Using antimicrobials prophylactically could induce side effects in users and resistance in bacteria. Antimicrobials need to be used according to national guidelines after appropriate assessment of risk,[1 2] especially when such prolonged use is intended. Although generally safe, ciprofloxacin is associated with rupture of tendons and neuropsychiatric disorders, especially in elderly people.[4 5] In most countries it is not licensed for use in pregnancy or children. In children the concern is damage to the cartilage in weight bearing joints—seen when treating juvenile beagle dogs. This concern has not been realised yet,[6] although treatment for 60 days will have been used in only a small number of patients with cystic fibrosis. Few data exist on use of ciprofloxacin in pregnancy, and here amoxicillin might be safer.

Fluoroquinolones such as ciprofloxacin are useful drugs with broad spectrum bactericidal activity. Their value has already been compromised by the development of resistance through overuse.[7] Humans have a rich and varied normal bacterial flora—only 10% of the cells we carry are human. With antimicrobials our expectation is that the infecting pathogen will be killed, but the myriad normal bacteria are also exposed. For example, ciprofloxacin is excreted on to skin and mucous membranes, and strains of *Staphylococcus epidermidis* resistant to ciprofloxacin have appeared on skin at a mean of 2.7 days after start of treatment[8]; they showed co-resistance to many other classes of antimicrobial.

Treatment with fluoroquinolone is also associated with development of resistance in enteric coliforms[9] and oral viridans streptococci.[10] The new fluoroquinolones (for example, levafloxacin, moxifloxacin, gatifloxacin) have a spectrum that includes *Streptococcus pneumoniae* and are used as empirical treatment in bacterial pneumonia. They too are part of the normal flora, and similar mutations that induce resistance to ciprofloxacin induce resistance to the new agents. *Str pneumoniae* is highly transformation competent, and our current problems with penicillin resistant pneumococci have resulted from acquisition of mosaic resistance genes from commensal viridans streptococci. Similar transfer of resistance to fluoroquinolones has been described in pneumococci.[11] This raises the possibility of fluoroquinolone resistance arising in some pneumococci or viridans streptococci during prophylaxis with ciprofloxacin, which could then spread horizontally to other perhaps more virulent pneumococci.

We have little information on the stability of such resistance once treatment with ciprofloxacin has stopped, but in vitro, ciprofloxacin resistant clinical isolates of *S aureus* have retained resistance for over 500 generations in antibiotic-free media.[12] Prolonged administration of ciprofloxacin to many individuals may lead to emergence of resistance in commensal bacteria which could be stable and transferable to other potentially pathogenic bacteria, thus limiting the usefulness of these important antimicrobials. Finally, we cannot exclude the possibility of the development of fluoroquinolone resistance in *B anthracis*—multidrug efflux pumps have already been detected in *B subtilis*.[13]

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School based programmes on obesity

Increase knowledge about nutrition but do not change eating habits by much

The prevalence of obesity has increased dramatically in the past 20 years, and the World Health Organization has declared obesity a global epidemic.[1] The increase in prevalence of childhood overweight and obesity is a particular worry. To combat this epidemic, educational programmes and policies in schools would seem to be a logical response. Two articles by Sahota et al in this issue examine the Active Programme Promoting Lifestyle Education in School, which was instituted in 10 schools in Leeds, England, over one year (pp 1027, 1029).[2 3] Their result reveal a paradox: cooperation by parents, teachers, administrators, and children was very good, and their knowledge and awareness about

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nutrition increased significantly. However, children's nutrition habits changed only slightly, and there were no changes in other outcomes.

The authors focus on one positive change over the school year—an increase in vegetable consumption of almost 50%. They give less emphasis, however, to other less favourable changes, such as a fall in the consumption of fruits, increase in consumption of food and drinks with high sugar levels, and a decrease in activity levels in overweight children. The increase in mean vegetable intake was only 0.3 servings a day (from 0.6 to 0.9 servings). On balance, these results suggest that school based prevention programmes have limited potential for curbing the epidemic of obesity among children.

A closer examination of this study and of the literature, however, puts the problem into perspective. The authors started with the problem of obtaining accurate food records from 8 year olds. The problems of obtaining accurate food records from anyone, adult or child, are well known. Because the three day food diaries kept by the children did not have good information on amounts Sahota et al used quality scores for their analyses. That may be appropriate, but using these qualitative data for quantitative statistics is fraught with difficulty. More assurance of the reliability and validity of the data gathering procedures would allow greater confidence in the results. Baranowski and his group have performed several studies evaluating the validity of food records of children.[4–6] They concluded that accurate records are difficult to obtain, require intensive training, and often have low test-retest correlations.[6] Sahota et al recruited 20 teachers from 10 schools to undergo training for their project. Though the overall effort was large, this represents only two teachers at each school. Setting up a programme for the whole school system of a country would require mobilising staff and parents on a scale that seems unlikely with present resources.

Several studies similar to those of Sahota et al have been reported and most have reached similar conclusions. These studies have been collected in several reviews and meta-analyses that analyse intervention and prevention programmes. In a literature search dating back to 1965, Story identified 11 such controlled experimental studies.[7] Treatment programmes showed positive, though modest, short term results. Few primary prevention research studies were targeted specifically at preventing obesity. Meininger reviewed studies involving minority students published in 1986-99 that sampled elementary, middle, or high school students and incorporated a comparison group.[8] There were no consistent effects of school based interventions on body mass and obesity, blood pressure, or lipid profiles, although knowledge and health behaviours did change.

Ciliska et al and Contento et al performed similar systematic reviews of the effectiveness of community based interventions to increase fruit and vegetable consumption.[9 10] Ciliska et al studied children aged 4 and older and found that the most effective interventions gave clear messages about increasing fruit and vegetable consumption, incorporated multiple strategies that reinforced the messages, involved the family, were more intensive, were provided over a longer period rather than one or two contacts, and were based on a theoretical framework. Six of the interventions in this study sample were targeted at school aged children. One of the largest was the child and adolescent trial for cardiovascular health study, which randomised 4019 children representing many ethnic groups.[11 12] These third grade students received an extensive intervention (15-24 lessons with family and food service activities) versus a non intervention control group. The post-test 24 hour recalls showed no differences between the intervention and control groups in total servings of fruits, vegetables, or fruits and vegetables combined and no significant differences in cardiovascular risk factors including obesity, blood pressure, and serum lipids.

Thus both Sahota et al's study and previous studies show that most school based intervention programmes increase knowledge about nutrition, but they rarely produce significant changes in behaviour or favourable short to intermediate term health outcomes. From this we might conclude that the most cost effective action would be to target higher risk children and devote resources to more intensive treatment programmes. Because individual based programmes for children have the potential to produce more stigmatisation and, if not carefully done, may result in eating disorders, careful thought and research are needed to identify the most appropriate strategies to treat obesity in children. For the future, novel thinking, public policy changes, and additional research funding are needed to develop strategies that will produce more effective methods of incorporating education on nutrition and physical activity into the school curriculum.

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