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New clinical guidelines on the prevention of healthcare-associated infections in primary and community care

New clinical guidelines on the prevention of healthcare-associated infections in primary and community care have been published by the National Institute for Clinical Excellence (NICE) (1). The guidelines have been developed by Thames Valley University and the National Collaborating Centre (NCC) for Nursing and Supportive Care with a group drawn from service users and carers, health professionals and academics and were subject to extensive external consultation with stakeholders. Although the guidelines aim to provide a standard set of measures that can be used by anyone either giving or receiving care in primary or community care, many of the underlying principles of infection prevention and control apply equally in both hospital and community settings. The intention of these guidelines is therefore to complement the *epic* phase 1 *Guidelines for Preventing Hospital-acquired Infections* (2). Although primarily directed at healthcare professionals based in general practice, health centres, and nursing homes, these guidelines will also be of relevance to others working with patients in their own home or the community, such as the voluntary sector and social services.

A systematic review process was used to identify the relevant questions to search the literature for articles meeting pre-determined criteria. Articles retrieved were then subjected to critical appraisal and graded using the hierarchy of evidence from A (based on category 1 evidence) to D (based on category IV evidence or extrapolated recommendation). Although some of the search questions were similar to those identified by *epic* others have been added to extend the work and to address aspects of care that are specific to the care of patients in the community. Each section includes recommendations about the education and training of patients, their carers and healthcare personnel.

In common with the *epic* guidelines, the NICE guidelines cover standard principles, comprising handwashing, use of personal protective equipment and safe use and disposal of sharps. Recommendations in this section are similar to those published previously, but additional evidence has been reviewed in relation to cost-effectiveness. Recommendations for urinary catheterisation are focused on the care of patients with long-term urinary catheters. A section devoted to preventing healthcare-associated infections during enteral feeding is particularly welcome since it reflects the increase in demand for this type of care in community settings. The final section is focused on preventing healthcare-associated infection in patients with central venous catheters and is directed on general site care and catheter management - issues of particular relevance to those in primary care.

The decreasing length of time that patients spend hospital after treatment, and the extent to which complex care is now delivered in community settings underline the need for these guideline. In addition

to addressing the particular needs of patients in the community they also provide an important opportunity to ensure that the same measures to prevent and control infection are applied in both hospital and community setting, hopefully ensuring more seamless and high quality care.

The guidelines are available in several formats: the full guidelines, including the evidence-base, are available from Thames Valley University <www.richardwellsresearch.com>; a shortened version is available from NICE <www.nice.org.uk>. This also includes a clinical practice algorithm and will be accompanied by a version prepared specifically for patients and their carers. The guidelines will be reviewed in 2005.

1. National Institute for Clinical Excellence. *Clinical Guideline 2. Infection control. Prevention of healthcare-associated infection in primary and community care*. London: National Institute for Clinical Excellence, 2003.
2. Pratt RJ, Pellowe CM, Loveday HP, Robinson N, Smith GW and the epic guideline development team. The epic Project: Developing National Evidence-based Guidelines for Preventing Healthcare-associated infections. Phase 1: Guidelines for Preventing Hospital-acquired Infections. *J Hosp Infect* 2001;**47** (Suppl): S1-S82.

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SARS update

UK

As of 26 June 2003, the United Kingdom (UK) is currently reporting four probable cases of severe acute respiratory syndrome (SARS) all of whom have recovered and been discharged from hospital. A further 171 reports of possible cases of SARS in residents of the UK have been assessed by the Health Protection Agency (HPA) and none have been classified as probable cases.

Website updates

The guidelines for primary care <http://www.phls.co.uk/topics_az/SARS/GP_guidance.htm> and for hospitals (http://www.phls.co.uk/topics_az/SARS/hospital_guidance.htm) have been updated to incorporate latest advice about emergency dental treatment of suspect and probable cases. All other information on the website has been updated in line with the latest travel recommendations and the updated list of affected areas from WHO. Further information is available at <http://www.phls.co.uk/topics_az/SARS/menu.htm>.

WHO report

As of 26 June, the World Health Organization (WHO) is reporting 8460 cases with 808 deaths. Only four new probable cases have been reported to WHO since 20 June: one in each of Toronto (Canada), United States, Guangdong province (China), and Japan. The most recent dates of onset of probable cases in Canada is 12 June, in Taiwan 15 June, in China 3 June, and in Japan 23 June. The Japanese case is a Taiwanese tourist who arrived in Tokyo on 21 June.

As vigilance is still high it is expected that a few additional cases will continue to be reported but that these will quite likely turn out to be cases of community acquired pneumonia caused by other agents than the SARS virus. Only in those areas where a great deal of experience has been amassed in diagnosing SARS from dealing with large numbers of cases will it be likely that reported cases have a lower likelihood of being discarded through an alternative diagnosis.

Travel restrictions

On 23 June Hong Kong was removed from the list of areas with recent local transmission, and Beijing was removed on 24 June. Only Toronto and Taiwan remain on the list of affected areas, and no WHO advisory travel restrictions remain in place. For further information see WHO SARS site at <<http://www.who.int/csr/sars/en/>>.

Case definitions

A number of articles on SARS have recently been published in the *British Medical Journal* <<http://bmj.com/cgi/search?fulltext=SARS&sendit=Enter&volume=326&issue=7403>>. Among them is a paper (1) which questions whether the current WHO case definition for suspected and probable cases are adequate to pick up infected cases at the earliest stage of disease before admission to hospital. The study looked at 556 people who had had previous contact with someone with SARS and who attended a

screening clinic in the emergency department of a university hospital in Hong Kong. Ninety-seven of these cases were confirmed SARS but only 25 of these met the WHO criteria. The WHO criteria for diagnosing suspected SARS had a negative predictive value of 86% a positive predictive value of 54% a sensitivity of 26% and a specificity of 95%. The respiratory symptoms of cough, shortness of breath and difficulty breathing were not found to feature strongly in the early stages of illness. Of all the predictors for SARS investigated, radiological evidence of pneumonic change had the highest odds ratio (32.1) and this was often seen before onset of fever (75 % of patients with history of contact with SARS and evidence of pneumonia by X-ray did not have high fever). The authors therefore recommend that chest radiography ought to be mandatory for all patients being screened for SARS. The study also recommends that in the early stages of SARS systemic symptoms such as fever chills malaise myalgia and rigours may be the most useful criteria to discriminate cases. The authors point out that since the study took place in a single centre with a high proportion of healthcare workers and primary contacts that the results may not be generalisable to the wider community

In response to these findings WHO has acknowledged that a more precise case definition is needed for longer-term surveillance. They do, however, highlight that there is also the danger that increased sensitivity may lead to the detection of more false-positive cases and that the next influenza season will also result in a large number of patients with symptoms easily confused with SARS. WHO realises that there is the danger that health services could be overwhelmed without an improved diagnostic test (which is a major priority) and that a more precise case definition is needed for SARS. The plan is that the revised case definitions will be developed through an international collaborative response. WHO also states that the situation is now moving from an emergency phase into one of sustained vigilance, and that SARS surveillance and reporting will be revised for this next stage and will need to continue for at least a year. The full response can be found at <http://www.who.int/csr/don/2003_06_20/en/>.

