STRATEGIES TO IMPROVE VACCINATION UPTAKE RATES

Yaso Shan examines parental and health professional attitudes to the triple measles, mumps and rubella vaccine and argues for a nationally consistent approach to raise vaccination rates to their previous level.

Summary
This article explores the controversy and uncertainty that still exists around the triple measles, mumps and rubella vaccine and its perceived link to autism. It looks at the experiences of front line staff and services in implementing the MMR vaccine, and attempts by authorities to allay the legitimate concerns of parents.

Keywords
Autism, measles, mumps, rubella, vaccination

ON MAY 24 2010, Andrew Wakefield, the doctor at the centre of the measles, mumps and rubella (MMR) vaccine controversy, was struck off the UK medical register by the General Medical Council for serious professional misconduct after a two and a half year investigation. However, the bad publicity which followed his original report and a lack of clarity on policy has left parents and health professionals with no clear direction on the issue.

Epidemiological studies have failed to document an association between autism and the MMR vaccine, and the biological mechanisms that may underlie such an association are ill-defined (Fombonne 2006). There is overwhelming scientific evidence that there is no causal link between MMR triple vaccine and autism (Baird et al 2008). Moreover, there is no proven correlation with an increase in autism since the introduction of the MMR vaccine in 1988 (Taylor et al 1999, Chen et al 2004), or a decrease in autism since the Wakefield controversy led to a fall in its uptake.

However, there has been an increase in the incidence of measles since the fall in MMR vaccine rates. We have lost herd immunity and measles is again endemic in the UK.

This article examines the suggested strategies for increasing uptake rates in the UK to address the outbreaks of MMR. It also considers the theories for causes of autism and examines conditions broadly categorised as autistic spectrum disorders. It explores the reasons why the link was made between MMR and autism and the attitudes of parents and the experiences of front line staff.

Controversy
The MMR debate has focused on the pattern of incidence in cases of autism and autism spectrum disorders (ASD) in an attempt to examine Wakefield et al’s (1998) claims in an article published by the Lancet, and since withdrawn (Lancet 2010), and determine if there is a link between ASD and the MMR vaccine.

There is no central register in the UK of people with autism so information is based on epidemiological studies. Recent studies estimate an ASD prevalence rate of one in 100 children, based on the population of the UK in the 2001 census. This puts the number of children with ASD at 133,500 (National Autistic Society 2009). Whether the actual prevalence of autism has increased is unresolved (Newschaffer et al 2007).

Following the 1998 Lancet paper by Wakefield et al and the ensuing media reporting, MMR uptake fell from 92 per cent in 1995/96 to 80 per cent in 2003/04 (Bedford and Elliman
2010. This is below the suggested England target for herd immunity of 95 per cent (Plotkin and Orenstein 2004). Table 1 shows the uptake rates in England from January 2008 to March 2010 (Health Protection Agency (HPA) 2010a).

Between 1998 and 2009 cases of measles and mumps in England and Wales rose, but cases of rubella fell (Table 2) (HPA 2010b). There were 7,628 cases of mumps in the UK in 2009 – up 317 per cent from the 2,405 cases in 2008. Measles cases dropped from 1,370 to 1,114 over the same period and rubella from 27 to eight cases (Table 2). The rate of spread of measles in teenagers and young adults in their twenties is an increasing concern. The HPA advises that teenagers and college students under 25 should be urged to have the MMR vaccine if they are unprotected.

### Parental concern

Single parenthood, area deprivation and family size are associated with low uptake of MMR (Pearce et al 2008). Since the MMR controversy, uptake has declined among parents living in affluent areas with more highly educated residents (Middleton and Baker 2003, Friederichs et al 2006).

A Commissioning Support for London (CSL) survey (2009) found that socio-economic status influences uptake of MMR, with low uptake in both high and low socio-economic groups (SEGs). Findings relating to parents from high SEGs who chose not to vaccinate their children (MMR doubters) included:

- Parents were not immunisation ‘rejecters’ but had specific concerns about MMR and its perceived link with autism.
- Perceived risks of vaccinating outweigh the risks associated with MMR.
- Concerns about MMR are minor in comparison to the fear of autism and concern that three vaccines in one were too much for young immune systems.
- GPs are not perceived as impartial advisers on MMR and were avoided as sources of information.
- Healthcare professionals (HCPs) are described as ‘agents of distrusted government’ and parents were more likely to trust family and friends.
- The internet is the first port of call for researching MMR, with organisations such as the National Autistic Society seen as independent and credible.
- Parents want an authority (ideally the NHS) to tell them that MMR is safe and that research proves there is no link between the vaccine and autism.
- Attendance at nursery and school is the trigger to reconsider vaccinations.

