

Children's understanding of the role of medicines in treating infectious illnesses

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ABSTRACT

Background

Patients' lack of understanding or misunderstanding of antibiotics is an important cause of inappropriate antibiotic prescribing and use. Education of school children about infectious diseases, and how they are transmitted and treated, could make an important contribution to improving the use of antibiotics.

Aim

To explore school children's understanding of how microbial diseases are transmitted and treated.

Methods

Sixty-six children aged nine to 11 from three schools were asked to write and draw pictures about 'how

do you catch bugs that make you sick?' and 'how do you kill bugs that make you sick?' These were analysed thematically.

Results

The most common method children identified to transmit 'bugs' was coughing and sneezing. The most common method of killing 'bugs' was by taking medicines or pills. Children from higher socio-economic status areas mentioned more ways of catching, and more ways of treating illness, than those from lower socio-economic status areas.

Key Words

Children, medicines, upper respiratory tract infections

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Introduction

Antibiotic resistance has become a serious problem worldwide, in part because no new classes of antibiotics have been developed for decades.¹ Many of the advances made in health care since the discovery of penicillin in 1928, are now threatened by the spread of resistant bacteria. The development and spread of resistance is caused in part by inappropriate use of antibiotics.

It is widely acknowledged that patient expectations are a major factor in unnecessary antibiotic prescribing.² Lay peoples' knowledge and un-

derstanding of antibiotics are important, because they can create pressure on doctors and other health care providers to prescribe inappropriately. Lay knowledge and understanding also affect how antibiotics are used, such as whether appropriate doses are taken, and whether full courses are taken. Patients may not understand what antibiotics do and do not do, or the concept of resistance, or the importance of adhering to dosage instructions.^{3,4,5,6} Previous research suggests a low level of understanding of antibiotics in the general population. Arroll and Everts⁴

found that only 40% of members of the public understood that antibiotics did not help viral infections. In one study, Tokelauan people in New Zealand had an extremely low level of understanding and widespread misconceptions about antibiotics. Many thought that antibiotics were for colds and flus, and some thought antibiotics were painkillers.³

Public education about infectious diseases and antibiotics has been recommended as an important strategy for controlling antibiotic resistance.⁷⁻⁸ In the UK, the Standing Medical Advisory Committee on

Antimicrobial Resistance suggests that this should begin in schools.⁷ Education of school children may be an efficient way to improve the use of antibiotics and other medicines.⁹ There is little research on children and medicines. Taking medicines is one of the most common health related behaviours that people perform, whether for treatment or prevention of illness. Children frequently receive messages about medicines, by being given medicines by caregivers, taking them themselves, observing family members taking medicine and by messages received through the media. *'Children therefore, are forming beliefs and expectations at an early age, which may well affect their own behaviour for years to come.'*⁹ The very few studies that have focussed on children and medicines have not looked at quality use of medicines and have ignored issues like whether children perceive common medicines such as antibiotics as cures for all their illnesses.¹⁰ Understanding how children perceive medicines may be key to improving medicine use by children.¹¹ It may also improve medicine use in the community if children take messages they learnt at school home to parents and other family members.⁹

The study reported here was carried out during Lynne Newell's Royal Society Science, Mathematics and Technology Teacher Fellowship at the School of Pharmacy, University of Otago. These Fellowships allow primary or secondary school teachers to take a year out from teaching and work in a research organisation. During her Fellowship Lynne developed teaching materials on antibiotics and resistance, aimed at primary school teachers. The study reported here was to assess children's existing knowledge, so that the curriculum materials could be appropriately targeted.

Aim

The aim of this research was to find out what groups of Year Five/Six children in different parts of New Zealand know about:

- how microbial disease is spread
- how microbial disease can be treated.

Year Six (or Year Five/Six if a composite class) students were studied because children at this age level take some responsibility for managing their medication themselves, for example, taking care of asthma inhalers and cough medication. Lynne Newell usually teaches children this age, and the curriculum materials she developed were targeted at this age group. In addition, Year Six students can write independently making the research less onerous for the class teacher.

Methods

Participants were 66 students aged nine to 11 years from three urban state primary schools in Wellington, Christchurch and Dunedin.

One school from each city was selected and asked to participate. We tried to select a decile one (low socio-economic status) school from Wellington, a decile five school from Christchurch and a decile 10 (high socio-economic status) school from Dunedin. Decile ratings of schools were obtained from the Ministry of Education website. The schools were required to have at least twenty-five students at Year

Six or in a composite class of Year Five/Six students. There were no urban decile one schools in Wellington. Rather than change cities we decided to choose a decile two school in Wellington. Four decile two schools in the Wellington urban re-

gion fitted the criteria so one school was randomly selected from these. In Christchurch the first school we approached declined to participate. There were no other appropriate decile five schools. A decile four school was then randomly selected.

Within each school, one Year Five/Six class was selected, and consent was sought from parents of all children. Consent forms asked for age and

Understanding how children perceive medicines may be key to improving medicine use by children

ethnicity of child and whether s/he had, or had had, any serious illnesses. Teachers were also asked whether their students had studied microbes (bacteria, viruses), disease and ill-

ness this year, and whether the teacher was aware of any previous study the class had done on this topic.

Participating children were asked by their class teacher to respond to two questions: *'How do you catch a bug that makes you sick?'* and *'How do you kill a bug that makes you sick?'* For each question, children were asked to draw a picture and write an answer. Stories and pictures were analysed thematically, using categories developed from the children's responses. One author initially developed categories, and both authors attempted to use these to categorise responses. Considerable disagreement was found, so new categories were developed through discussion between authors and repeatedly examining the children's responses. The new categories were found to produce much greater agreement between authors. Categories were kept as close as possible to the children's own words, and we avoided assuming knowledge they may not have. For example, we did not assume that those who mentioned coughing and sneezing understood that saliva was the means of transmission.