Lessons from the Toronto experience

The *Morbidity and Mortality Weekly Report* (MMWR) recently published a report on the circumstances surrounding the resurgence of SARS in a second major outbreak which occurred in Toronto after travel recommendations were relaxed by WHO at the end of April (2). The second outbreak occurred because unrecognised transmission of SARS, initially by patient to patient and patient to visitor, was continuing in a hospital when a directive for increased infection control precautions was lifted. This led to an increase in the number of observed cases, particularly among healthcare workers (HCWs). The report highlighted the need healthcare providers and infection control staff to maintain a high level of suspicion for SARS among hospitalised patients and visitors, particularly after a decline in reported SARS cases and the difficulty in determining when expanded precautions for SARS are no longer necessary. Passive and active surveillance of HCWs are important components in controlling SARS in healthcare settings, but identifying hospitalised patients with SARS is difficult, especially when no epidemiological link can be found. A standardized assessment for SARS for all hospitalised patients with new-onset of fever is one way that the sensitivity of detection of SARS affected patients might be improved. Prevention of healthcare associated SARS infections needs to involve not only HCWs and patients but also visitors and the community. The need to pay scrupulous attention to hand hygiene both before and after the use of surgical gloves by HCWs was again emphasised as an important infection control measure.

1. Rainer TH, Cameron PA, Smit D, Ong KL, Hung ANW, Nin DCP. Evaluation of WHO criteria for identifying patients with severe acute respiratory syndrome out of hospital: prospective observational study. *BMJ* 2003; **326**: 1354-8. Available online at <<http://bmj.com/cgi/reprint/326/7403/1354>>.

2. CDC. Update: severe acute respiratory syndrome - Toronto, Canada. *Morb Mortal Wkly Rev MMWR* 2003; **52**(23): 547-50. Available online at:
<<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5223a4.htm>>

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Errata

HIV infection and AIDS in the United Kingdom: monthly report - April 2003 (A summary of HIV infections diagnosed in 2002)

Commun Dis Rep CDR Wkly 2003; **13**(17): HIV/STIs
Published 25 April 2003

As a result of a miscalculation during the data analysis, tables two and three of this report included incorrect figures. The figures have now been recalculated and the correct figures published at <http://www.phls.org.uk/publications/cdr/archive03/hivarchive03.html#hivapr2003>.

Table 2 HIV infection newly diagnosed in the United Kingdom in 2002 by ethnicity and region of infection

Region of Diagnosis	White	Black African	Black Caribbean	Black Other	Indian sub-continent	Other/Mixed	Not known	Total
England								
North East	20	27	1	–	–	1	12	61
Yorkshire and Humberside	84	134	9	1	2	6	51	287
East Midlands	65	134	7	2	5	6	13	232
Eastern	79	316	10	2	1	8	27	443
London	508	1027	138	31	21	75	804	2604
South East	176	350	9	5	3	19	67	629
South West	65	50	4	–	–	4	31	154
West Midlands	76	136	19	5	–	–	57	293
North West	154	69	5	–	6	7	93	334
Wales	33	26	–	–	–	2	5	66
Northern Ireland	17	5	–	–	–	1	–	23
Scotland	191	20	1	–	–	–	–	212
Total	1468	2294	203	46	38	129	1160	5338

Table 3 HIV infections newly diagnosed in the United Kingdom in 2002 by probable route of transmission

Region of Diagnosis	Sex between men *	Sex between men and women	Injecting Drug Use	Blood/Tissue	Mother to Infant	Other/Undetermined	Total
England							
North East	14	38	–	–	–	9	61
Yorkshire and Humberside	48	197	8	2	5	27	287
East Midlands	40	151	5	2	12	22	232
Eastern	49	267	3	3	5	116	443
London	837	1335	40	9	51	332	2604
South East	143	398	7	1	5	75	629
South West	67	81	3	–	1	2	154
West Midlands	48	168	4	3	11	59	293
North West	130	102	5	1	4	92	334
Wales	25	34	2	–	–	5	66
Northern Ireland	13	9	1	–	–	–	23
Scotland	67	119	6	1	2	17	212
Total	1481	2899	84	22	96	756	5338

Enhanced surveillance of meningococcal disease: weeks 01-13/2003

Commun Dis Rep CDR Wkly 2003; **13**(21): Immunisation

Published 22 May 2003

Owing to a problem with a NOIDS dataset there was an error in the the last Enhanced Surveillance of Meningococcal Disease quarterly report in the CDR Weekly of 22 May. The corrected third and final paragraphs are as shown below. The full, corrected article can be found at <http://www.phls.org.uk/publications/cdr/archive03/immunisation03b.htm>

"A clinical diagnosis of invasive meningococcal disease was reported for 699 cases identified in England and Wales compared to 411 cases of meningitis and septicaemia officially notified to CDSC during the same period. This implies that approximately 59% of clinically diagnosed meningococcal disease is formally notified. The overall case fatality rate, in cases identified in ESMD, with a clinical diagnosis (in England, Wales, and Northern Ireland) was five per 100 cases, whereas the case fatality rate for cases with septicaemia alone was seven per 100 cases (table 2).

"There has continued to be an overall reduction in the observed number of cases of meningococcal disease compared to the equivalent period in the previous year: serogroup B fell by 29% (343 cases compared to 483 in 2002), serogroup C by 46% (28 cases compared to 52 in 2002), other serogroups by 73% (20 compared to 74 in 2002), and unconfirmed by 15% (364 compared to 431 in 2002). This trend may reflect a real reduction in meningococcal disease, since a decline is also observed in routine data: clinical notifications fell by 32% (411 compared to 606 in 2002), and laboratory reports by 32% (511 compared to 753 in 2002). "

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Invasive meningococcal infections, England and Wales: laboratory reports, weeks 09-12/03

	Method of diagnosis			Total reports 05-08/03	Cumulative* total 2003
	CSF and blood		Other sites		
	Culture	Non-culture	Culture		
Group A	–	–	–	–	–
B	58	47	5	110	407
C	4	5	–	9	42
W135	4	–	–	4	11
X	–	–	–	–	1
Y	1	–	1	2	7
Z	–	–	–	–	–
29E	–	–	–	–	–
Ungroupable	–	–	–	–	–
Ungrouped	–	10	–	10	30
Total	67	62	6	135	498

* combined CDSC data and Meningococcal Reference Unit data

latex antigen, microscopy, polymerase chain reaction

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Laboratory confirmed cases of measles, mumps, and rubella, England and Wales: January to March 2003

The four weekly reporting of laboratory confirmed cases of measles, mumps, and rubella (MMR) previously published in the *CDR Weekly* have been replaced by quarterly reporting. Cases include those confirmed by oral fluid IgM antibody tests and routine laboratory reports (table 1). Analyses are by date of onset rather than by week of report as was used previously in this section. Quarterly figures for cases confirmed by oral fluid antibody detection only from 1995 are available at:

- http://www.hpa/topics_az/measles/data_not_confirmed.htm

- <http://www.hpa/topics_az/mumps/data_quarter.htm>
- <http://www.hpa/topics_az/rubella/data_rub_not.htm> ;

and annual total numbers of confirmed cases by region and age from:

- <http://www.hpa/topics_az/measles/data_reg_age.htm>
- <http://www.hpa/topics_az/mumps/data_reg_age.htm>
- <http://www.hpa/topics_az/rubella/data_reg_age.htm>.

Table 1 Total confirmed cases of measles, mumps and rubella, and oral fluid IgM antibody tests in cases notified to ONS, weeks 01-13/03

	Cases			Oral fluid	IgM antibody	Results		
	Notified	Tested	%	Total positive	Recently vaccinated	Confirmed	Other lab confirmed	Total confirmed cases
Measles	695	767	110%*	99	8	91	60	151
Mumps	972	576	59%	234	–	234	180	414
Rubella	453	258	57%	1	–	1	3	4

*due to the increase in confirmed measles in this quarter many oral fluid tests were submitted early for detection of IgM antibody for suspected cases, some of which were not subsequently notified, thus more samples were submitted than notified in this period.

