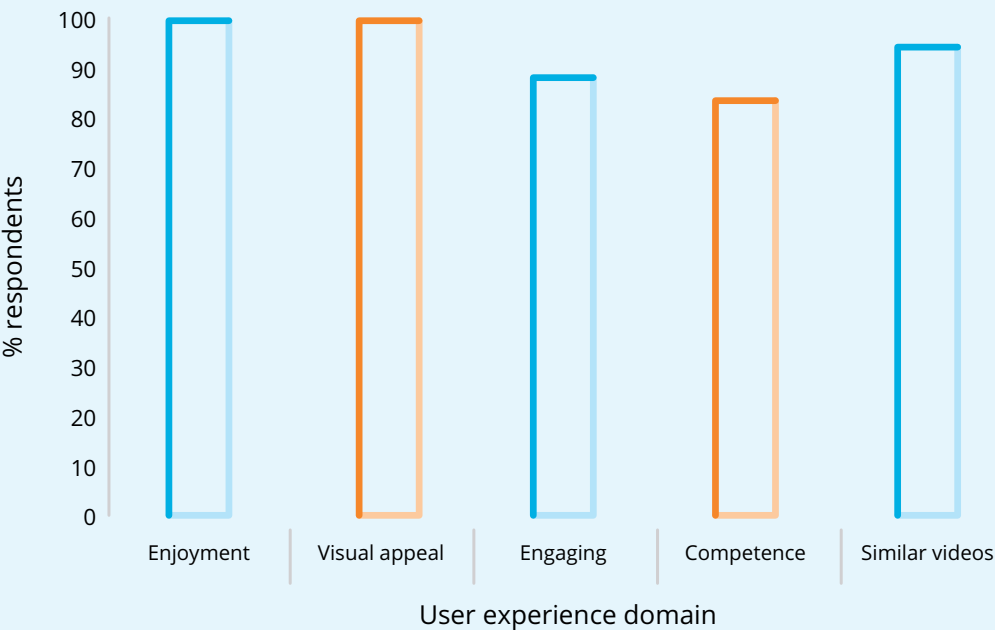


Figure 4: Adapted from E Balls et al, 2021. User experience summary for the Fizzmo the Cat training video (n=27).

This pilot supports age-appropriate, potentially remote, interactive learning which provides educational support as good as the current standard EpiPen training programme.

POSITIVE HEALTHCARE COMMUNICATION

The training programme relayed through the Fizzmo the Cat avatar developed by Cognitant shows the utility of digital healthcare technologies in improving communication with patients vs traditional methods of training. This study has clearly shown an impact on helping school-age children become proficient in using an adrenaline autoinjector.

The digital and animated medium through which the healthcare information was conveyed was shown to be effective with school-age children. The positive reception to the platform, combined with the children’s ability to digest the information presented, reiterates the importance of ensuring that healthcare information is communicated in a way that is accessible, appealing and age appropriate. When healthcare information is understood by patients (vs lower levels of understanding), they may be able to:

- improve their health literacy
- feel empowered
- improve their health outcomes

Logistically, the digital approach to conveying health information may also benefit patients and healthcare professionals alike through:

- providing remote access to important information to accommodate varying lifestyles, or when physically attending a clinical facility is not advised
- potentially improving the efficiency of healthcare systems, through providing healthcare professionals with an ability to delegate time used for some patient training sessions/consultations elsewhere

The study highlights the potential impact of a digital, age-appropriate healthcare communication tool with a small cohort of children. As such, no statistically conclusive deductions can be made from this study alone. Additional studies with larger cohorts of children, and a more varied age demographic are required to determine the effectiveness of the technology across different populations. Furthermore, the technology is not meant to serve as a replacement for conventional consultations with general practitioners and other healthcare professionals. Such training must also be accompanied by holistic allergy education, such as how to correctly identify anaphylaxis.

The study however shows that the use of such approaches in healthcare communication may be of benefit and can be brought in as supplementary tools for the routine care of patients and for improving general health literacy and outcomes. It may also have wider applicability to different age groups (with modification), and provide hard to reach populations in rural areas with the means to access healthcare information remotely.

Acknowledgements

We would like to thank all the children who volunteered to take part in this study, and the study team from Cardiff University and the Children's Hospital for Wales, in particular Dr David Tuthill, Consultant Paediatrician at the Children's Hospital for Wales, and Emily Balls, a medical student at Cardiff University.

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hello@cognitant.com
www.cognitant.com