

# Peanut-free guidelines reduce school lunch peanut contents

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Arch Dis Child 2007;92:980-982. doi: 10.1136/adc.2006.113118

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Accepted 27 May 2007  
Published Online First 7 June 2007

**Background:** Some schools implement peanut-free guidelines (PFG) requesting omission of peanut from lunches. Our study assessed parental awareness of, and adherence to, PFG by comparing the percentage of lunches containing peanut between primary school classes with and without PFG in Montreal, Québec.

**Methods:** Parents, school principals and teachers were queried concerning the school's PFG and children's lunches were inspected by a dietician for peanut-containing foods.

**Results:** When lunch peanut contents were compared in randomly selected classrooms, peanut was found in 5/861 lunches in classes with PFG (0.6%, 95% CI 0.2% to 1.4%) and in 84/845 lunches in classes without PFG (9.9%, 95% CI 8.0% to 12.2%), a 9.4% (95% CI 7.3% to 11.4%) difference.

**Conclusions:** Our findings demonstrate that PFG are effective in reducing peanut in classrooms providing a basis for future research that should address whether or not the reduction in peanut achieved by restrictive lunch policies decreases the morbidity associated with peanut allergy in the school setting.

Peanut allergy is relatively common<sup>1</sup> and can induce potentially fatal anaphylaxis in highly sensitised individuals. A 1996 Canadian consensus document<sup>2</sup> recommended avoiding accidental exposure in schools by forbidding food sharing, separating allergic children during meals, encouraging hand washing and washing surfaces on which food had been placed. It recommended that, in earlier grades, peanut-containing foods should not be permitted in classes attended by peanut-allergic children.

Although it seems intuitive that guidelines prohibiting peanut in children's lunches (ie, peanut-free guidelines, PFG) would reduce the risk of accidental exposures, it has not been shown that PFG are communicated and adhered to by parents preparing lunches. Some schools provide clear directives on permissible foods and vigilantly monitor lunch contents, while others provide rudimentary guidance. Our study assessed parental awareness of, and adherence to, PFG by comparing the percentage of lunches containing peanut between primary school classes with and without PFG in Montreal, Québec.

## METHODS

### Class selection

All Greater Montreal area public school boards were approached for permission to query schools on their policies concerning peanut-containing foods and on their willingness to allow inspections of children's lunches (fig 1). Following consent from their boards, schools containing kindergarten to grade 3 classes were asked if PFG were implemented within at least one class. Classes were considered to implement PFG if principals indicated that parents had been requested at least once not to include peanut-containing foods in lunches.

Classes with and without PFG were then randomly selected. A priori, we anticipated that the proportion of lunches containing peanut would be 5% in classes with PFG and 25% in classes without. To estimate the proportion in classes implementing PFG with a 95% confidence interval (CI) width of  $\pm 1.25\%$ , 1216 lunches would need to be inspected. To estimate the proportion in classes without PFG with a 95% CI width of  $\pm 2.5\%$ , 1200 lunches would need to be inspected. Assuming that 60% of parents would permit inspections and that there are 20 children per class, approximately 200 classes

(100 with PFG and 100 without) needed to be randomly selected.

### Process of lunch inspection

Parents of children in the randomly selected classes were asked to consent to an inspection of their child's lunch by a dietician at an unspecified time over the school year. Our ethics review board required full disclosure to parents of the purpose of the inspection, that is, that we were examining lunches for peanut products. Parents were assured of their and their child's anonymity. Parents not responding were re-contacted after 2 weeks.