Measles

One hundred and fifty-one cases of confirmed measles with onset dates in the first quarter of 2003 were reported. One hundred and nineteen (79%) were aged under 15 years (11 less than one year, 52 aged between 1 and 4 years; 36 aged between 5 and 9 years; 20 aged between 10 and 14 years), eight were aged between 15 and 19 years, and 24 were adults aged between 20 and 51 years. Only seven cases had a history of vaccination, including a one year old known to have received single antigen measles vaccine.

The regions reporting the majority of cases this quarter were London (75), the South East (27), and Wales (27). Of the 30 cases reported in south London most were in unvaccinated primary school children, although a small number of cases were associated with nurseries and secondary schools. A total of 18 unvaccinated cases were associated with a north London nursery, including two cases that lived in Wales, and a separate cluster of four cases that were linked to a north London primary school. Linked clusters at a boarding school and a holiday camp in the South East region were identified, where the index case at the boarding school had a history of contact with a clinical case from Kenya (1). Further cases reported in unvaccinated children and young adults were linked to the previously reported clusters in travelling families resident in the South East region and in Wales (1,2).

As of the 20 June 2003, there have been 246 confirmed cases of measles with onset dates in 2003. London remains the region with the highest number of cases (110), of which almost half were associated with the south London clusters mentioned above. This area of London was also the focus of an outbreak at the beginning of last year when predominately nursery and primary school children were affected, reflecting the affect of sustained low MMR vaccine coverage (3). Travelling communities in south east Wales account for the majority of the 45 cases confirmed, so far, in Wales. MMR vaccine coverage may be lower in travelling communities than in the general population, but may also vary between travelling communities. In one affected travelling community in south east Wales only 65% (2) of the children had received a single dose of MMR compared to over 85% of children outside this community, explaining why the outbreak does not appear to have spread to the wider population. Cases in other travellers who have links with these families have also been identified in the Eastern and South East regions.

Mumps

Four hundred and forty-one cases of mumps with onset dates in the first quarter of 2003 were confirmed. Outbreaks in secondary schools, universities and military establishments have been reported from most regions although, as in the previous quarter, more than 75% of the cases reported were from two regions: Northern and Yorkshire region (150) and Wales (170) (1). Complication rates from mumps increase with age, and meningitis was reported in twomen aged 17 and 21 years, the latter being confirmed by detection of mumps virus in the CSF.

The cohort at particularly high-risk of mumps are those who are too old to have received two doses of MMR in the routine schedule (born between 1983 and 1992), but young enough to have grown up during a period of low incidence and so to have escaped catching mumps as a child (figure 1). In particular, those born before 1990 (aged over 14 years) did not have the opportunity to have a second dose of MMR in the catch-up campaign that started in 1996. Those who are now older teenagers and young adults may have been offered MMR from 1988, before or at school entry, if they had not received the routine dose of single antigen measles aged between 13 to 24 months. Coverage of this catch-up is unknown; most districts had a policy of active recall at the pre-school stage, but a number relied upon opportunistic vaccination and some did no catch-up at school entry (4). Those currently aged between 13 and 21 years (born between 1982 and 1990) should

have also received MR in the catch up campaign in 1994 – a source of much confusion as many think they received MMR. Overall, susceptibility to mumps is probably highest in the older part of this cohort (5), but declines for those twenty years and over, *ie*, those born before or around 1982 due to naturally acquired immunity. As the more susceptible cohort has aged, outbreaks have moved from being predominantly in secondary schools to being in universities and military establishments (1,6). Single antigen mumps vaccine has never been used routinely in the UK.

The Green Book (Immunisation against Infectious Diseases 1996) (7) advises that students who have not received MR or MMR vaccine should be offered MMR immunisation. This advice was updated in March 2001 when the Department of Health (DoH) recommended that teenagers who had not received MMR or received only one dose should be offered MMR (8). It is unclear how many teenagers are not properly protected, but current outbreaks of mumps indicate that susceptibility remains high. This confirms that the advice given in 2001 is still appropriate today.

It is appropriate to consider offering MMR to those at risk in all relevant settings, including universities, colleges, and secondary schools before or at the beginning of the autumn term, and to military establishments. MMR-II is licensed for use in adults and should be used in these settings where possible. Further advice on this issue will be published by the DoH in the coming weeks, and in the interim is available from the Immunisation division Communicable Disease Surveillance Centre, Colindale, London.

Table 2 Laboratory confirmed cases of mumps by age group and region, England and Wales: weeks 01-13/03

Region	Age group						Not known	Total
	<1y	1-4y	5-9y	10-14y	15-19y	≥ 20y		
Northern and Yorkshire	–	1	1	11	99	34	4	150
Trent	–	–	–	–	15	12	–	27
Eastern	–	–	–	2	3	2	–	7
London	–	–	–	3	4	4	–	11
South East	–	1	1	5	3	6	–	16
South West	–	–	–	2	4	4	–	10
West Midlands	–	–	–	–	1	4	–	5
North West	–	1	–	–	12	4	1	18
Wales	–	2	11	50	90	14	3	170
Total	–	5	13	73	231	84	8	414

Rubella

Only four cases of rubella with onset dates in the first quarter of 2003 were confirmed; three adult cases aged 26, 38, and 43 years (one male, 2 females), and one male, age not stated.

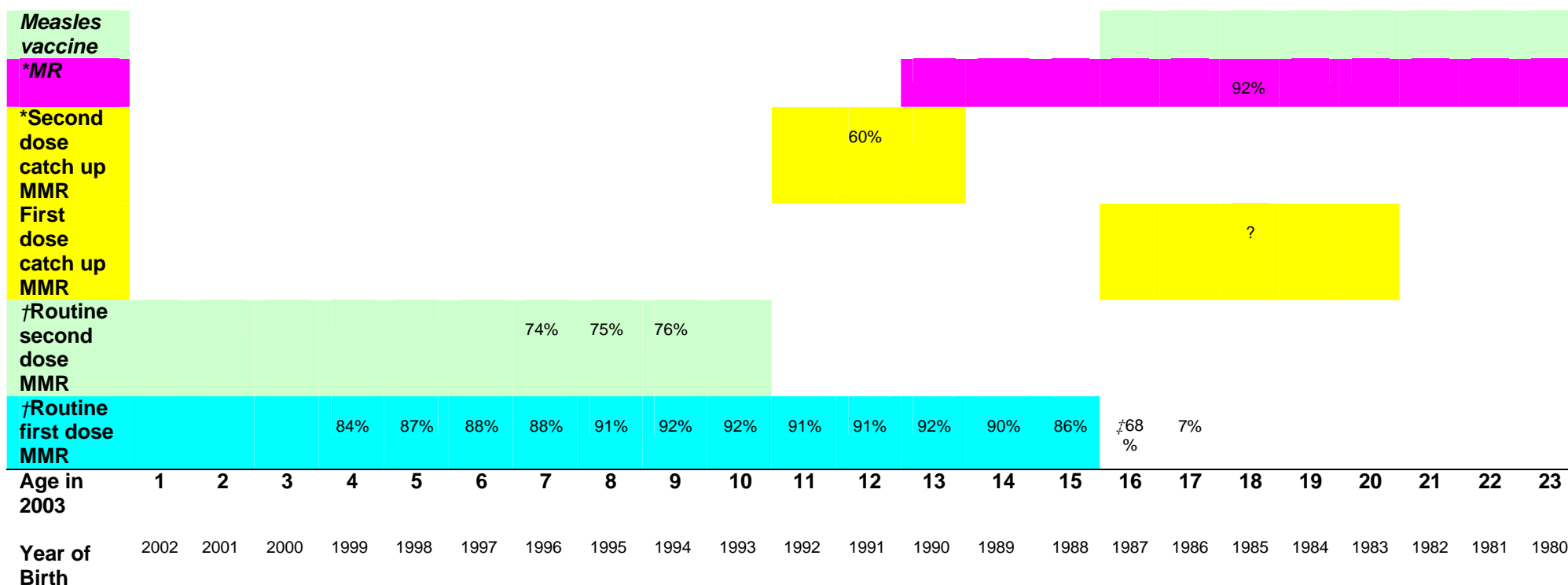
Figure 1 Opportunity for protection from mumps by vaccination in the UK NHS vaccination programme

[Click here to view, download, or print figure 1](#) 

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Figure 1 Opportunity for protection from mumps by vaccination in the UK NHS vaccination programme



* The percentages shown for the second dose catch-up MMR and MR relate to the coverage for the whole campaign cohort.

