

Original Research

# Knowledge and reported use of antibiotics amongst school-teachers in New Zealand

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## ABSTRACT\*

Gaps in public knowledge about antibiotics have led to calls for public education campaigns about antibiotics, including education of school children. Objective: This study investigates New Zealand primary school teachers' current level of knowledge about antibiotics, to assess whether this is adequate for providing accurate education for children. Methods: Two hundred and sixty-six primary school teachers from 39 schools in four cities were interviewed about their knowledge and understandings of antibiotics, using a questionnaire. Results: Teachers reported having little current involvement with antibiotics. There were gaps in the understanding of antibiotics amongst many of the teachers. Only about 60% knew that antibiotics were useful only in bacterial infections, many believed antibiotics were useful for colds and flu, and many did not know about antibiotic resistance. On the other hand, teachers largely reported appropriate patterns of antibiotic use. Conclusion: If teachers are to educate children about antibiotics, basic education about antibiotics and resistance will be required for school teachers.

**Keywords:** Anti-Bacterial Agents. Health Education. Schools. New Zealand.

## CONOCIMIENTO Y USO COMUNICADO DE ANTIBIÓTICOS ENTRE PROFESORES DE ESCUELA EN NUEVA ZELANDA

### RESUMEN

Las lagunas en el conocimiento del público sobre antibióticos han llevado a llamadas de atención para realizar campañas sobre antibióticos, incluyendo la educación de niños en escuela. Objetivo: Este estudio investiga el nivel actual de conocimiento sobre antibióticos de los profesores de escuelas primarias en Nueva Zelanda, para evaluar si son adecuados para proporcionar educación adecuada a los niños. Métodos: Se entrevistó, utilizando un cuestionario, a 266 profesores de escuelas primarias en 39 escuelas de 4 ciudades sobre sus conocimientos e ideas de antibióticos. Resultados: Los profesores informaron tener poco conocimiento de antibióticos. Había lagunas en su comprensión de los antibióticos entre muchos profesores. Sólo el 60% sabía que los antibióticos eran útiles solo en infecciones bacterianas, muchos creían que los antibióticos eran útiles en gripe y resfriado, y muchos no sabían nada sobre resistencias a antibióticos. Por el contrario, los profesores informaron sobre patrones de uso de antibióticos adecuados. Conclusión: Si se pretende que los profesores eduquen a los niños sobre antibióticos, se requerirá una formación básica sobre antibióticos y resistencias para los profesores de escuela.

**Palabras clave:** Agentes anti-bacterianos. Educación sanitaria. Escuelas. Nueva Zelanda.

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## INTRODUCTION

Antibiotic resistance has been described by the World Health Organization as a major global health problem that needs urgent action.<sup>1</sup> This is largely due to inappropriate use and overuse of antibiotics. A number of studies have found gaps in public knowledge about antibiotics.<sup>2-4</sup> These misunderstandings may contribute to inappropriate prescribing, as patients' expectations create a major pressure on prescribers to provide antibiotics inappropriately.<sup>5</sup> As a consequence, calls to reduce antibiotic use and thereby control the development of resistance often include public education and information campaigns.<sup>1</sup> Some authors have

suggested that children need to be educated about antibiotics<sup>6</sup> and education programs have been developed.<sup>7,8</sup> The most efficient way to organize such education would be in schools.

Currently, teachers may contribute to forming children's knowledge, beliefs and expectations about antibiotics in their teaching, and in interaction with individual children who are taking antibiotics. Schools are both places where children learn about health, medicines, and the science underpinning these, and places where children take medicines. For example, US studies have found that 3-5% of students received medication for chronic illness at school<sup>9,10</sup> and in the UK there have been debates about who is responsible for administering medication at school.<sup>11</sup> There is little evidence about this topic in New Zealand, but it seems clear that teachers may affect children's knowledge about antibiotics and contribute to forming their beliefs and expectations both in classrooms in general, and with specific children who are taking antibiotics. There are currently no formal sessions about medicines, antibiotics and antibiotic resistance in the school curriculum, so any discussion of these topics is incidental and may not be consistent between teachers, classes or schools. If education programmes about antibiotics were to be carried out in schools, school teachers would likely play a key role in these. The aim of this study was to assess school teachers' existing level of knowledge and reported personal use of antibiotics. This will determine whether, and to what extent, school teachers themselves would need education about antibiotics before they could provide it to children. Current practices regarding medication taking in schools, and teachers' roles in this would be an interesting topic, but was outside the scope of the study reported here.