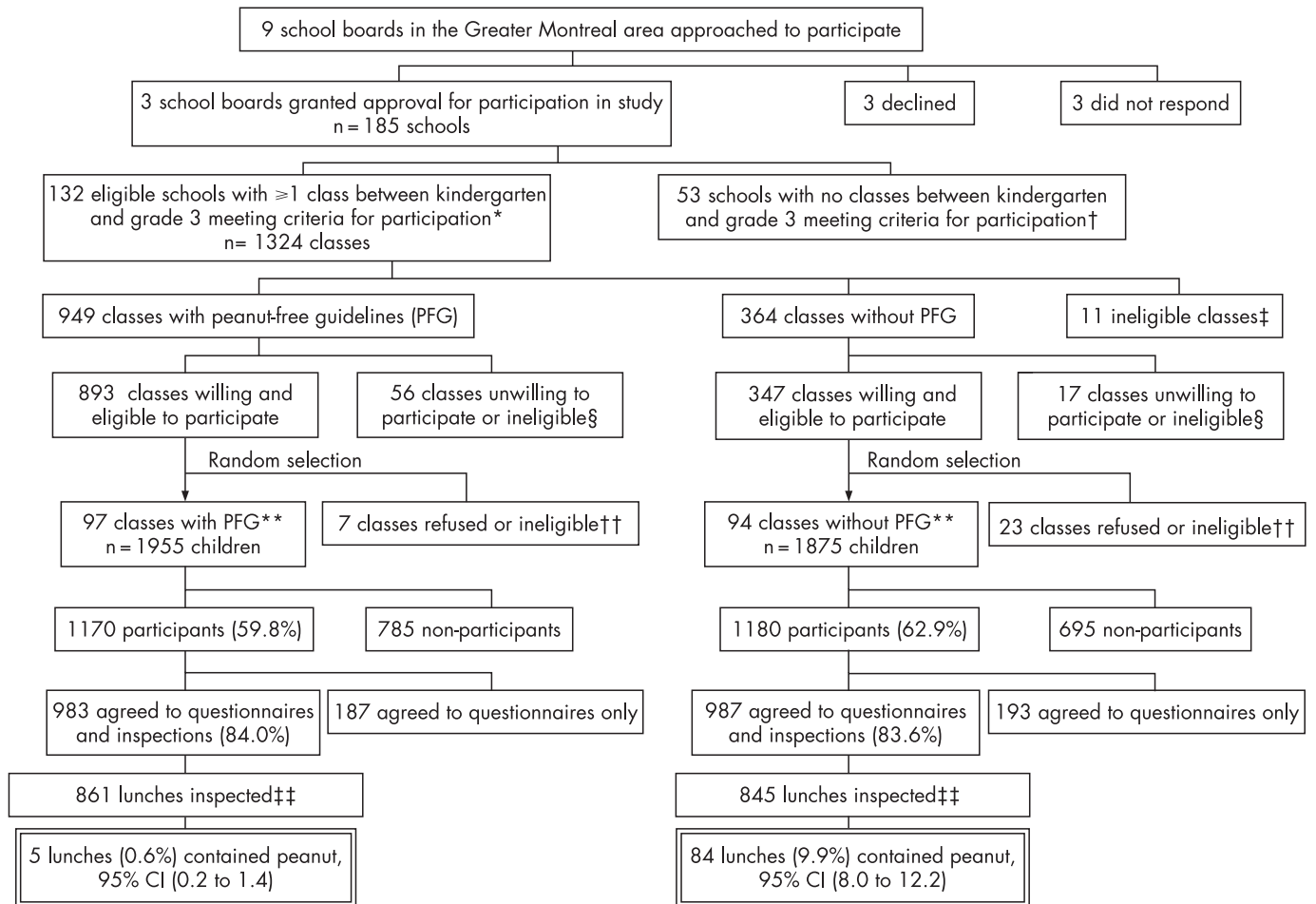
Lunches were inspected between April and May 2004 and April and June 2005. On the inspection day, children were asked to affix their name to their lunch box and leave it outside the classroom. Our dietician, blinded to classroom peanut policy, inspected lunches for foods visibly containing or labelled as containing peanut. Items with precautionary labelling (eg, "may contain traces of peanut") were not considered as containing peanut. Although such products could contain sufficient amounts of peanut to provoke reactions, they were not considered as peanut-containing because PFG tend not to provide clear directives on their use. Our objective was to determine if parents are aware of, and adhering to, clear-cut PFG to omit foods visibly, or labelled as, containing peanut. When foods whose ingredients were not identifiable were suspected of containing peanut, parents were contacted.