† The percentages shown for the routine first and second dose of MMR are coverage data for England only and are based on levels recorded when birth cohort was aged between 2 and 5 years respectively.

Note: chronology of MMR programme

- 1988 - MMR introduced
 - (i) ‡routinely offered to children born from October 1987
 - (ii) catch-up dose offered to children born between 1983 and 87 who had not received single antigen measles vaccine before their pre-school booster
- 1994 - MR Campaign *NO MUMPS. Offered to children aged between 5 and 16 years, born between 1978 and 89*
- 1996 - MMR second dose introduced
 - (i) routinely offered to children born from October 1991
 - (ii) catch-up dose offered to children born between January 1990 and March 1992

Laboratory confirmed cases of pertussis infection in England and Wales: January to March 2003

Table 1 Laboratory confirmed cases of pertussis infection in England and Wales by age group January to March 2003*

Age group	PCR and/or serology only	Culture	Total	% increase in case ascertainment through PCR &/or Serology
< 3 months	1	13	14	8
3-5 months	–	5	5	–
6-11 months	–	1	1	–
1-4 years	–	–	–	–
5-9 years	2	6	8	33
10-14 years	2	1	3	200
≥ 15 years	3	1	4	300
NK†	–	–	–	–
Grand Total	8	27	35	30

* All data are provisional

† Not known

Since January 2002, infants aged under 6months with suspected pertussis have been offered PCR testing through RSIL. Adults with a cough persisting for more than 21 days and children with a cough persisting for more than 14 days, have been offered serology testing through RSIL. These cases are likely to have been culture negative, and testing with PCR and/or serology have increased case ascertainment.

Table 2 Laboratory Confirmed Cases of Pertussis Infection England and Wales by age group*

Method of Diagnosis		Culture	pcr/serology reports as a % of total	Grand Total
quarter	PCR &/or Serology			
Q1	8	27	23%	35

* All data are provisional

The apparent increase, particularly in adult cases, is explained by the availability of enhanced diagnostic methods which have been increasingly used during the three quarters, as illustrated by the increasing proportion of reports diagnosed by PCR and or serology

COVER programme: January to March 2003

Vaccination coverage statistics for children up to five years of age in the United Kingdom

This report of the COVER programme presents coverage data for children in the United Kingdom (UK) who reached their first, second, or fifth birthday during the evaluation quarter – January to March 2003 (annual COVER begins on 1 April each year, *ie*, 1 April to 30 June 2002 is first quarter). This is the eleventh quarter to include coverage data on Meningococcal conjugate Group C vaccine (MenC) following its introduction in the UK vaccination programme in November 1999 (1). Children who reached their first birthdays in the quarter would have been scheduled to receive their third-dose primary vaccinations (third-dose diphtheria, tetanus, pertussis (DTP vaccine), *Haemophilus influenzae* type b (Hib vaccine), polio vaccine, and MenC vaccine) during the period between May and July 2002. Children who reached their second birthdays would have been scheduled to receive their third-dose primary vaccinations between May and July 2001 and first measles, mumps, and rubella (MMR) vaccination between January 2002 and July 2002. Children who

reached their fifth birthdays would have been scheduled to receive their third-dose primary vaccinations between May and July 1998, their first MMR during the period January 1999 to July 2000, their pre-school DT booster, polio, and second-dose MMR from May 2001 onwards. One catch-up dose of MenC would have been scheduled from July 2000 onwards.

Table 1 Completed primary immunisations (all antigens) by 12 months: January to March 2003

Region/Country	HA* (total)	DTPol3 %	P3 %	Hib3 %	MenC %
Regions of England					
Northern & Yorkshire	13 (13)	90.9	90.5	90.7	90.1
Trent	11 (11)	91.6	91.3	91.6	90.6
Eastern	7 (7)	93	92.6	92.8	92.5
London	14 (14)	82.7	82.5	83.2	80.5
South East	13 (13)	91.8	91.5	91.5	91.4
South West	8 (8)	93	92.6	92.8	92.5
West Midlands	13 (13)	91.2	90.6	91.2	91.4
North West	16 (16)	90.6	90.1	90.6	90.4
England (Total)	95 (95)	90	89.7	90	89.6
Wales	5 (5)	93.6	92	93.4	93.3
Northern Ireland	4 (4)	94.2	93.8	94.3	94.3
Scotland	15 (15)	95.6	95.3	95.4	94.6
United Kingdom	119 (119)	90.8	90.3	90.7	90.3

*Health authorities/health boards

Table 2 Completed primary immunisations (all antigens) by 24 months: January to March 2003

Region/Country	HA* (total)	DTPol3 %	P3 %	Hib3 %	MenC %	MMR1%
Regions of England						
Northern and Yorkshire	13 (13)	93.8	93.8	93.2	92.6	81.5
Trent	11 (11)	95.6	95.2	95.4	94.4	83.5
Eastern	7 (7)	94.9	94.5	94.6	94	78
London	14 (14)	88	87.8	88	84.5	67.9
South East	13 (13)	94.4	93.9	93.7	93	78
South West	8 (8)	95.6	95.1	95.4	94.5	79.1
West Midlands	13 (13)	93.4	93.3	93.5	93.6	81.1
North West	16 (16)	94.2	93.7	93.8	93.8	80.3
England (Total)	95 (95)	93.4	93	93.1	92.3	77.9
Wales	5 (5)	95.6	94.7	95.5	95	78.1
Northern Ireland	4 (4)	96.3	95.8	96.2	96.2	86.9
Scotland	15 (15)	97.6	97.4	97.3	96.6	86.1
United Kingdom	119 (119)	94	93.5	93.6	92.9	78.9

*Health authorities/health boards

Methods

Data from computerised child health information systems were submitted in May and June 2003 for children resident in UK health authorities, health boards, and British Forces Germany (BFG) on 31 March 2003 and reaching their first, second, or fifth birthdays during the evaluation quarter (January to March 2003). The numbers were requested of children completing a primary course of each antigen: (three-doses of diphtheria (D3), tetanus (T3), pertussis (P3), polio (Pol3), *Haemophilus influenzae* type b (Hib3), meningococcal conjugate Group C (MenC3) vaccines; and one dose of measles, mumps, and rubella (MMR1) vaccine any time up to their first or second birthdays. Numbers were also requested for resident children who had received a primary course of each antigen (DTPol3, P3, and Hib3), a pre-school booster dose (DTPol4), at least one MMR (MMR1), and two doses of MMR (MMR2) at any time up to their fifth birthdays.

For this quarter, COVER data were collected for each old health authority area (where available). The data are evaluated against the World Health Organization (WHO) targets of 95% coverage for each antigen (except MenC) by two years of

age at the national level and of at least 90% coverage in each health authority (2).