## METHODS

A random sample of 120 schools was selected from the 493 primary schools (that teach children five-thirteen years of age) in four cities: Auckland, Christchurch, Dunedin, and Palmerston North. An additional seven schools in Palmerston North were randomly sampled when we found that fewer agreed to participate from this city.

Minor modifications were made to a questionnaire used in previous studies.<sup>12,13</sup> The first part of the questionnaire did not assume that participants know what antibiotics are. This included demographic questions, basic questions about the uses of antibiotics, questions that asked participants to identify antibiotics from a list of commonly used medicines, and a question about the causes of colds and flu. In the second part of the questionnaire, participants were shown a list of common antibiotics, and asked questions based on them. Ethical approval was obtained from the University of Otago. The questionnaire was pre-tested on school teachers and others.

Principals of the selected schools were approached with a letter explaining that the study was about prescription medicines, rather than antibiotics. This

was to ensure that teachers did not have an opportunity to research the topic before they were interviewed. Schools were followed up by telephone. Those principals who consented for their schools to participate arranged a day and time for an interviewer to visit the school. During this visit the researcher interviewed all the teachers who were available and consented to be interviewed. Each teacher was given the option of filling out the questionnaire personally during the interviewer's visit or being interviewed.

## RESULTS

A total of 39 schools (out of 127, i.e. 31%) agreed to participate in this study, and 266 teachers were interviewed. Most (60%) teachers were 41 to 60 years old, most (85%) were female, and the most common ethnicity (85%) was Pakeha/New Zealander of European descent. Most teachers trained in New Zealand (90%).

A small proportion of teachers reported often (2%) or occasionally (12%) being asked about antibiotics. Most teachers rated their knowledge of antibiotics as moderate. Sixty-seven percent rated their knowledge as 2 or 3 on a scale from 0 (nothing) to 5 (a lot).

### Knowledge

Teachers were asked to identify the uses of antibiotics from a list of options. Participants could choose more than one response. Approximately 79% of teachers correctly replied that antibiotics were used for killing bacteria, and 13% gave the general answer of "heal illnesses". However, 22% incorrectly thought that antibiotics killed viruses, some thought that antibiotics were used to strengthen the immune system (18%), and relieve pain (9%). Only 59% of the participants correctly chose killing bacteria and/or healing illness without choosing any incorrect options.

Teachers were asked to identify antibiotics from a list of medications. Most teachers were able to correctly identify "Amoxyl/Amoxicillin" (91%) and "Augmentin" (common brand name for amoxicillin with clavulanic acid) (82%), as antibiotics. Small numbers of teachers incorrectly selected other drugs. Thirteen teachers selected "allopurinol for gout", six "metformin for diabetes", six paracetamol (acetaminophen), two Codral (a popular cough and cold remedy), and two asthma inhalers. Eighty-eight percent of teachers correctly picked either "Amoxyl/Amoxicillin" or "Augmentin" (or both), but not other medicines.

Participants were asked about the causes of colds and flu, and given a range of options. They were told they could select more than one option. Most teachers (85%) gave the correct answer (viruses). However many also indicated incorrect causes: bacteria (44%), changes in weather (15%) and getting cold (12%), or dust (3%). Less than half of the teachers (47%) correctly chose "viruses" as their only answer.

Most teachers (58%) correctly indicated that antibiotics are not useful for colds and flu, 28% said

they were, and 14% were not sure. Of those who thought they were useful, 57% believed that antibiotics prevent more serious illnesses developing, 37% said antibiotics make you get better sooner, 35% said they prevent the cold/flu getting worse, 32% said they relieve symptoms, and 5% indicated other reasons.

Most teachers (89%) were aware that antibiotics could have undesired effects. Most of the others (10%) were not sure, while only 1% thought that antibiotics did not have any bad effects. The most popular "bad effect" selected by 67% of teachers was "germs get used to antibiotics and get harder to kill" (i.e., resistance). This was followed by "thrush" (63%), "allergy" (57%), and "diarrhoea" (47%).

#### Antibiotic related practices

Most teachers (88%) reported that they had used the antibiotics listed in the questionnaire (Penicillin, Amoxyl, Amoxicillin, Augmentin). Twenty two teachers (8%) reported having used antibiotics for colds and flu.

A prescription written by a health professional was by far the most common source of previously used antibiotics: 86% reported that antibiotics were prescribed by their doctors, and 10% by dentists. Very few teachers reported other sources, such as pharmacies without prescription (illegal in New Zealand) (2%), stored at home (1%), nurses (less than 1%), family and friends (less than 1%).

