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England

Protecting and improving the nation's health

Eye of the Needle

United Kingdom Surveillance of Significant Occupational Exposures to Bloodborne Viruses in Healthcare Workers

December 2014

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Executive summary

Data submitted^a to the significant occupational exposures surveillance system between 2004 and 2013^b indicates that:

- 4830 significant occupational exposures to a bloodborne virus (BBV) were reported among healthcare workers; the annual number of exposures increased from 373 in 2004 to 496 in 2013
- of healthcare workers reporting a significant occupational exposure, half were exposed to hepatitis C (HCV), a third to HIV and one in ten to hepatitis B (HBV)
- seven in ten (71%, 3396/4766) exposures involved a percutaneous needlestick injury, the majority of which were sharps injuries involving a hollowbore needle; the annual number of reported percutaneous injuries increased by 22% over the ten year period from 283 to 344 whereas mucocutaneous injuries increased by 61% from 90 to 145
- two-thirds (65%, 2490/3816) of exposures occurred in wards, theatres and A&E; the annual number of exposures increased over time both in theatres and A&E but declined in wards
- four in five (81%, 3926/4830) injuries were sustained by doctors, nurses and healthcare assistants; among all occupational groups, two-thirds (65%, 2288/3494) of injuries occurred during a clinical procedure
- of healthcare workers exposed to HBV and for whom immunisation status was reported (data limited to 2009 to 2013), 96% (300/313) were known responders to the HBV vaccine; no HBV seroconversions have been reported
- occupational exposures to HIV are well managed; 97% (580/598) of healthcare workers exposed to HIV who started post-exposure prophylaxis (PEP) did so within 72 hours of exposure; 89% (535) started PEP within 24 hours; no HIV seroconversions have been reported
- nine HCV seroconversions following occupational exposure were reported in England, Wales and Northern Ireland; eight of the nine healthcare workers received antiviral therapy of whom seven are known to have achieved viral clearance

^a Data submitted is limited to significant occupational exposures where the source patient is either known or thought to be infected with HIV, hepatitis B and/or hepatitis C.

^b Note that denominators change throughout this document as reported information varies for different fields. Figures are provided as a proportion of available data.

Introduction

Since 1997, Public Health England (previously the Health Protection Agency) has received reports of healthcare workers sustaining significant occupational exposures in healthcare settings in England, Wales and Northern Ireland. The objectives of the Significant Occupational Exposures Surveillance System are detailed in Figure 1.

Reports are voluntarily submitted where healthcare workers have been exposed to blood or other high-risk body fluids. Reports are received from occupational health departments, genitourinary medicine clinics, microbiology, virology and infection control departments across England, Wales and Northern Ireland. Reports are classified as significant occupational exposures and qualify for inclusion in the surveillance system when the following conditions are satisfied:

- incident involved a percutaneous injury (where the skin has been broken by a needle or other sharp object, or a human bite or scratch) and/or mucocutaneous exposure (where the mucous membranes (mouth, nose or eyes) or non-intact skin, have been contaminated)
- source patient^c was either known to be or thought to be hepatitis B surface antigen (HBsAg) positive (HBV), hepatitis C virus (HCV) (HCV antibody positive) and/or HIV positive (HIV antibody positive)

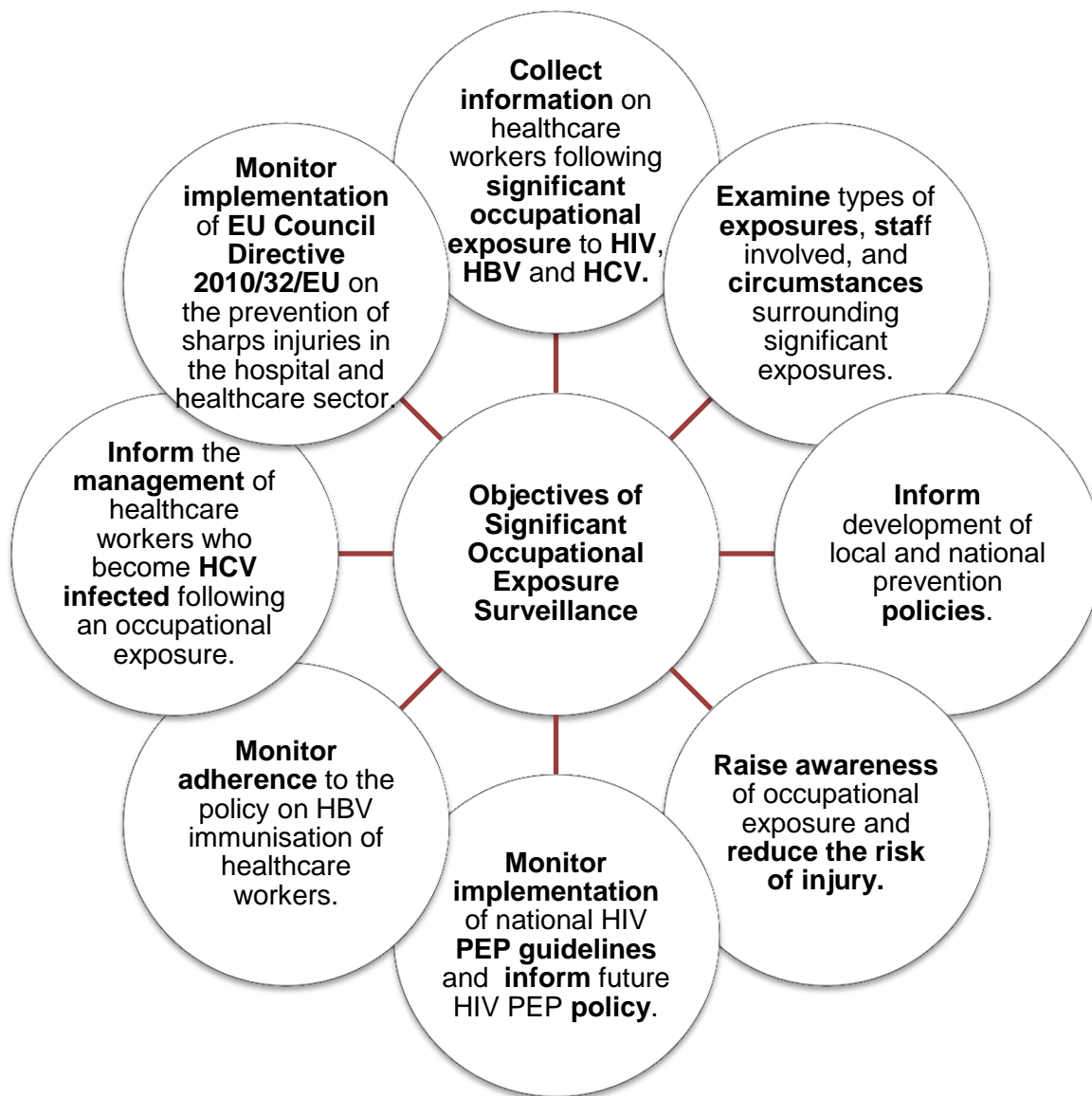
This report highlights significant occupational exposures among healthcare workers in England, Wales and Northern Ireland during the past ten years: 2004 to 2013. Data is reported to 30 September 2014. The number of exposures may increase as further reports are received. Unless indicated otherwise, percentages and proportions are calculated on the basis of available data, therefore denominators change within the report.