### Participant questionnaires

Parents were asked whether they were aware if their child's class implemented PFG. Principals were queried on whether PFG were implemented in their schools, on the implementation process, and on the number of peanut-allergic children in kindergarten to grade 3 classes. Teachers were queried on whether PFG and other peanut avoidance policies (eg, forbidding food sharing) were implemented and on the implementation process.

The ethics review board of the McGill University Health Centre and participating school boards and schools approved the study.

**Abbreviations:** CI, confidence interval; PFG, peanut-free guideline(s)



**Figure 1** Outline of recruitment and participation of school boards, schools, classes and children, and results of lunch inspection. \*100 of these 132 schools (75.8%) had at least one class implementing PFG. †Exclusion criteria: schools >1 hour away from Montreal; schools where, for every class between kindergarten and grade 3, it was unclear if a PFG was implemented; schools where all children went home for lunch or lunch was provided; schools where all classes between kindergarten and grade 3 had <10 children; schools having classes with no grade divisions; schools where there was lack of cooperation from personnel. ‡Ineligible because it was unclear if classes implemented PFG. §Ineligible because classes had <10 children. \*\*The randomly selected classes came from 59 schools, among which PFG were implemented in every class in 35 schools, in some classes in two schools, and in no classes in 22 schools. Of schools with at least one class implementing PFG, 94.0% (95% CI 81.0% to 99.0%) had at least one peanut-allergic child between kindergarten and grade 3; of schools where no class implemented PFG, 77.0% (95% CI 55.0% to 92.0%) had at least one peanut-allergic child. ††Ineligible because it became apparent after the random selection process that it was unclear if classes implemented PFG. ‡‡Discrepancies between the number of parents agreeing to inspections and the actual number of lunches inspected were due to: absence of a child from school, child's refusal to give his/her lunch box, child forgetting his/her lunch on the inspection day, child eating a school-prepared meal on certain days of the week (ie, "hot lunch" on inspection day) or a government lunch, or child going home for lunch on the inspection day.

### Statistical analysis

Point estimates and CIs for the overall percentages of peanut-containing lunches in classes with and without PFG were calculated using standard formulae and compared. Unadjusted point estimates and 95% CIs were based on the observed fractions of lunches containing peanut of the total number of lunches inspected (ie, full responders).

Given that the numerator and denominator might be affected by selection bias, selection bias-adjusted estimates and CIs were derived using information from parents, principals and teachers to account for children whose parents completed questionnaires but refused lunch inspections (ie, partial responders) or whose parents refused both questionnaires and inspections (ie, non-responders) through a Bayesian bias correction technique called multiple imputation. These methods impute the probability of a lunch containing peanut based on all available information, while accounting for the fact that the imputed information is imperfect.

### RESULTS

Three of nine Greater Montreal area public school boards participated (fig 1). From 132 schools, 893 classes with PFG

and 347 classes without were willing and eligible to participate. Ninety seven classes with PFG and 94 classes without were randomly selected. Of 1955 children in the classes with PFG, 59.8% of parents agreed to participate, while 62.9% of parents of the 1875 children in the classes without PFG agreed to participate. Inspections were conducted a mean of 94.5 days (standard deviation 32.8) after obtaining consent.

In classes with PFG, five of 861 lunches contained peanut (0.6%, 95% CI 0.2% to 1.4%). In classes without PFG, 84 of 845 lunches contained peanut (9.9%, 95% CI 8.0% to 12.2%), a 9.4% (95% CI 7.3% to 11.4%) difference among full responders. Among full and partial responders, the estimated difference in lunch peanut content between classes with and without PFG was 9.3% (95% CI 7.0% to 11.7%). Among full responders, partial responders and non-responders, the estimated difference was 9.5% (95% CI 7.3% to 11.7%).