Teachers were asked to specify how they would take their antibiotics. Almost all (97%) reported that they would finish the whole course. Some reported that they would stop taking antibiotics when they felt better (5%). Teachers were asked what they would do with leftover antibiotics. Most teachers surveyed reported that they would dispose of leftovers by throwing them away (60%) or returning them to pharmacies (23%). However some said they would keep them for later use (15%) or give their antibiotics to someone else (less than 1%).

#### DISCUSSION

The sample appears to be very representative of the primary school teacher population. Approximately 82% of New Zealand primary teachers are female (85% in our study), 62% are aged 40 or over (60% of our sample were 41-60), and 79% are NZ Europeans (85% of our sample).<sup>14</sup>

The questionnaires were administered in less than ideal conditions, during breaks in the school day. Break times were limited, and teachers may have been distracted by other tasks. Teachers may occasionally have overheard others' answers. The data on antibiotic practices is self-reported, and actual practices may be different.

Other studies have shown that teachers have limited knowledge of health and illness. In Bevis and Taylor's study of London primary school teachers, most were uncertain about many aspects of asthma.<sup>15</sup> Only a quarter of Liverpool teachers of diabetic children were judged to have adequate understanding of diabetes.<sup>16</sup> However, Bannon et

al. found that teachers in the UK had a good general knowledge of epilepsy, despite never having received formal training about it.<sup>17</sup>

While the knowledge of teachers in this study seems to be higher than that of the general population in New Zealand<sup>2,18</sup>, there were gaps in the understanding of antibiotics amongst many of the teachers. Other studies have found similar misconceptions. For example, Eng et al found that amongst a population-based sample of US residents, 48% would expect an antibiotic if they were ill enough to seek medical attention for a cold.<sup>4</sup>

Although incorrect knowledge about antibiotics was common amongst teachers, they mostly reported appropriate use of antibiotics, with some exceptions. These results were much better than those reported in other studies. For example, in a multi-country study, Pechere found that about a quarter of respondents reported saving antibiotics for future use, although this varied from 4% in the UK to 41% in Italy.<sup>19</sup> In a New Zealand study, only 71% of Korean people said they would take a course of antibiotics until finished.<sup>13</sup>

Efforts have been made to educate children about antibiotics, or medicines in general, in some countries.

In Moldova, a programme was developed to specifically target the use of antibiotics for colds and flu. Student volunteers were recruited for training as peer educators. Training emphasized that antibiotics do not help colds and flu, colds and flu are caused by viruses, antibiotics do not kill viruses, and that people should not take antibiotics for colds and flu. These volunteers then educated their peers and led meetings of parents to communicate these messages. This is a novel approach, which reduced teachers' involvement and focused instead on developing leadership potential and knowledge of students. The programme reduced use of antibiotics for colds and flu among students and their families.<sup>20</sup>

In Finland, a curriculum about medicines has been developed after considerable background research. This standardized curriculum is one way to avoid the problem identified in our research, that teachers' own knowledge may be lacking. Focus group discussions were initially held with children aged 7-14, to find out what they knew about medicines, and how much autonomy they had in taking medicines.<sup>21</sup> A survey of teachers' views about medicines education for children was conducted.<sup>22</sup> The curriculum material was then piloted with teachers, and revised accordingly. Topics in the Finnish curriculum include "what are medicines", "side effects", "vaccines", "storing medicines", "proper use of medicines". For example under "what are medicines" children are taught that some medicines cure illness, some relieve symptoms, and some prevent illness. The full curriculum is available at [http://www.uku.fi/laakekasvatus/english-introduction-dear\\_reader.shtml](http://www.uku.fi/laakekasvatus/english-introduction-dear_reader.shtml). This includes lesson plans, assignments, and ready to print handouts for children in English and Finnish.

Lecky et al mention the development of a programme called "E-bug", a Europe-wide teaching resource on hygiene and antibiotics, and report that a programme called "Microbes en question" is in operation in France.<sup>8</sup>

We do not know of any other attempts to educate teachers or children about antibiotic use, although in New Zealand, there is a view that the school curriculum is over-crowded already, and there is reluctance to include more information and more areas of responsibility for teachers. There may be individual pharmacists who visit local schools to talk to children about medicines, but this is undocumented. Organisational and funding constraints around introducing new material into school curricula are likely to differ between countries. Groups concerned about antibiotic resistance and suboptimal use of medicines should explore the most feasible way to introduce medicines education in schools in their own countries.

## CONCLUSIONS

If teachers are to educate children about antibiotics, basic education about antibiotics and resistance will be required for school teachers. Alternatively, providing medicines education to children would be a useful additional role for pharmacists.

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## CONFLICT OF INTEREST

There are no conflicts of interest.

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