In order to investigate the impact of socio-economic status on knowledge, each child was given a 'score'

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indicating the number of categories they mentioned in their answers. Scores from each class were compared using the Kruskal-Wallis test.

Results

Of the 68 children in the selected classes, 66 participated. Two participants' responses were discounted as they participated but did not have parental consent forms returned. Of the respondents, 34 were female (52%). Most children (45) were ten years old, with some nine-year-olds (eight) and some 11-year-olds (13) participating. Thirty-four were identified by their parents as European/'Kiwi'; 24 Maori or Maori plus some other ethnicity; three Samoan or Samoan plus some other ethnicity. The parents of seven children reported that they had had, or have, a serious illness. These were one food poisoning, one croup, one skin infection and four cases of asthma.

The method of disease transmission most commonly mentioned by the children was coughing and sneezing (mentioned by 66% of children (n=44)). The next most common methods were:

- sharing food or drink (32 children)
- exposure to cold – e.g. *'wearing hardley eny clothes outside when its raining'* [sic] – (12 children)
- spit or saliva (11 children)
- from food and drink, but not from another person, such as through poor food storage (seven children)
- not washing hands (seven children)
- kissing (three children)
- hygiene lapses apart from handwashing (one child).

In addition, 24% of children (n=16) mentioned miscellaneous methods of 'catching bugs' such as *'picking up an animal (picture shows dead bird) off the road then putting your fingers in your mouth'*, *'picking a scab and then touching someone'*.

Equal numbers of both genders mentioned coughing or sneezing. All other mechanisms were mentioned by

more girls than boys, apart from 'sharing food/drink'.

The most commonly mentioned method of 'killing bugs' was taking medicines. Eighty-three per cent of children (n=55) mentioned unspecified medicines or pills. Eighteen per cent (n=12) mentioned a specific kind of medicine ('Panadol', 'Lemsip' – both advertised on television – cough lollies, vitamins or vitamin C). Other methods mentioned were:

- seeing a doctor (19 children)
- hygiene measures other than hand-washing – such as showering – (18 children)
- resting or restricting activities (18 children)
- handwashing (10 children)
- staying warm (8 children)
- seeing a pharmacist (7 children).

Thirty-two per cent of children (n=21) mentioned a miscellaneous method of 'killing bugs'. These included *'getting an injection such as mmr or tetanus (shot) will stop bugs'*, *'drink heaps of water'* and *'having a lemon drink'*.

Children from higher socio-economic status areas described more ways of catching bugs that make you sick (Kruskal-Wallis $H=12.29$ $df=2$ $p=0.0021$) and killing bugs that make you sick (Kruskal-Wallis $H=24.05$, $df=2$, $p<0.0001$).

Discussion

Regardless of decile, gender or ethnicity, most children in this study believed that bugs are caught by coughing and sneez-

ing on someone, or sharing spit as in drink bottles and sharing food with someone. The 'not sharing spit message' has been widely publicised in schools, amongst sports teams and in the media as a way of avoiding diseases, especially meningitis, and students appear to have understood this message. Similarly, from an early age, most children are taught and re-

minded to cover their face with their hands when they cough or sneeze. Few students mentioned the transfer of disease through the infected hands of the person who has coughed or sneezed or 'not washing hands' as a means of catching a bug. This suggests that, although hand washing is one of the easiest, cheapest and most recommended ways of reducing the transmission of disease, few children understand the importance of hand-washing.¹²

When asked about 'bugs that make you sick' most children appeared to describe viral URTIs. Seventy-three per cent referred to 'bugs' caught by either coughing/sneezing and/or through exposure to cold temperatures. Most students suggested medicine or pills were needed to kill bugs that make you sick. Medicines such as antibiotics cannot kill viruses that cause URTIs, so this suggests the students may lack understanding or have misunderstandings about the different microbes that cause disease, and the medicines used to treat them.

Bush and Hardon,⁹ suggest that family modelling and messages by the media in medicine use affect the

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beliefs of children at an early age. The widespread advertising of medicines on television, including within children's peak viewing times, may explain the participants' knowledge of particular medicines.¹³

Children from lower socio-economic status groups are likely to be exposed to more infections,¹⁴ and this study suggests they also have lower knowledge of means of avoiding and treating infection. However, the students at the decile 2 school had had a pharmacist visit to talk to them about medicines and safe practices earlier in the year. This may have had some influence on their responses on

ways to kill a bug as they more often mentioned the taking of medicines/pills, seeing a doctor and seeing a pharmacist.

Because we asked class teachers to ask children to draw pictures and write stories, it is possible that subtle prompting by teachers, parents or peers influenced the children's answers. The study was done in the normal class-room environment so children may have influenced each other's answers. Although this draw-and-write method is efficient in gathering data from larger numbers of children, variations in children's ability to convey their ideas in writing can also influence results.

Conclusion

When asked about 'bugs which make you sick' children appeared to think mainly about viral illness such as coughs and colds. Medicines are rarely needed for these illnesses and antibiotics are certainly not needed unless secondary bacterial conditions develop. Nevertheless, medicines were the most common method children suggested to 'kill' these 'bugs'. This suggests that misconceptions about antibiotics begin at an early age and that, like adults, primary school children should be educated about appropriate medicine use, particularly for

Figure 1



common upper respiratory tract infections. The results also suggest that children need to be educated about the transmission of diseases and simple health care practices such as hand washing. Programmes designed to involve the family and community ensure the messages given at school help improve the use of medicines in the community,

and equip a future generation with knowledge of how to use medicines wisely. In the case of antibiotics, this would help conserve a precious but threatened resource.

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