It is unclear how HCPs view MMR because they are professionally bound to follow government recommendations (www.dh.gov.uk/en/PublicHealth/Immunisation/index.htm) but may experience conflicts of interest as parents. There may also be an attitude among parents that if everyone else’s child is vaccinated, their child will benefit from herd immunity. Hanson (2006) refers to this as the ‘prevention paradox’.

### Table 1

<table>
<thead>
<tr>
<th>Date/Period</th>
<th>Number of Children</th>
<th>MMR (percentage vaccinated)</th>
<th>First dose</th>
<th>Second dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>January-March 2008</td>
<td>13,4934</td>
<td>87.0</td>
<td>74.1</td>
<td></td>
</tr>
<tr>
<td>April-June 2008</td>
<td>14,2191</td>
<td>87.7</td>
<td>75.2</td>
<td></td>
</tr>
<tr>
<td>July-September 2008</td>
<td>15,2472</td>
<td>88.3</td>
<td>76.3</td>
<td></td>
</tr>
<tr>
<td>October-December 2008</td>
<td>14,9263</td>
<td>89.0</td>
<td>77.4</td>
<td></td>
</tr>
<tr>
<td>January-March 2009</td>
<td>14,8255</td>
<td>89.6</td>
<td>80.0</td>
<td></td>
</tr>
<tr>
<td>April-June 2009</td>
<td>15,1855</td>
<td>90.0</td>
<td>81.1</td>
<td></td>
</tr>
<tr>
<td>October-December 2009</td>
<td>15,4523</td>
<td>91.5</td>
<td>82.0</td>
<td></td>
</tr>
<tr>
<td>January-March 2010</td>
<td>14,6768</td>
<td>91.3</td>
<td>82.9</td>
<td></td>
</tr>
</tbody>
</table>

(Health Protection Agency 2010a)

### Table 2

<table>
<thead>
<tr>
<th>Year</th>
<th>Measles</th>
<th>Mumps</th>
<th>Rubella</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>112</td>
<td>94</td>
<td>3,922</td>
</tr>
<tr>
<td>1997</td>
<td>177</td>
<td>182</td>
<td>117</td>
</tr>
<tr>
<td>1998</td>
<td>56</td>
<td>121</td>
<td>119</td>
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<tr>
<td>1999</td>
<td>92</td>
<td>373</td>
<td>162</td>
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<tr>
<td>2000</td>
<td>100</td>
<td>730</td>
<td>62</td>
</tr>
<tr>
<td>2001</td>
<td>70</td>
<td>784</td>
<td>45</td>
</tr>
<tr>
<td>2002</td>
<td>319</td>
<td>500</td>
<td>64</td>
</tr>
<tr>
<td>2003</td>
<td>437</td>
<td>1,541</td>
<td>16</td>
</tr>
<tr>
<td>2004</td>
<td>188</td>
<td>8,129</td>
<td>14</td>
</tr>
<tr>
<td>2005</td>
<td>78</td>
<td>43,378</td>
<td>29</td>
</tr>
<tr>
<td>2006</td>
<td>740</td>
<td>4,420</td>
<td>34</td>
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<tr>
<td>2007</td>
<td>990</td>
<td>1,476</td>
<td>35</td>
</tr>
<tr>
<td>2008</td>
<td>1,370</td>
<td>2,405</td>
<td>27</td>
</tr>
<tr>
<td>2009*</td>
<td>1,144</td>
<td>7,628</td>
<td>8</td>
</tr>
</tbody>
</table>

*Provisional data

(Health Protection Agency 2010b)
To gauge the true picture across social divides, it is important to examine the views of disadvantaged groups or low SEGs as studied by CSL (2009). These groups, which include Travellers, asylum seekers and homeless people, also distrust the MMR vaccine:
- They do not understand the importance of the second dose and the seriousness of the three diseases.
- They are less likely to have researched MMR.
- They are more likely to be informed and influenced by media stories and hearsay and to avoid the perceived risk by not vaccinating.
- They are potentially harder to influence and persuade than the ‘doubter’ audience.
- They have better contact with and respect for GPs and nurses than the ‘doubter’ audience.
- A lack of access to health services does not appear to be a major factor (although it would have been difficult to recruit hard to reach groups for this research).