Results

Coverage at 12 and 24 months

Data were received from all health authorities and health boards in the UK (tables 1 and 2), although, two trusts serving parts of two health authorities were unable to submit data for this quarter. Twenty-one of the participating health authorities/boards (17.6%) achieved the 95% target at 12 months for three doses of diphtheria, tetanus, and polio vaccine (DTPol3) and for three doses of Hib vaccine (Hib3), and 15 (12.6%) for three doses of pertussis vaccine (P3). Fifty-three health authorities/boards (44.5%) achieved 95% coverage at 24 months for DTPol3, 42 (35.3%) for P3, and 49 (41.2%) for Hib3 and all countries/regions, except for London, which achieved at least 90% coverage for these antigens. No health authorities/boards achieved 95% coverage for MMR at 24 months. Coverage for the UK was slightly lower (0.1% to 0.3%) for all antigens at 12 months compared to that reported in the previous quarter (3). Coverage for P3 and MenC at 24 months increased by 0.1%, while DTPol3 and Hib3 at 24 months remained the same. Coverage for MMR1 at 24 months fell by 2.1% to 78.9%.

The country specific 12 month coverage for MenC vaccine was 89.6% in England, 93.3% in Wales, 94.3% in Northern Ireland, and 94.6% in Scotland. Coverage for the 24 month cohort was 92.3% in England, 95.0% in Wales, 96.2% in Northern Ireland, and 96.6% in Scotland. This is the fifth 24 month cohort to be entirely routinely scheduled for three doses of MenC vaccine.

Coverage at 5 years

Data were received from all health authorities/health boards in England, Wales, and Northern Ireland. Coverage at 5 years decreased by 0.1% for P3, Hib3, and MMR1 and decreased by 0.2% and 1.6% for DTPol3 and DTPol4 respectively, compared to the previous quarter. Coverage for MenC increased by 1.7% to 85.9% and coverage for MMR2 increased by 0.3% to 73.4% (table 3) (3). Country specific data for MenC catch-up coverage at five years was 85.2% in England, 90.7% in Wales, and 95.0% in Northern Ireland (table 3). Data for children reaching their sixth birthday in Scottish health boards were also received for DTPol4 and MMR2; coverage was 95.2% and 90.9% respectively.

Table 3 Completed primary immunisations (all antigens) by 5 years: January to March 2003

Region/Country	HA* (total)	DTPol3 %	P3 %	Hib3 %	MenC %	MMR1 %	MMR2 %	DTPol4 %
Regions of England								
Northern and Yorkshire	13 (13)	95.3	94.2	94.6	84.5	92.5	79.2	82.7
Trent	11 (11)	96.7	96.1	96.2	89.9	94.2	78.5	83.6
Eastern	7 (7)	94.2	93.1	93.7	87.6	90.4	77.1	83.5
London	14 (14)	86.4	85.7	85.8	68.8	80.6	52.8	56.6
South East	13 (13)	93.5	92.7	92.5	87.2	90.4	75	82.1
South West	8 (8)	96.6	95.7	95.8	90.7	92.7	79	85
West Midlands	13 (13)	95.4	94.5	94.2	90.4	93.3	78	81.9
North West	16 (16)	95.5	94.2	94.6	89.7	92.7	75.5	80.5
England (Total)	95 (95)	93.7	92.8	93	85.2	90.3	73.9	79
Wales	5 (5)	94.7	92.3	94.1	90.7	90.4	74	82.7
Northern Ireland	4 (4)	97.4	96.5	96.8	95	96.5	86.6	89.2
Scotland	15 (15)	-	-	-	-	-	90.9	95.2
England, Wales, and Northern Ireland	104 (104)	93.9	92.9	93.2	85.9	90.5	73.4	77.6

*Health authorities/health boards

† No data available at 5 years

British Forces Germany Health Service

Comparable COVER data have been received from the regions across British Forces Germany (BFG). The BFG child population is approximately 1500 and is spread over five separate geographical regions throughout Germany. The average coverage at 12 months (n=206) was 98.5% for all antigens; average coverage at 24 months (n=205) was 96.6% for DTPol3, P3, Hib3, and MenC, and 95.1% for MMR1. Average coverage at five years (n=228) was 98.7% for DTPol3, P3, Hib3, and MMR1, and 97.4% for MenC, 96.5% for MMR2, and 96.9% for DTPol4.

MMR sentinel surveillance scheme coverage

In order to give a more timely indication of trends in MMR coverage, a sentinel surveillance scheme has monitored MMR coverage in a sample of children becoming 16 and 24 months of age in a particular month in England from April 1999. Since March 2002, this information has been routinely collected every month and was extended in June 2002 to include coverage at 20 and 36 months of age to help determine whether there is further improvement in coverage as children get older, because some parents delay MMR vaccination. This sentinel scheme is based on a sample of trusts/health

authorities in England and represents approximately 20% of the population, although monthly reporting is not always complete for the whole sample. This means that these data are not sufficiently detailed to allow us a comparison of different regions, and will be subject to greater variability than the national data due to varying monthly sample size. Data collected from March 2003 to May 2003 for children in the four age cohorts is summarised in table 4 (range for the three months was from 64.4% to 68.8% at 16 months, 74.3% to 75.1% at 20 months, 78.1% to 79.3% at 24 months, and 86.7% to 87.3% at 36 months).

Table 4 Monthly sentinel estimates of measles, mumps rubella (MMR) coverage at 16, 20, 24, and 36 months: March 2003 to May 2003

Evaluation month	Number of HA/ trusts	Age at vaccination			
		16 months	20 months	24 months	36 months
March 03	40	64.40%	74.30%	78.50%	86.90%
April 03	40	66.70%	75.00%	79.30%	87.30%
May 03	40	68.80%	75.10%	78.10%	86.70%

Comments

The decrease in UK MMR coverage at 24 months of age by 2.1% to 78.9% follows a similar decrease in the previous quarter from 83.0% to 81.0% (3). The current fall has been observed in all regions and countries, although in Wales, Scotland, and Northern Ireland the decrease ranged between 0.5% and 0.7%, whereas in England the drop was 2.5% (regional range: 0.6% in Trent to 4.9% in London). London has consistently had the lowest coverage for all antigens, and the consequences of sustained low MMR coverage are reflected in the current epidemiology of measles (see above article on measles, mumps, and rubella, [click here](#)).

There was considerable adverse publicity in relation to MMR vaccine at the end of 2001 and the first half of 2002, which was at its height during the period the children, evaluated at 24 months, would have been scheduled to receive their MMR (between January 2002 and July 2002). Falling MMR coverage in recent years is largely due to adverse media coverage. A survey conducted in May 2002 by *Immunisation Information** found that the media has an important influence on mothers' attitudes to immunisation with mothers being negatively influenced when media reporting about MMR vaccine was negative (4) and trends in the proportion of mothers who believe MMR is safe match trends in MMR coverage at 16 months (5). A recent paper published by researchers in the School of Journalism, Media, and Cultural Studies at Cardiff University showed that the majority of parents are still confused about the safety of MMR (6). Parents wrongly believe that medical science gives equal weight to both sides of the argument when in fact there is overwhelming evidence that the vaccine is safe. The slight increase in monthly sentinel estimates of MMR coverage at 16 months from March to May 2003 (representing children born between October and December 2001, scheduled for their MMR between October 2002 and April 2003) has occurred when media reporting on MMR has been very low, and suggests that any levelling off in the routine MMR coverage at 24 months may not be seen until early next year.

Coverage in the UK of MenC continues to improve at 5 years increasing by 1.7% to 85.9%, and remains similar at 12 and 24 months, compared to the previous quarter (3).

In May 2003 a national catch-up immunisation campaign began, offering all children aged between 6 months and 4 years an additional dose of *Haemophilus influenzae* type b (Hib) vaccine (7). The campaign is due to finish in September and a one-off data collection to evaluate coverage is planned for the beginning of 2004.

