Effectiveness and acceptability of parental financial incentives and quasi-mandatory schemes for increasing uptake of vaccinations in preschool children: systematic review, qualitative study and discrete choice experiment

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Scientific summary

Increasing uptake of vaccinations in preschool children

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Background

Childhood vaccination programmes form a core component of public health strategies worldwide. Nationally and globally, childhood vaccinations have been highly effective in reducing the incidence of, and associated morbidity and mortality from, a range of infectious diseases. However, coverage of preschool vaccinations in England and elsewhere is not always at a rate recommended by the World Health Organization as needed to achieve herd immunity.

Financial incentives have been used to encourage a number of health behaviours worldwide, including uptake of preschool vaccination. Many countries have quasi-mandatory policies which restrict access to child care or educational settings to those who are fully vaccinated, or those who have a legitimate reason for exemption. However, little is known about the effectiveness, acceptability and economic costs and consequences of such interventions, particularly in a UK context.

Research questions

We conducted a systematic review, a qualitative study and a discrete choice experiment (DCE) to answer the following research questions:

- What is the existing evidence on parental incentive and quasi-mandatory schemes for increasing uptake of vaccinations in preschool children in high-income countries, compared with usual care or no intervention in terms of
  - effectiveness
  - acceptability
  - economic costs and consequences?
- What are stakeholders' views, wants and needs concerning interventions to promote the uptake of preschool vaccination programmes?
- Would parental incentive or quasi-mandatory schemes for encouraging uptake of preschool vaccinations be viewed as acceptable?
  - If not, why not?
  - If not, what, if anything, could be done to make such schemes more acceptable?
- What is the value parents place on key attributes and associated attribute levels of preschool vaccination programmes?

Methods

Systematic review

One systematic review was performed, which had three parallel components: effectiveness, acceptability and economic. Studies that met the criteria for either the effectiveness or the acceptability components were additionally screened for inclusion in the economic component. Throughout, parental incentives were defined as interventions that increase demand for vaccinations by offering contingent rewards or penalties with real material value; and quasi-mandatory schemes were defined as interventions that increase

demand for vaccinations by restricting access to universal goods or services to those who are fully vaccinated. Studies were included in the effectiveness component if they compared the effects on uptake of preschool vaccinations of an included intervention with usual care or no intervention using a randomised controlled trial, a controlled before-and-after study or a time series analysis. Studies were included in the acceptability component if they explored the acceptability of included interventions in any stakeholder group using any study design. Studies were included in the economic component if they explored the economic costs and consequences of interventions to parents or society. Included studies were identified using searches of electronic databases, and reference and citation searches of included studies. A narrative synthesis was conducted.

Qualitative study

Ten focus groups were conducted with parents and carers ($n = 91$) of preschool children living in the north-east of England. Participants were recruited from Children's Centres and baby and toddler groups in localities with high and low levels of deprivation. Some areas had experienced recent cases or outbreaks of measles and some had not. Individual interviews were conducted with a range of health and other professionals ($n = 24$) working in the north-east of England. Data were analysed using framework analysis.

Discrete choice experiment

The DCE was conducted in four stages. In stage 1, attributes and levels were identified from the current systematic review and qualitative study, other relevant reviews, a focused search of the general literature, discussions with an expert group and consultation with a group of parents and carers. This resulted in eight attributes with 2–6 levels each: location and type of health-care professional providing the vaccinations, how information was received prior to vaccination, the availability of appointments, how information on risks and benefits was presented, waiting times, the value of rewards, the type of reward and, finally, who received the reward. The type of health-care professional providing the vaccinations was found to be the most important characteristic of immunisation programmes to parents. As the number of combinations of attributes and levels was too many for any one participant to consider, in stage 2, a D-efficient design for the DCE was generated using Ngene software (ChoiceMetrics Pty Ltd, Sydney, NSW, Australia) to reduce the combinations of attributes and levels. A blocked design was used and interactions were pre-specified. A questionnaire was then designed that included the DCE questions and captured a range of other participant information, attitudes and experiences. A paper version of the questionnaire was piloted using think-aloud techniques and then converted to an electronic format for further online piloting. In stage 3, participants were recruited by a market research organisation and data were collected online using the electronic questionnaire. All participants were parents of preschool children living in England. Two groups of participants were recruited: those at high risk of not completely immunising their children (those living in a deprived area, with a preschool child with a disability, living alone, aged under 20 years, or with more than three children; $n = 259$); and those not at high risk of not completely immunising their children ($n = 262$). Data were analysed using a random utility model framework and multinominal logit models.