National Institute for Health and Clinical Excellence (NICE) guidelines (2011) highlight that parents in the Asian community are more compliant. However, children from minority ethnic groups and those whose first language is not English may be vulnerable. Despite reports and articles based on empirical research refuting any link between MMR and autism, there is still some public scepticism, distrust and fear.

A Japanese study by Honda et al (2005) showed that despite a decline in the uptake of the MMR vaccine, autism rates and ASD continued to rise. Moreover, the study showed that the incidence was higher in children born after 1992 who were not vaccinated with MMR than in children born before 1992 who were vaccinated. The authors comment that this destroys any possible causative link between the use of the vaccine and autism.

It seems that UK health and education campaigns aimed at putting forward the facts are failing. However, vaccination rates cited by the HPA represent the national picture and do not illustrate the success of local campaigns where the target of 95 per cent may have been restored. A co-ordinated and consistent campaign needs to be put in place to repeat this success across all regions.

Causes of autism
There is no established or proven cause of autism, which is a complex neurodevelopmental disorder. Clinicians look to past and present theories, including environmental causes, of which vaccines are a significant component (Figure 1). This is despite the vaccine hypotheses lacking convincing scientific evidence (Rutter 2005, Baird et al 2008).

Other proposed environmental factors include certain foods, infectious disease, pesticides and vaccines containing the preservative thiomersal (also known as thimerosal in the US) (Newschaffer et al 2007). Thiomersal is a form of organic ethyl mercury formerly used in several childhood vaccines in the US to stabilise vaccine formulations. Although there appears to be no epidemiological study that has confirmed a possible increase in the risk of autism or developmental disorders in children exposed to thiomersal (Fombonne 2008), nor a convincing case for the MMR link, other as yet unidentified environmental risk factors cannot be ruled out (Rutter 2005).

Edicts from government agencies and health authorities to increase vaccination rates have not always been followed up by training and education of front line staff (NICE 2011). The CSL (2009) survey suggests a need for co-ordinated and effective training and education. HCPs need to be updated and informed of the facts of vaccination and MMR as some do not feel confident advising patients when asked searching questions about the perceived link to autism and other risks associated with vaccination (CSL 2009).

Healthcare practitioners’ views
Gauging the views of HCPs has been difficult because there is little research on the subject. The CSL (2009) survey found:
- HCPs experienced problems administering the second vaccine dose as mothers lose touch with health services, forget or do not see its importance.
- Nurses and health visitors did not feel well equipped to deal with questions from those who were concerned about the alleged autism link.
- Poor data storage and updates by primary care trusts meant that GP practices did not have accurate or current information about who to target and who had been fully immunised.

A childhood immunisation survey conducted by the Department of Health (DH) (2008) gives a national indication of the views of GPs, health visitors and practice nurses about childhood immunisations. It found:
- GPs have a low awareness of training,
- HCPs experienced problems administering the second vaccine dose as mothers lose touch with health services, forget or do not see its importance.
- Nurses and health visitors did not feel well equipped to deal with questions from those who were concerned about the alleged autism link.
- Poor data storage and updates by primary care trusts meant that GP practices did not have accurate or current information about who to target and who had been fully immunised.
Box 1 | Recommendations for increasing MMR uptake rates

1. Continue to offer the MMR and do not make single vaccines available.
2. Do not make MMR vaccination compulsory.
3. Do not politicise MMR – politicians’ responsibility.
5. Integrate a strategy to address three key areas:
   - **Infrastructure** – implement new IT systems and data cleansing for an accurate picture of immunisation levels so that affected parents and families can be more effectively targeted via emails, faxes, texts and so on.
   - **Health practitioners** – improve and update knowledge and skills through training and continuing professional development so they are confident in addressing the concerns of parents and making suitable referrals.
   - **The public** – HCPs need to engage with the public to consolidate the national campaign for increasing uptake rates within their remit.
6. Respected authorities need to correct misinformation.
7. All public information on the subject needs to be disseminated in accessible, balanced and evidence-based formats.
8. A commitment to the triple vaccine programme from healthcare professionals so that chances of improving uptake rates at a national level.


