

Leading articles

Double click for health: the role of multimedia in asthma education

Asthma is now the most common chronic childhood illness in Britain and the prevalence is increasing.¹ Currently 1.5 million children (aged 2-15 years) in the UK are estimated to have asthma, giving the country one of the highest prevalences in the world,² with estimated costs of £100-150m.³ Asthma also has a significant social impact, including school absence⁴ and poorer psychological health.⁵

Educational programmes for children with asthma have been around since the 1940s, albeit in varying guises, utilising leaflets, group work, individualised training, home visits, and specialised camps.⁶⁻⁹ The goal behind them has always been to improve the child's physical and/or psychological management of their asthma.¹⁰ More recently, attention has focused on the potential contribution of multimedia computer programs to paediatric health education.¹¹ Multimedia software delivers information to a laptop or desktop computer screen using a range of visual and auditory forms, including animation, video, voice over, and sound effect. The interactive capabilities of such programs and their potential to store users' responses can be harnessed to provide personalised information in engaging forms such as games or quizzes. Computer technology has altered the way children spend their free time, and has become increasingly integrated into education, possibly because of expectations that all learning must be "fun".¹² Educational software developers have been quick to catch up with this demand for "edutainment", and packages have been developed for a variety of illnesses, including asthma.^{13 14} Arguably, they are suited to paediatric education because they combine familiar technology with interesting graphics that hold children's attention.^{11 15 16} Voice-overs and graphical demonstrations can enhance comprehension of complicated concepts that might otherwise be hampered by the child's level of literacy. Such technologies can also reduce demands on parents and medical staff in terms of information provision.¹⁴ Furthermore, Dorman highlights the potential benefits of allowing children to "role play" asthma management in a safe environment, before transferring those skills to the real world.¹²

This review will explore the rationale behind educational programmes for children with asthma and explore the role of multimedia in meeting children's information needs.

Why do children with asthma need health education?

Expansion in the provision of health education for children with asthma has been driven, at least in part, by a growing acceptance that children with chronic conditions should be actively involved in the management of their illness and in decisions about treatment.⁹ Proposed benefits of health education for children with chronic disorders include reduced distress during treatment¹⁷ and decreased morbidity.¹⁸ Giving children information about their illness helps to promote a sense of control and "mastery" over their health.⁹ Sense of control has been found to improve compliance in asthma,¹⁹ which fits well with the ethos that children with asthma should take more responsibility, for example, by carrying their own medications.⁴ As attitudes

towards health related behaviours can persist beyond childhood,²⁰ education may also influence health outcomes in adulthood.

Effective management of asthma depends primarily on early recognition of asthma symptoms. Children with acute asthma, who have a poor perception of breathlessness, may present late, leading to a greater degree of hypoxia.²¹ Paediatricians often rely on parents' assessment of symptoms to guide diagnosis; however, evidence from pain research suggests that parents underestimate intensity of symptoms and that even very young children are capable of observing and assessing their own symptoms.²² Picture based rating scales facilitate this process and have been found to correlate well with physiological measures.²¹

Self determination, or the ability to make decisions, exercise choice and take control, is influenced by knowledge and skills as well as by environmental factors.²³ It can therefore be enhanced, both by education and by reducing the demands of the decision making task.²³ Interactive multimedia has much to offer in this respect, as it can present information about treatment alternatives in an accessible format and allows children to make choices in a safe "virtual" environment. Furthermore, there is evidence from studies with children and young people with learning disabilities that skills learnt through a desktop virtual environment do generalise to real world situations.²⁴

How do we educate children about asthma?

Group based teaching for children and parents has been the traditional model for asthma education, using talks, videos, role playing, and outings to educate about asthma symptoms, physiology, triggers, and medication. This has been effective in improving knowledge,^{6 7} reported self management behaviours,⁷ and health locus of control⁸; the methodology has also been successfully adapted to target specific vulnerable groups, such as low income families²⁵ and Hispanic families in the United States.²⁶ However, such improvements may not be maintained over time and "refresher courses" may be necessary to maintain a high level of competence in asthma behaviour.⁷

Although traditional educational programmes can be effective, they can be costly in terms of time and resources. They also "... teach the same skills regardless of the characteristics of the child and of his/her asthma".¹³ To circumvent these difficulties, a number of researchers have employed computer technology to impart information for a range of illnesses, including diabetes,¹⁶ nocturnal enuresis,¹¹ as well as asthma.¹³⁻¹⁵

An important aspect of these multimedia packages is that they can be individualised to the user, and can easily store personal information such as triggers, medication, and peak flow. An interactive asthma education computer program which is currently being evaluated has utilised the internet, so that gaps in the child's and their carers' knowledge are identified by the program and the education customised accordingly. This feedback, including personal medication and symptoms, can then be reported back to their health centre so that these aspects can be addressed at the next visit. Preliminary findings reported at a recent

asthma conference suggest increased knowledge in carers of children (aged 0–6 and 7–17 years) and increased knowledge in the children themselves in the 7–17 year age group. Asthma health outcomes were also improved: emergency room visits, days of asthma symptoms, and doses of inhaled corticosteroid were all reduced in the intervention (computer) group.²⁷ More traditional individualised education programmes, using a tailored management plan and constant access to an asthma nurse, have already been shown to reduce hospitalisations in children over 2 years of age²⁸; hence it appears that taking individuals' characteristics into consideration when planning their education is paramount.