### DISCUSSION

Our study is the first to demonstrate that lunches in classrooms with PFG contain substantially less peanut than lunches in classrooms without PFG. Although most primary schools (100

### What is already known on this topic

- Some schools have issued peanut-free guidelines asking parents to avoid including peanut-containing foods in their children's lunches.
- This has been done with the aim of preventing peanut-allergic children from experiencing allergic reactions in the school environment, caused by accidental exposures to peanut.
- However, parental adherence to these peanut-free guidelines has never been assessed.

### What this study adds

- This study adds to knowledge about policies related to food allergy management in public settings by showing that guidelines issued by schools requesting the omission of peanut-containing foods from children's lunches are effective in reducing the peanut content of lunches.
- This information provides a foundation for future studies on the impact of restrictive lunch policies on the occurrence of allergic reactions from accidental peanut exposures.

of 132) involved in our study implemented PFG, classes without PFG promoted other peanut avoidance policies (data not shown). Over 80% of parents in classes implementing PFG were aware that peanut was not allowed (data not shown). In classes without PFG, most parents were unaware that peanut was permitted (data not shown) and did not include peanut in their children's lunches.

Our research was not designed to determine if PFG and other allergen avoidance policies result in less accidental exposures. However, we speculate that implementation of PFG, in concert with other allergen avoidance policies, has contributed to enhanced societal awareness of peanut allergy and its consequences, leading to decreased use of peanut in public settings involving children, and a subsequent reduction in accidental exposures. Our group recently reported that the annual incidence rate of accidental exposure to peanut among peanut-allergic children in Québec was 14.3% (95% CI 10.0% to 19.9%).<sup>3</sup> Only one of the total 35 accidental exposures occurred at school and this school allowed peanut; 80% of children attended schools forbidding peanut. Our findings contrast sharply with data from 15 years previously where 50% of peanut-allergic children had an accidental exposure in the previous year, the majority occurring in schools.<sup>4</sup>

The percentage of lunches containing peanut in both classes with and without PFG was lower than anticipated and there are several possible explanations. Increased concern for children with food allergies and high levels of uncertainty among parents in classes allowing peanut likely contributed to reluctance to prepare lunches containing peanut. Furthermore, there may have been selection bias arising from imperfect sampling frames and non-response bias (eg, only three of nine school boards and approximately 60% of parents participated). Thus, the subset reached by our sampling and participating may have been more cognisant of peanut allergy than the general population. In addition, by disclosing the

study's purpose, we potentially heightened parental vigilance, increasing adherence to PFG and discouraging the less compliant from participating.

We attempted to minimise bias by not disclosing inspection dates and conducting inspections at least 2 months after obtaining consent, at which time it was unlikely that the prospect of inspection would continue to modify parental behaviour. We assured parents of anonymity to encourage participation among the less adherent. By giving parents the option of just completing questionnaires and obtaining data from principals and teachers, we were able to calculate selection bias-adjusted estimates, which actually differed little from unadjusted estimates. We recognise that available information about partial and non-responders may have been insufficient to accurately predict the probability that a lunch contained peanut.

Although our findings demonstrate that PFG are effective in reducing peanut in classrooms, recent Canadian guidelines on allergen avoidance strategies recognise the difficulty of ensuring compliance with food restrictions and recommend avoiding the term "peanut-free" as it may create a false sense of security.<sup>5</sup> They encourage schools to create "allergy-safe" environments through educating personnel on identifying and properly managing anaphylaxis and implementing practices to reduce accidental exposures. They acknowledge that parents may resent impositions of dietary restrictions on a majority not suffering from peanut allergy. Future research should evaluate anaphylaxis management in schools, particularly the ability of personnel to identify and treat reactions, and should determine if current standards are actually effective at reducing the morbidity of food allergy.

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Funding: The Canadian Institutes for Health Research and Montreal Children's Hospital Foundation provided funding for this study.

Competing interests: None.

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