This is the last COVER report summarising data by the old health authorities and regions. Health authorities were dissolved in April 2002 and immunisation coverage is now being collected for Primary Care Trusts (PCTs), which have different boundaries and populations to health authorities. New regional health authority boundaries also came into effect at the same time. Quarterly COVER data will be published by Government Regional Offices for PCT relevant populations from April 2003.

*Immunisation Information is part of the communicable disease and immunisation team at the Department of Health, previously at Health Promotion England and the Health Education Authority.

Relevant links

- <http://www.hpa.co.uk/facts/Immunisation/Measles/meas.htm>
- <http://www.show.scot.nhs.uk/scieh/>
- <http://www.cdscni.org.uk/surveillance/Coveragestats/default.asp>
- <http://www.phls.wales.nhs.uk/jabs.htm>
- <http://www.mmrthefacts.nhs.uk/>
- <http://www.doh.gov.uk/public/sb0218.htm>

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 7. Chief Medical Officer, Chief Nursing Officer, and Chief Pharmaceutical Officer. *Planned Hib vaccination catch-up campaign*. (PL/CMO/2003/1) London: Department of Health, 2003. Available at <<http://www.doh.gov.uk/cmo/letters/cmo0301.htm>>
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HTLV infection in England and Wales

The HIV/AIDS Reporting Section (HARS) of the HIV and Sexually Transmitted Infections division, undertakes the surveillance of human T cell lymphotropic virus (HTLV). In early June 2003, the 11th international conference on human retrovirology on *HTLV and Related Viruses* was held in San Francisco, United States. This article is based on poster presentations on HTLV in England and Wales from members of the Health Protection Agency.

HTLV types I and II can be transmitted through breast feeding, sexual contact, and blood transfusion, with HTLV-II particularly associated with injecting drug use. HTLV-I is endemic in the Caribbean, Japan, South America, and parts of Africa, with HTLV-II found among some native American groups. If infected, the lifetime risk of developing disease is low (less than 5%). Clinically, HTLV-I infection may cause adult T cell lymphoma (ATLL) and/or HTLV-I associated myelopathy/tropical spastic paraparesis (HAM/TSP) and is associated with other inflammatory conditions (1). There is some evidence that HTLV-II infection is associated with neurological and lymphoproliferative disorders (2).

Surveillance of new diagnoses of HTLV infection in England and Wales began in the late 1980s, and has recently been enhanced through the routine follow-up of all laboratory reports through clinicians. Additionally, in August 2002, the National Blood Service (NBS) introduced testing of all blood donations for HTLV in England and Wales, with reports of any infections identified passed to the routine surveillance scheme.

A poster presentation described the epidemiology of HTLV infections in England and Wales between 1988 and 2001, through the collation and de-duplication of laboratory reports (3). Six hundred and fifty reports of HTLV were identified, with an average of 46 new diagnoses per year (range 30 to 59) (figure and table). There was a higher number of females infected and reported, with a male to female ratio of 1:2. The median age of both males and females was 57 years, and where ethnicity or country of origin was reported, 80% of individuals newly diagnosed with infection were associated with the Caribbean basin. A greater number of cases were diagnosed with HAM/TSP, than ATLL.

Figure Number of HTLV infections by year of laboratory diagnosis : 1988-2001

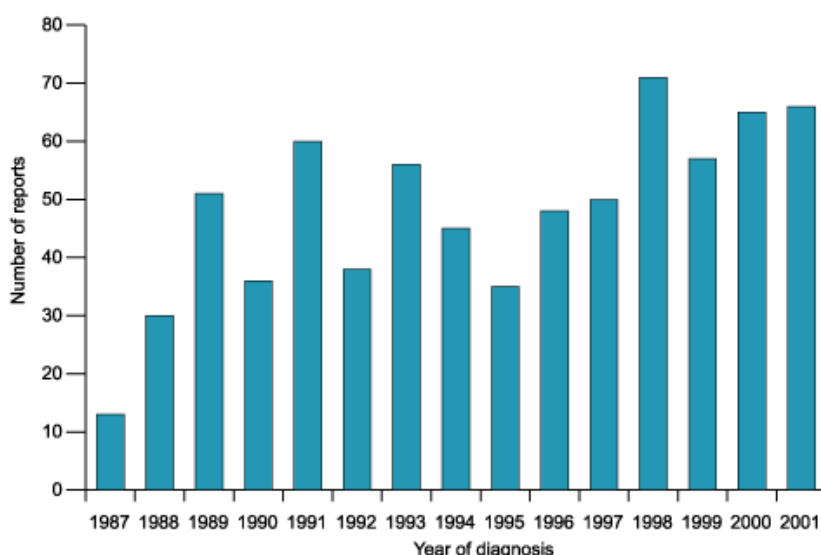


Table Number of HTLV infections by year of report: 1988-2001

Year of diagnosis	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Total
Number of reports	30	51	36	58	38	56	44	37	42	41	53	50	59	55	650

Preliminary data from the enhanced national surveillance system for HTLV was also presented at the international conference on human retrovirology (4). During 2002, there were 52 individuals reported with newly diagnosed HTLV. Twenty-two were males and 30 females, with median ages of 57 and 52 years respectively. Thirty clinician reports had been received, and where ethnicity was reported (29 cases), 21 were black Caribbean, five white, and three of other ethnicity. The probable route of infection was known for 19 individuals, of whom six were

probably infected through heterosexual sex, four through mother-to-child transmission, and nine either route. Where probable country of infection was reported (21), nine individuals were probably infected in the United Kingdom (UK), seven in Jamaica and five in other regions. The authors conclude that HTLV transmission in both the Caribbean and UK impacted on the epidemiology of HTLV in England and Wales when considering those newly diagnosed in 2002.

The experience, so far, in the testing of blood donors in England and Wales for HTLV has been described (5). Between August and December 2002, 32 infections in blood donors were identified, with rates in donors approximately 2.7 and 0.5 per 100,000 for HTLV-I and HTLV-II respectively. The majority of those reported were female (74%), and of those interviewed, 70% were either born in, or had sex with, a person from an endemic country. The authors conclude that the estimated prevalence of HTLV in blood donors in this country is low, with most infections associated with a high prevalence country. Since most of these donors will have donated before, the NBS has begun a 'lookback' to identify any recipients of potentially HTLV infectious donations transfused prior to August 2002. This provides an unique opportunity to recruit these people (donor and recipients) and their families to a HTLV National Register for long-term follow up in order to investigate the clinical course of HTLV infection.

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Surveillance of waterborne disease and water quality: July to December 2002

This report is part of a twice-yearly series on the surveillance of waterborne disease and water quality. The PHLS uses a framework for assessing the strength of association between human illness and water exposure in outbreak investigations according to microbiology results from cases, microbiological examination of water samples and descriptive and analytical epidemiology (1). The data on the microbiological quality of private water supplies and bathing pools were collected from Birmingham, Brighton, Bristol, Chelmsford, Chester, Coventry, Newcastle, Norwich, Nottingham, Preston, Reading, Shrewsbury, and Stoke Public Health Laboratories, and the Wessex Environmental Microbiological Services (WEMS). The report also contains an update on enteroviruses in water with data on the virological contamination of wastewaters provided by the Environmental Virology Unit at Reading.

Water-related outbreaks of infection

This report describes waterborne outbreaks and incidents of association between human gastrointestinal disease and water in England and Wales reported to the PHLS Communicable Disease Surveillance Centre (CDSC) between 1 July 2002 and 31 December 2002. At present, there are details on four water-related outbreaks or incidents of infection reported to CDSC during this period (table 1). The annual summary for 2002 of all outbreaks or incidents of waterborne gastrointestinal disease will be published in *CDR Weekly* in the latter half of 2003.

