

## SHORT REPORT

## A survey of vaccine coverage and antibiotic prophylaxis in splenectomised patients in Scotland

M H Kyaw, E M Holmes, J Chalmers, I G Jones, H Campbell

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**Aims:** To determine the coverage of vaccine and antibiotic prophylaxis in splenectomised patients in Scotland.

**Methods:** Patients who had undergone splenectomy between 1 January 1988 and 31 December 1998 were identified. A questionnaire was sent to general practitioners to validate vaccine and antibiotic status for these patients.

**Results:** A total of 974 living splenectomised patients were identified during the study period. Information on vaccine and antibiotic status was available for 708 (73%) and 770 (79%) of living patients, respectively. Coverage of pneumococcal vaccine (88%) was higher than that of *Haemophilus influenzae* type b (Hib) conjugate vaccine (70%) or meningococcal vaccine (51%). Only 47% of patients received all three vaccines. A higher coverage was also documented for pneumococcal vaccine (28%) than Hib (19%) and meningococcal vaccine (14%) before elective splenectomy. Only 13% received all three vaccines before splenectomy. Coverage of influenza vaccine increased significantly, from 76% in the 1997/1998 season to 96% in the 2000/2001 season. Antibiotic prophylaxis was received by 67% of all patients. The current recommendation, comprising pneumococcal and Hib vaccination and antibiotic prophylaxis, was received by only 52% of the patients. There was no association between the coverage of vaccine and socioeconomic status.

**Conclusion:** Further improvement in coverage of recommended vaccines and antibiotic prophylaxis is still needed to reduce the risk of serious infection in this high risk group.

Patients without spleens are at a significantly increased risk of serious infection with encapsulated bacteria, especially *Streptococcus pneumoniae*, *Haemophilus influenzae* type b (Hib), and *Neisseria meningitidis*.<sup>1</sup> Antibiotics and polysaccharide pneumococcal, meningococcal, influenza, and Hib conjugate vaccines are available for the prevention of postsplenectomy infection and are recommended for all splenectomised patients by the Department of Health (DoH) and the British Committee for Standards in Haematology (BCSH), with the exception of meningococcal polysaccharide vaccine.<sup>2,3</sup> Because the adherence to preventive measures has been reported to be low,<sup>4,5</sup> we conducted this study to determine the coverage of appropriate vaccination and antibiotic prophylaxis in splenectomised patients in Scotland during an 11 year period from 1988 to 1998.

"Patients without spleens are at a significantly increased risk of serious infection with encapsulated bacteria"

## METHODS

Patients who underwent splenectomy from 1 January 1988 to 31 December 1998 were identified using the Scottish Morbid-

ity Record (SMR01), which is collected at discharge from all episodes of hospital inpatient or day case care. It records information on demography, number of hospital admissions, and the clinical nature of the patient treatment episode. SMR01 records were linked to General Register Office (Scotland) death registrations using probability matching to exclude patients who had died because their medical records would not be available to general practitioners. A questionnaire was sent to general practitioners of living patients requesting details of elective or emergency splenectomy, antibiotic prescribing, and vaccination with pneumococcal, meningococcal, Hib, and influenza vaccines. A reminder was sent to those who did not respond after six weeks. The Carstairs deprivation score<sup>6</sup> was used to determine the deprivation index values of the patients' areas of residence and the coverage of these vaccines. Data analysis was performed on SPSS version 10 and Stata (Stata Corporation, version 6, 1999; College Station, Texas, USA) for Fisher's exact test.

## RESULTS

There were 974 living patients who had undergone splenectomy during the study period. Information on vaccination status was available for 708 (73%) of those patients. A higher coverage was documented for pneumococcal vaccine (622 of 708, 88%) and Hib vaccine (468 of 664, 70%) than for meningococcal vaccine (317 of 619, 51%) (table 1). All three vaccines were received by 47% (269 of 576) of the patients. Vaccination status before elective splenectomy was recorded for 541 (56%) of the patients. Coverage of pneumococcal vaccine (153 of 541, 28%) was higher than that of Hib (83 of 435, 19%) or meningococcal vaccine (48 of 335, 14%) for elective splenectomy. All three vaccines were received by 13% (38 of 291) of the patients. An increasing trend in coverage of influenza vaccine was noted between 1997 and 2000: from 76% in the 1997/1998 season to 96% in the 2000/2001 season. Of the 770 (79%) patients in whom antibiotic status was recorded, 518 (67%) received antibiotic prophylaxis. Coverage was 35% (201 of 571) for all three vaccines and antibiotic prophylaxis and 52% (333 of 634) for pneumococcal and Hib vaccines and antibiotic prophylaxis.