Immunisation

the local immunisation co-ordinator and of material available to parents.
- Low awareness of parents’ websites, reducing the possibility of referrals to sources of information that could benefit parents and allay their fears.
- Concerns about the complexity of the immunisation schedule and the difficulty of keeping themselves and parents up to date.
- Education and training issues for all health professionals, especially GPs who have a significantly lower attendance rate at training sessions, constraints of a busy schedule being commonly cited as the cause for non-attendance.
- Sources of information are diverse, ranging from DH and NHS information and publications (most frequently used and most useful), internet (www. dh.gov.uk/en/Publichealth/Information/index.htm was the second most commonly mentioned) and media outlets (television, radio and newspapers).
- Most health professionals were confident explaining MMR and the second dose to parents and thought that the dosing policy was appropriate. Confidence has remained high over time and is now at the highest level seen.
- The most common solution to addressing parental concerns about immunisations was to refer them to a colleague. GPs who made referrals did so to a paediatrician.
- Most HCPs said they allay parents’ concerns by referring them to the internet or providing factsheets. This course of action was highest among health visitors.
- Personal views and concerns could be as important as their professional opinions influencing advice and support given to parents.
- Concerns that babies were given too many immunisations and problems with scheduling the number of vaccines.
- Few HCPs said they would refuse to immunise a child, and those who would cited the MMR vaccine and the children’s flu vaccine. Refusal of the MMR vaccine by HCPs was due to conflicting research, the perceived link to autism and the need for more information.

In light of these findings, it is clear that a comprehensive strategy to address the decline in MMR uptake rates is needed. A rigorous health campaign is required if only to tackle the ‘prevention paradox’ that maintains low uptake rates. Derry (2003) argues the case for compulsory vaccination but this is unlikely to be effective (Hanson 2006).

There is evidence to suggest that administering single vaccines is no better than using the MMR, because of increased episodes of side effects and difficulties in implementation, administration and parental co-operation, with more injections and visits to the clinic (Pearce et al 2008).

There are no routine data on the use of single antigen vaccines and only a limited number of small studies with which to make a comparison (Pearce et al 2008). Importantly, the separate mumps and rubella vaccines have never been given on a large scale to children in this country so their safety has not been confirmed.

Single vaccines

Single vaccines (separate antigens of the measles, mumps and rubella viruses) are no longer licensed in the UK, and are not available on the NHS. Only parents who pay privately have the choice of these vaccines. However, single jabs are not necessarily the better option because there are problems with implementation, administration, compliance, side effects and risk of infection of the two diseases not vaccinated against first.

Offering single vaccines could reduce public confidence in the MMR vaccination programme which could reduce uptake, putting more people at risk. This does not seem a sensible, feasible or safer alternative.

Compulsory vaccination

It has been suggested that making the MMR vaccine compulsory would halt the fall in uptake rates and offer the herd immunity that will prevent disease
outbreaks (Pearce 2008, Derry 2003, Hanson 2006). However, this is controversial because it would impinge on the rights of individuals, could lead to challenges from parents to prove that vaccination was in the child’s best interests, need public support and long-term assessment to show that consistent, high uptake rates are deliverable.

The medical profession is not in favour for fear it will damage relationships between patients and practitioners which should be based on trust. Therefore, compulsory vaccination is not deliverable and could be counterproductive.

Another popular suggestion is to make vaccination a condition of entry to school ensuring healthy uptake rates. Suggestions, recommendations and strategies are summarised in Box 1.

Any strategy must consider parental concerns that may be influenced by cultural, religious or personal beliefs (American Academy of Pediatrics 2010). A 2004 paper by Poltorak et al attempted to show how campaigning can work by addressing personal and social issues that shape parents’ immunisation actions. It aimed to understand the emergence of the MMR controversy as part of the wider changes in people’s relationships with science and the state, rather than a temporary aberration which will fade away.

**Implications for practice**

- Despite recent increases in MMR vaccine uptakes, more needs to be done to raise rates further towards the aim of achieving herd immunity.
- This includes training front line staff, educating and informing the public on important facts, and alloying fears by offering referral opportunities for information and advice.
- Governments, senior health experts and scientists must engage with the debate and communicate with each other, patient groups and the media to implement a comprehensive and realistic strategy. This will address legitimate concerns of the powerful anti-vaccination lobbies and ensure public health and safety for future generations.
- Health professionals can assist parents in making informed choices by advising them to visit: www.dh.gov.uk/en/Publichealth/Immunisation/index.htm
  www.nhs.uk/conditions/mmr/Pages/Introduction.aspx
  www.immunisationscotland.org.uk/

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