Results

Systematic review

Few studies were found that met the inclusion criteria. There was substantial heterogeneity across studies in terms of both interventions and methods. There was insufficient evidence to conclude that parental financial incentives and quasi-mandatory interventions are effective for encouraging uptake of preschool vaccinations. There was some evidence that quasi-mandatory interventions linking vaccinations to education were particularly acceptable, although the risk of bias in these studies was high and they were conducted in contexts where such interventions were the norm. There was insufficient evidence to draw generalised conclusions on the economic costs and consequences of these interventions.

Qualitative study

Both parents and professional staff based in the north-east of England felt that offering cash payments in exchange for immunising a child was inappropriate. It was felt that this might encourage families who were living in disadvantage to prioritise vaccination. However, this advantage would be outweighed by the unintended consequences of turning a behaviour that is generally willingly engaged in to achieve protection for children, out of a sense of altruism and social responsibility, into a cash transaction. A penalty scheme (e.g. reducing family benefits) was seen by parents as superficially more attractive than a financial reward. However, parents acknowledged that the most disadvantaged families were very reliant on this aspect of their income and that children might suffer as a consequence of a parent's decision if this were implemented. The introduction of a quasi-mandatory scheme, whereby vaccination would be a requirement for entry into universal services such as nursery or ultimately school, was met with mixed opinions. For many, it seemed like an appropriate option that was fair and equitable. However, the suggestion that a child could be refused entry into education based on their vaccination status seemed immoral to some. For this reason participants believed there would have to be robust procedures in place for parents to legitimately opt out of vaccinations.

Although both parents and health professionals considered the relevant pros and cons of introducing changes to the way in which vaccination could be offered to enhance uptake, these discussions always came back to one factor: the need to strengthen delivery of the existing programme.

The two head teachers in our sample were reluctant to allow schools to become an integral part of the policing of the childhood vaccinations programme. Head teachers did, however, acknowledge that schools offered opportunities to promote child health, and even to deliver vaccinations.

Discrete choice experiment

Respondents demonstrated a strong preference for vaccinating their children, both overall and in the subgroups that were and were not 'at high risk' of incompletely vaccinating their children. Parents had significant preferences for the way in which vaccination services are delivered, demonstrating strong opposition to pharmacists delivering vaccinations and, to a lesser degree, a community nurse delivering vaccinations in a vaccination bus at schools. Although there were no differences in preference for how information was delivered (e.g. mail vs. e-mail vs. internet), risks and benefits presented in charts and pictures were significantly less preferred than when presented as numbers. There was a general preference for shorter waiting times at vaccination appointments. In terms of financial incentives, there was a general preference for cash over vouchers, particularly among the group 'at high risk' of incomplete vaccination. Preference increased with higher value of incentives, and universal incentives were preferred to targeted ones. In a preference elicitation task, which was not part of the DCE, most support was given to universal financial incentives, followed by quasi-mandatory interventions, followed by current practice, followed by targeted financial incentives. In those individuals who stated that they would require a financial reward to vaccinate their children, the average minimum required was around £110. The average maximum incentive that participants believed should be provided, among those who stated that they did not require a financial incentive to vaccinate their children, was around £70.

Conclusions

There is a limited existing evidence base on the effectiveness, acceptability and economic costs and consequences of parental financial incentive and quasi-mandatory interventions for encouraging uptake of preschool vaccinations.