There were no significant trends in the deprivation index values for coverage of vaccine with ( $p = 0.12$ ) or without ( $p = 0.14$ ) antibiotic prophylaxis for the combination of pneumococcal and Hib vaccine. Similar findings were recorded for the combination of pneumococcal, meningococcal, and Hib vaccine with ( $p = 0.07$ ) or without ( $p = 0.08$ ) antibiotic prophylaxis. In addition, no association was documented for influenza vaccine coverage and the value of the deprivation index (Fisher's exact test,  $p = 0.46$ ).

**Abbreviations:** BCSH, British Committee for Standards in Haematology; DoH, Department of Health; Hib, *Haemophilus influenzae* type b; SMR, Scottish Morbidity Record

**Table 1** Vaccine and antibiotic coverage in splenectomised patients

DoH and BCSH recommendations	Vaccine or antibiotic prophylaxis	Timing of vaccination	Vaccine coverage	
			N	%
Yes	Pneumococcal	All cases (before or after surgery)	622/708	88
		Two weeks before elective surgery	153/541	28
Yes	Hib	All cases (before or after surgery)	468/664	70
		Two weeks before elective surgery	83/435	19
No	Meningococcal	All cases (before or after surgery)	317/619	51
		Two weeks before elective operation	48/335	14
Yes	Influenza	All cases (before or after surgery)		
		Season 1997–8	16/21	76
		Season 1998–9	24/27	89
		Season 1999–2000	82/89	92
		Season 2000–2001	329/342	96
Yes	Antibiotic prophylaxis	–	518/770	67
Yes	Pneumococcal and Hib	All cases (before or after surgery)	439/641	68
		Two weeks before elective surgery	80/406	20
No	Pneumococcal and meningococcal	All cases (before or after surgery)	305/602	51
		Two weeks before elective surgery	44/313	14
No	Hib and meningococcal	All cases (before or after surgery)	276/588	47
		Two weeks before elective surgery	40/305	13
No	Pneumococcal, meningococcal and Hib	All cases (before or after surgery)	269/576	47
		Two weeks before elective surgery	38/291	13
Yes	Pneumococcal and Hib vaccine and antibiotic prophylaxis	All cases (before or after surgery) for vaccines and after surgery for antibiotic prophylaxis	333/634	52
No	Pneumococcal, meningococcal, and Hib vaccine and antibiotic prophylaxis	All cases (before or after surgery) for vaccines and after surgery for antibiotic prophylaxis	201/571	35

BCSH, British Committee for Standards in Haematology; DoH, Department of Health; Hib, *Haemophilus influenzae* type b.

## DISCUSSION

Optimal management comprising pneumococcal and Hib vaccines and antibiotic prophylaxis was received by 52% of the patients. Annual influenza vaccination uptake increased substantially during 1997 and 2000 and reached over 96% coverage in the 2000/2001 season. A review of studies of postsplenectomy infection between 1952 and 1987, before the availability of Hib conjugate vaccine, found that most cases of postsplenectomy infection are caused by *S pneumoniae* (57% of cases), followed by *H influenzae* (6%), *N meningitidis* (4%), and *Escherichia coli* (4%), with a 32–77% case fatality rate.<sup>1</sup> The widespread use of Hib conjugate vaccine appears to influence the prevalence of causative organisms of postsplenectomy infection. Passive surveillance data in the UK, based on 77 cases of postsplenectomy infection between 1994 and 1998, showed that *S pneumoniae* and *N meningitidis* accounted for 87% and 3% of cases, respectively.<sup>7</sup> The remaining 10% of cases were caused by *Listeria monocytogenes*, *E coli*, *Klebsiella* sp, *Salmonella typhimurium*, and others.