Computerised education programs can also provide "support", albeit in a more limited fashion than a dedicated asthma nurse. Adults using computer assisted instructions about asthma management and practical techniques (such as using a peak flow meter) felt that it was useful for validating what they already knew about asthma.²⁹ In addition, computerised programs can provide cognitive support by presenting complicated tasks in a simplified manner, for example, breaking down into simple steps how to use an inhaler. It has been hypothesised that children are able to extend beyond their existing knowledge to a more sophisticated level of understanding if given appropriate guidance and instruction (termed "scaffolding").³⁰ Thus, a computer program which provides an appropriate degree of support, such as simplifying instructions and providing simulations of complex physiological processes, could help children understand more complex aspects of their asthma management. Furthermore, the appealing, interactive nature of many computer programs can encourage the user to engage with the task long enough for them to absorb more information for themselves.

Residential camps for children with asthma, such as Camp SUPERTEEN⁸ have been used to develop asthma management skills in a supervised environment, thus promoting confidence managing real life crises. Multimedia health education could potentially complement this approach by allowing the user to "experiment" safely in ways that they never could in the real world. For example, Brown *et al* developed an educational computer game for children with diabetes to monitor a character's blood glucose, take the right amount of insulin, plan meals, and engage in other appropriate self care behaviours.¹⁶ Children using the program could learn the consequences of those actions without putting their own health in danger.

However, it is still vital that computerised programs are pitched at an appropriate stage of the child's development. Bartholomew and colleagues developed an interactive computer program called "Watch, Discover, Think & Act", where children were assigned a character whose asthma they managed by avoiding triggers, taking medication, and monitoring symptoms.¹³ When compared with children who hadn't seen the program, the intervention group had a lower rate of hospitalisation and greater functional status; however, despite having screened for reading ability prior to the study, the authors found that asthma knowledge increased only in older children and those with better baseline knowledge. They felt the results indicated that it was too complex for younger and less able children.

Evaluations of multimedia are growing and early indications are that they can be of benefit in educating children about asthma management. However, it is unlikely that they will prove to be superior to individualised teaching from an expert. Homer *et al* showed in their randomised, controlled trial that their program for children, "Asthma Control", was effective in increasing knowledge, reducing emergency visits, and improving child behaviour and self reported symptom severity.¹⁴ However, the comparison

group, who had returned to the hospital to review an asthma booklet with a researcher and play on a non-educational computer game, also had improved outcomes. Knowledge about asthma was the only outcome that was significantly different in the computer group children. In practical terms, if both approaches are broadly equivalent in producing positive behavioural change, a computer program could be far more cost effective in the long term.

Conclusions

Health education for children is important in order to set positive attitudes to take into later life. This is especially important for children with asthma, who need to be able to recognise symptoms and respond appropriately in order for them to manage their asthma effectively. Educational programmes for asthma are now widespread and have been shown to produce positive outcomes; stress, self efficacy, and coping strategies can all be improved through education, which can reduce medical resource usage. Transmission of knowledge and reinforcement of positive beliefs and behaviours are central to this process.

Innovative means have been sought to make health education more appealing to children and improve compliance. Interactive group work and tailor made, child focused education programmes have been popular, but have significant time and resource implications. Computer programs have many advantages for paediatric education by presenting information in an engaging manner and using technology that most children are familiar with these days. Multimedia technology can provide an "expert" role, and thus help children understand information or concepts which they might not understand alone. Multimedia is flexible and sensitive, so that programs can be tailored to suit a wide range of information needs, for example by providing different "levels" of text for varying reading abilities. Pressure on staff and parental time is somewhat ameliorated by using computer programs in asthma education, and may offer a feasible option for "booster session" work. Furthermore, observing the way children use computer programs may lead to more effective education, for example, by encouraging collaborative learning and peer tutoring.³¹

The emergence of multimedia in paediatric education offers exciting possibilities, and by supplementing, rather than replacing more traditional educational methods, it can be seen as an additional tool to help educate children with asthma and encourage self management. There clearly needs to be more research evaluating the effectiveness of multimedia, and identifying those children who will benefit most from such programs. To this end, our group is currently undertaking a randomised, controlled trial of an innovative multimedia package which aims to educate children about asthma and promote self management skills. We are investigating whether, by augmenting existing care through multimedia, we can enhance children's understanding of asthma and improve clinical outcomes. In this technological generation, we hope to make further discoveries as to whether multimedia holds the key to asthma education of the future.

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STAMPS IN PAEDIATRICS

Dr Henryk Goldszmit (Janusz Korczak) 1878–1942

The stamp, issued in Poland in 1992, depicts a statue marking the 50th anniversary of the murder of Dr Henryk Goldszmit in the Treblinka camp,¹ along with the children from his orphanage and many thousands of other victims. Henryk (known throughout Europe under his pen name Janusz Korczak) holds a small child in his arms, and is followed by others, as described by those who witnessed their departure for the trains. The statue is in the Jewish Cemetery² near the former Warsaw Ghetto, where he lived with the orphans. Henryk was a Polish-Jewish paediatrician,³ writer, broadcaster, and vigorous advocate for the rights of the child. His children's stories are known in 20 languages, but few of his writings, until recently, have been available in English.⁴ His ideas were important in the development of the UN Convention on the Rights of the Child.⁵

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- 1 <http://fcit.coedu.usf.edu/holocaust/resource/VR/TRE3S.htm>
- 2 <http://warsawghetto.epixtech.co.uk/Korczak.htm>
- 3 <http://korczak.com/>
- 4 <http://www.korczak.org.uk/>
- 5 <http://www.ibe.unesco.org/International/Publications/Thinkers/ThinkersPdf/korczake.pdf>