Table 1 Outbreaks and incidents of association between human disease and water in England and Wales: July to December 2002

Outbreak reference number	Organism	NHS Region	Month	Total affected	Positive	Association (1)
02/051	<i>Campylobacter jejuni</i>	South East	February -March	8	3	Possible
<i>Members of school party drank untreated upland spring water. No microbiological evidence from water or food..</i>						
02/058	<i>E. coli</i> O157 and <i>Campylobacter</i>	Wales	August	16	16	Strong
<i>Mixed outbreak of VTEC O157 and campylobacter in children and adults linked to a private spring water supply to a campsite². Pathogen identified in cases and from water. Descriptive and statistical evidence from analytical study.</i>						
02/1547	<i>Cryptosporidium</i>	South East	November	21	21	Possible
<i>Community outbreak possibly linked to consumption of un-boiled public drinking water supply. Other risk factors also identified. Case control study undertaken.</i>						
02/1701	VT-producing <i>Escherichia coli</i> O157 PT 21/28	South East	November/December	31	31	Strong
<i>Community outbreak. Pathogen identified in cases and from water. Public water supply suspected. Descriptive evidence. Case-control study underway.</i>						

Eight cases of gastroenteritis in children aged less than 15 years occurred among a party of 24 during a five-day residential outdoor pursuits course in the Yorkshire and Humberside region in July 2002. Three of the eight cases tested positive for *Campylobacter jejuni*. There were a number of possible exposures routes. Pupils had been allowed to drink untreated upland stream water during outdoor pursuits, as well as untreated tap spring water in the residential centre. No water samples were taken from either source. Temperature abuse of cooked food transported and given to pupils during the day's activities was another possible exposure.

An outbreak of gastroenteritis due to Verocytotoxin-producing *Escherichia coli* (VTEC) O157 and *Campylobacter* spp occurred among visitors to a small campsite in North Wales (2). Both pathogens were identified in the private water supply. Following investigation of reports of illness in one party, case finding among all site users and screening of contacts revealed 16 confirmed cases: ten VTEC O157, four of whom had a mixed infection with *Campylobacter* spp, another five with only *Campylobacter* spp, and one case with mixed *Campylobacter* and *Salmonella* spp infection. No cases required hospital admission. Onset of illness ranged from 6 to 11 August 2002, and cases were aged between 4 and 76 years. The water tap on the campsite was served by an untreated private water supply fed from a spring rising on grazed land nearby. There was unusually heavy rainfall one week prior to the first case. A boil water notice was served under the *Water Industry Act 1991* within 24 hours of identification of the outbreak. VTEC O157 and *Campylobacter* spp were later cultured from a sample of water from the site tap. The PHLS (now HPA) Laboratory of Enteric Pathogens confirmed that isolates from patients and water belonged to phage type (PT) 4 VT2 with the same subtype of VT2 sequence.

Twenty-one cases of non travel-related primary cryptosporidium infection were ascertained in residents of a city in the South East region with dates of onset in November 2002. Sixteen cases had dates of onset ranging from 2 to 7 November 2002. Ages of cases ranged from 1 to 61 years, and were clustered within the city and environs. The clustering of cases in space and time was considered to be above what could normally be expected for the time of year. Nineteen isolates typed by the PHLS (now HPA) Cryptosporidium Reference Laboratory were genotype 1 (human strain). Cases received water from two water companies either solely or in combination. Continuous sampling of water from the two water company sites had shown the occasional detection of oocysts at low levels (single numbers) although no problems at the works had been identified. Following initial investigations, no common exposures were identified amongst cases, and multiple risk factors other than water were identified. Although there is no obvious source, this cluster may have been waterborne. A case-control study examining possible exposures is ongoing.

Thirty-one cases of non travel-related primary cryptosporidium infection were ascertained in a community outbreak in the South East region with dates of onset in November 2002. Ages of cases ranged between nine months and fifty-eight years. Investigations were limited to two circumscribed groups of cases: military personnel (11 cases) and civilian members of the population (20 cases). Illness in both groups was possibly associated with a treated public drinking water supply originating from service reservoirs fed by both river water and borehole sources. Twenty-four hour continuous monitoring of river water showed the detection of oocysts at low levels (less than 1 oocyst per 10 L). Heavy rain in the water catchment area during the period before onset of illness was identified as possible contributing factor. Control measures included a reduced water intake from the river and increased water intake from the borehole supply. A case-control study is ongoing.

Surveillance of water quality

Private water supplies

A private water supply is any water supply that is not provided by a statutorily appointed water company. Private water supplies are divided into category 1 supplies, which are used wholly for domestic purposes and category 2 supplies, which include supplies to premises such as hospitals, residential homes, holiday sites and food preparation premises (3). These categories are further sub-divided into classes depending on the volume of water or number of people supplied. About 1% of the population of England and Wales have private water supplies to their homes. Many more people may, however, be exposed transiently to private water supplies, particularly category 2 supplies when used in hospitals, holiday sites, and for food preparation. There is a statutory obligation for local authorities to monitor private water supplies and the specified frequency varies between two samples per month to one sample every five years, depending on the class of supply. Local

authorities also have powers to secure improvements to private supplies or connection to a mains supply.

Results of microbiological analysis of samples from various classes of private water supply for July to December 2002 are presented (table 2). The presence of *E. coli* indicates that human or animal faecal contamination has occurred and that urgent action should be taken to eradicate the contamination. *E. coli* was isolated from 26% (409/1587) of supplies examined. A total of 2482 samples were taken from the 1587 supplies, 22% (541) of which were positive for *E. coli*. Compared to the same period last year when an apparent improvement in water quality was noted (4), the 2002 figures show a return to the levels of contamination observed in previous years (table 3). The microbiological quality of private water supplies continues to be better in the period January to June compared with the period July to December (table 3) (5). The decreased level of contamination in private water supplies was coincident with the foot and mouth epidemic. The reported reduction in cryptosporidiosis during this period may have been due to the reduction in numbers of animals or reduced access to the countryside (6,7).

Table 2 Routine, including regulatory, tests of private water supplies: July to December 2002

	Number of supplies (samples)						Category unknown
	Total supplies	Category 1: domestic			Category 2: others*		
		Class F [single dwelling]	Class D and E [≤ 100 people]	Class A to C [> 100 people]	Class 3 to 5 [daily volume $\leq 100\text{m}^3$]	Class 1 and 2 [daily volume $> 100\text{m}^3$]	
Number tested	1587 (2482)	324 (446)	87 (147)	3 (27)	63 (86)	16 (163)	1094 (1613)
Number positive for <i>E. coli</i>	409 (541)	138 (175)	30 (47)	1 (31)	22 (27)	– (–)	218 (289)
Total coliforms (including <i>E. coli</i>)	790 (1016)	209 (259)	54 (76)	3 (18)	32 (38)	2 (2)	490 (623)

*Supplies to premises such as hospitals, residential homes, holiday sites and food preparation premises.

Table 3 Percentage of private water supplies positive for *Escherichia coli*: January 1995 to December 2002

Year	Percentage of private water supplies positive for <i>E. coli</i>	
	Jan-June	July-Dec
1995	19	42
1996	18	40
1997	13	31
1998	23	37
1999	20	29
2000	17	28
2001	13	20
2002	16	26

The presence of coliforms other than *E. coli* in water does not specifically indicate faecal contamination, as they are natural inhabitants of many aquatic environments. They are, however, indicators of the efficiency of water treatment and current legislation states that they should not be present in drinking water. Coliforms (including *E. coli*) were isolated from nearly 50% (790/1587) of supplies, from which 1016 samples out of a total of 2482 (41%) were positive.