The coverage of vaccine was higher in this large survey compared with previous UK studies, which reported 35.5% in 1986–90 for pneumococcal vaccine<sup>4</sup> and 10% in 1992–96 for Hib and meningococcal vaccines.<sup>5</sup> A recent study in England showed that the coverage of pneumococcal, meningococcal, and Hib vaccine was 79%, 51%, and 40%, respectively.<sup>8</sup> However, in our present study, it is possible that vaccine coverage was lower among splenectomy patients who had died, and that our results are biased.

In Scotland, the guidelines for the management of postsplenectomy infection are based on the DoH and BCSH recommendations. As with other vaccinations and preventive measures, general practitioners are responsible for ensuring that these patients receive appropriate preventive measures. However, there is a need for a national splenectomy register to identify those patients who have not received vaccines or antibiotic prophylaxis in Scotland. This could also be used to generate a regular reminder to general practitioners regarding their patients' prophylaxis status. Our data also suggest that most general practitioners and other clinicians follow recommendations for pneumococcal and influenza vaccines but not for other vaccines. Although the administration of bacterial

vaccines is recommended for at least two weeks before elective splenectomy,<sup>2,3</sup> compliance with this schedule was suboptimal. It appears that compliance with current recommendations for the timing of vaccination with regard to splenectomy was poor among clinicians. Although the effectiveness of pneumococcal, meningococcal, and Hib vaccines in asplenic patients is uncertain, the increased susceptibility to serious infection and the documented safety and potential benefits of these vaccines justify their use in these patients. As yet, meningococcal polysaccharide vaccine is not included in the general recommendations, the vaccine is likely to offer benefits to these patients and thus should be considered.

New conjugate vaccines may offer better protection against these organisms. Meningococcal group C conjugate vaccine has recently been recommended for routine immunisation in

## Take home messages

- Coverage of pneumococcal vaccine (88%) was higher than that of *Haemophilus influenzae* type b (Hib) conjugate vaccine (70%) or meningococcal vaccine (51%) and only 47% of patients received all three vaccines
- A higher coverage was also documented for pneumococcal vaccine (28%) than Hib (19%) and meningococcal vaccine (14%) before elective splenectomy and only 13% of patients received all three vaccines before splenectomy
- Coverage of influenza vaccine increased from 76% in the 1997/1998 season to 96% in the 2000/2001 season
- Antibiotic prophylaxis was received by 67% of all patients and only 52% of patients received pneumococcal and Hib vaccination and antibiotic prophylaxis (the current recommendation)
- Thus, it is apparent that further improvement in coverage of recommended vaccines and antibiotic prophylaxis is still needed to reduce the risk of serious infection in this high risk group

asplenic patients.<sup>9</sup> The decision to use pneumococcal conjugate vaccine is expected soon. Although our study found no significant correlation between the coverage of the combination of pneumococcal polysaccharide and Hib vaccine or the combination of pneumococcal, meningococcal, and Hib vaccine, with or without antibiotic prophylaxis, studies in the USA have highlighted low socioeconomic status in relation to poor coverage of childhood<sup>10</sup> and adult vaccines.<sup>11</sup>

“As yet, meningococcal polysaccharide vaccine is not included in the general recommendations, the vaccine is likely to offer benefits to these patients and thus should be considered”

Although current guidelines recommend life long antibiotic use in these patients,<sup>3</sup> only 67% of patients in our study had received antibiotic prophylaxis. We do not know how many of these patients had discontinued the prophylactic regimen or were taking macrolides (those allergic to penicillin). The rapid emergence of drug resistant pneumococcus complicates this preventive measure and highlights the need for the improved use of pneumococcal polysaccharide vaccine, which covers most drug resistant serotypes. Our survey indicates a high degree of coverage for pneumococcal and influenza vaccine but suboptimal coverage for Hib and meningococcal vaccine and antibiotic prophylaxis despite the existence of national guidelines and the risk of serious infection in these patients. Efforts to increase the coverage of recommended vaccines and antibiotic prophylaxis should continue.

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