There is a consistent preference among UK parents and stakeholders for universal over targeted parental financial incentives for encouraging the uptake of preschool vaccinations.

There is a consistent preference among UK parents and stakeholders for quasi-mandatory interventions over targeted parental financial incentives for encouraging uptake of preschool vaccinations.

Relative preferences for universal parental financial incentives over quasi-mandatory interventions were inconsistent. This inconsistency may reflect 'social desirability' bias, where participants report what they believe to be the socially acceptable response in social circumstances such as focus groups. Further, open and non-judgemental discussion of these interventions in public settings may lead to people feeling more able to express their views and an apparent increase in acceptability.

There was a consistent recognition that universal financial incentives may be effective in encouraging a small group of parents to vaccinate. Around one-quarter of parents in the DCE stated they would require a reward, of at least around £110, to vaccinate. Most parents who would not require a reward would still accept one if it was offered. Higher incentives provided as cash, rather than as vouchers, were preferred.

A range of methods for optimising the configuration and delivery of existing services was identified. Reducing waiting times, avoiding block appointments, and providing information about the risks and benefits of vaccinations using numbers rather than charts and pictures were particularly identified as potentially valuable. Offering vaccinations in pharmacies or community buses was not valued.

Further evidence is required on the effectiveness of parental financial incentive and quasi-mandatory interventions for encouraging the uptake of preschool vaccinations. As such interventions are likely to be implemented on a large scale, if at all, evaluation strategies such as natural experiments and step-wedge designs may be most useful in generating such evidence.

Further evidence is required on the most effective configuration of any parental financial incentive and quasi-mandatory interventions for encouraging the uptake of preschool vaccinations. Intervention development work, taking account of existing theory on how to change behaviours, would be useful to maximise the potential effectiveness of incentive interventions. Further consideration of the effective component, or components, of financial incentive intervention, informed by the results of the current DCE, would usefully feed into this.

Further consideration of reasons for non-vaccination should be incorporated into new interventions for promoting uptake of preschool vaccinations. Parental financial incentive and quasi-mandatory interventions for encouraging uptake of preschool vaccinations may not adequately address reasons for non-vaccination in high-income countries that tend to achieve overall high coverage of preschool vaccinations.

The systematic review identified that further qualitative evidence is required to explore what aspects of parental financial incentive and quasi-mandatory interventions for encouraging uptake of preschool vaccinations are and are not acceptable, to whom, and why. The current qualitative study provides such evidence.

The systematic review identified that further evidence is required on the acceptability of quasi-mandatory interventions for encouraging uptake of preschool vaccinations in contexts where they are not the norm. The current qualitative study provides such evidence.

If high-quality evidence of effectiveness of parental financial incentive and quasi-mandatory interventions for encouraging uptake of preschool vaccinations is generated, further evidence is required on how to effectively communicate this information to all stakeholders, and on its impact on acceptability.

Further consideration of how a quasi-mandatory intervention for encouraging uptake of preschool vaccinations could be designed and implemented is required. Particular issues requiring further consideration include data sharing of vaccination status between health-care providers and schools, responsibilities of different sectors and staff, and how provision would be made for legitimate opt-out.

Further consideration may be required of how existing systems and resources for encouraging uptake of preschool vaccinations can be optimised. In particular, further evidence may be required on how to provide accessible information and education, and how to deliver accessible vaccination services. However, although these issues were raised in the present work, we did not conduct an extensive literature review on these topics and, as such, cannot make definitive recommendations for future research.

Further evidence is required on the acceptability of financial incentive and quasi-mandatory interventions for preschool vaccinations among the wider public, and not just parents of preschool children, and relevant professionals.

- Research engaging parents in an iterative codesign process to design optimally acceptable and usable information on consequences of disease and benefits and risks of vaccinations is required.
- The factors that may increase acceptance of mandatory schemes warrant further research, and additional DCEs could be conducted to explore parental preferences on how a mandate for vaccination might be imposed.

Study registration

This study is registered as PROSPERO CRD42012003192.

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