The percentage of samples positive for *E. coli* from category 1 supplies (36%) was greater than samples from category 2 supplies (11%). There appears to be a continued improving trend in the category 2 supplies over the last two years. This is in contrast to the same period in the two years (1999/2000) previous to that, when the percentage of samples positive for *E. coli* from both domestic and commercial supplies were at around 40%.

The results of statutory testing of public water supplies in England and Wales have been compiled and published annually by the Drinking Water Inspectorate since 1992. These reports have shown that the microbiological quality of mains water supplied by the twenty-six water companies has been continually improving. In 2001, 0.04% and 0.51% of the total samples from water supply zones were positive for *E. coli* and coliforms, respectively (8). In comparison private water supplies are generally of a poor microbiological quality, and despite an apparent improvement in the latter half of 2001 (4) this was not a continuing trend in 2002. Overall there has been no substantial improvement in the microbiological quality of private water supplies since PHLS surveillance began (table 3). With new legislation for private water supplies being developed, any real improvements in water quality will probably depend on the implementation of robust evidence-based risk assessment, which will correlate environmental survey data and water quality information, together with improved enforcement powers.

Pool waters

Guidelines for pool water quality have been formulated and state that *E. coli* should be absent from 100mL samples from all pools and that *Ps. aeruginosa* should be absent from 100mL samples from spa and hydrotherapy pools (9,10). Coliforms should also be absent from 100mL. A count of <10/100mL coliforms is, however, acceptable, provided that they are not in consecutive samples, Aerobic Colony Count (ACC) after 24 hours incubation at 37°C is less than 10 colony forming units per mL (CFU/mL) and the residual disinfection and pH are within the recommended range. A raised ACC may result from heavy pool use and microbial proliferation in the pool water and indicates possible discrepancies in disinfection.

Results from the microbiological analysis of 5572 pool water samples from 1953 pools (156 hydrotherapy, 363 spa and 1434 swimming pools) are shown in table 4. The swimming pools were in municipal, leisure and sports centres and hotels. Pools on a single site, such as learner, diving, and main pools, were counted separately. As in previous years, there was a low rate of isolation of *E. coli*, with around 2% (36/ 1953) of pools positive. The 36 positive pools yielded 41 positive samples. Coliforms (including *E. coli*) were isolated from 144 pools, which yielded 169 positive samples.

Table 4 Routine (including regulatory) tests of pool waters: July to December 2002

Organisms	Total pools (samples)	Hydrotherapy pools (samples)	Swimming pools (samples)	Swimming pools (samples)
Coliform organisms				
Number tested	1953 (5572)	156 (734)	363 (862)	1434 (3976)
Number positive for <i>E. coli</i>	36 (41)	1 (1)	11 (11)	24 (29)
Number positive for Total coliforms (including <i>E. coli</i>)	144 (169)	12 (16)	25 (27)	107 (126)
<i>Pseudomonas aeruginosa</i> *				
Number tested	1561 (4408)	153 (720)	357 (853)	1051 (2835)
Number positive	310 (474)	14 (16)	103 (147)	139 (311)

* Not always tested for routinely

The presence of *Ps. aeruginosa* in hydrotherapy and spa pools is a potential health risk, as outbreaks of disease caused by *Ps. aeruginosa* have been associated with them. In conventional pools, *Ps. aeruginosa* is an optional quality parameter and is not always looked for. *Ps. aeruginosa* was isolated from 18% (193/1051) of swimming pools in which it was looked for, 9% (14/153) hydrotherapy pools and 29% (103/357) spa pools (table 4). ACC of greater than 100 colony-forming units per mL were found in 7% (139/1953) of pools and 12% (674/5572) samples obtained from these pools (table 5). The microbiological results for pool waters are similar to those found in previous years.

Table 5 Total viable count (CFU/mL) in all pool waters

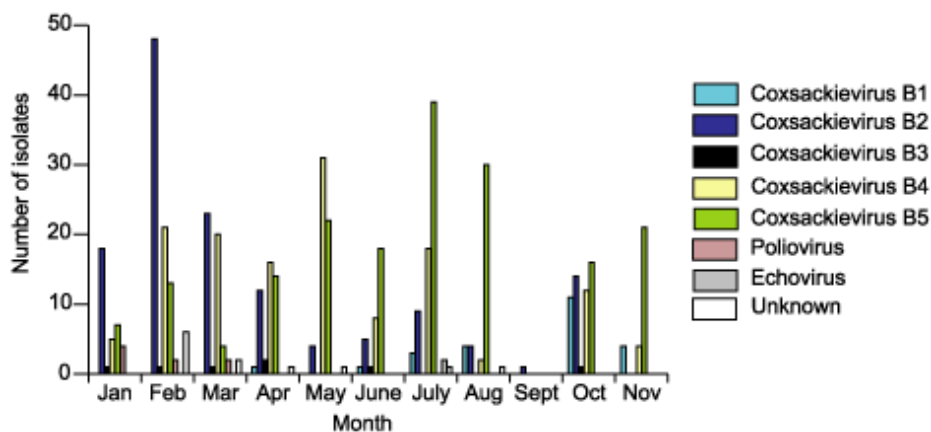
Total viable count	Pool waters	Pools samples
0 to 10	1451	3346
11 to 100	363	1552
>100	139	674
Total	1953	5572

Enteroviruses in water

Enteroviruses are common infections, which may cause a flu-like illness or occasionally meningitis, but the majority of the infections are without obvious symptoms. All ages may be infected and as the viruses replicate in the gastro-intestinal tract they are present in sewage throughout the year. This combined with the relative ease with which enteroviruses may be cultured in the laboratory has made this virus group the most practical and widely used marker of human faecal viruses in the environment. Currently the EU Bathing Water Directive includes a provision for enterovirus testing if deterioration in the quality of bathing water is suspected. Most UK bathing waters are marine, but nine are inland and freshwater. Many other inland waters are used for recreational purposes but are not covered by the Directive. For monitoring purposes a ten-litre sample of recreational water is processed, usually by filtration and protein precipitation to a final volume of 5 to 10ml. In the UK enteroviruses are detected and enumerated using BGM cells in a suspended cell plaque assay. Other countries use the less sensitive monolayer plaque assay.

Figure 1 shows the number and serotype of enteroviruses detected from a major river and crude sewage in southeast England during 2002. Five river sites and a sewage treatment work were sampled monthly. Each isolate originated as a single plaque and is equivalent to a single infectious virus unit. Enteroviruses are present all year with sporadic higher counts. In reported clinical cases enterovirus infections are common all year with increased numbers in summer and autumn. The number of isolates from water was highest during the early part of the year instead of during the autumn.

Figure 1 Enterovirus serotypes: sewage and recreational river water isolates, 2002 (click on graph to display larger version)



Each plaque was passaged to fresh BGM cells to confirm the presence of enterovirus and subsequently the virus serotype was identified by immunofluorescence assay. This plaque assay detects poliovirus and coxsackieviruses B serotypes more efficiently than coxsackieviruses A or echoviruses. Coxsackieviruses B2 and B4 were the most common serotypes identified throughout 2002 but numbers waned later in the year. During the summer coxsackievirus B5 numbers increased. Coxsackievirus B5 is the most neurotropic of these strains and commonly reported associated with clinical illness although this year the number of reported cases of coxsackieviruses B5 meningitis remained low. Coxsackieviruses B1 isolates became increasingly numerous after the middle of the year. Coxsackievirus B3 was detected in small numbers throughout the year.

Low numbers of poliovirus were detected in the river water. All isolates are tested to confirm vaccine characteristics and this information is used to support the UK surveillance for the WHO Poliomyelitis Eradication Programme. Echovirus was detected from a single sample collected in July; the serotype has yet to be identified.

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