This report is accompanied by a PowerPoint slideset, an infographic summary and data tables. These outputs are available online^d.

^c The term 'source patient' refers to a patient who is known or thought to be infected with a BBV and who has been involved in an incident in which a healthcare worker has sustained an injury.

^d Accompanying documentation is available at: www.gov.uk/government/publications/bloodborne-viruses-eye-of-the-needle.

Figure 1. Objectives of the significant occupational exposures surveillance system

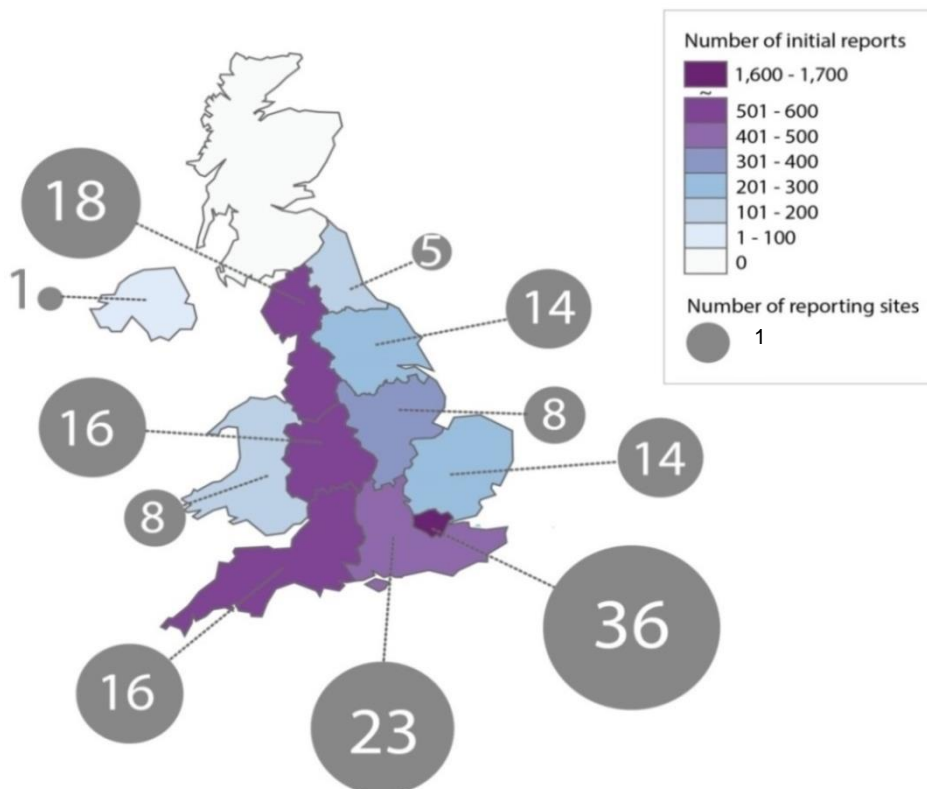


Reporting of significant occupational exposures

Since 1997, when the surveillance system was introduced, 6864^e significant occupational exposures have been reported. Of these exposures, 70% (4830) were reported between 2004 and 2013.

Approximately one-third (34%, 1631) of the 4830 exposures reported between 2004 and 2013 were received from 36 healthcare sites in London. Outside of London, the greatest number of reports was received from the West Midlands (559) and the South West of England (549). In total, reports were received from 159 healthcare sites across England, Wales and Northern Ireland. Figure 2 illustrates by geographical location the number of reporting sites and number of exposures reported between 2004 and 2013.

Figure 2. Number of reporting sites and initial reports of significant occupational exposures by geographical location, 2004-2013



¹ Size of circle is proportional to number of reporting sites.

^e Includes data up to 31 December 2013, including reports received where the year of exposure is unknown.

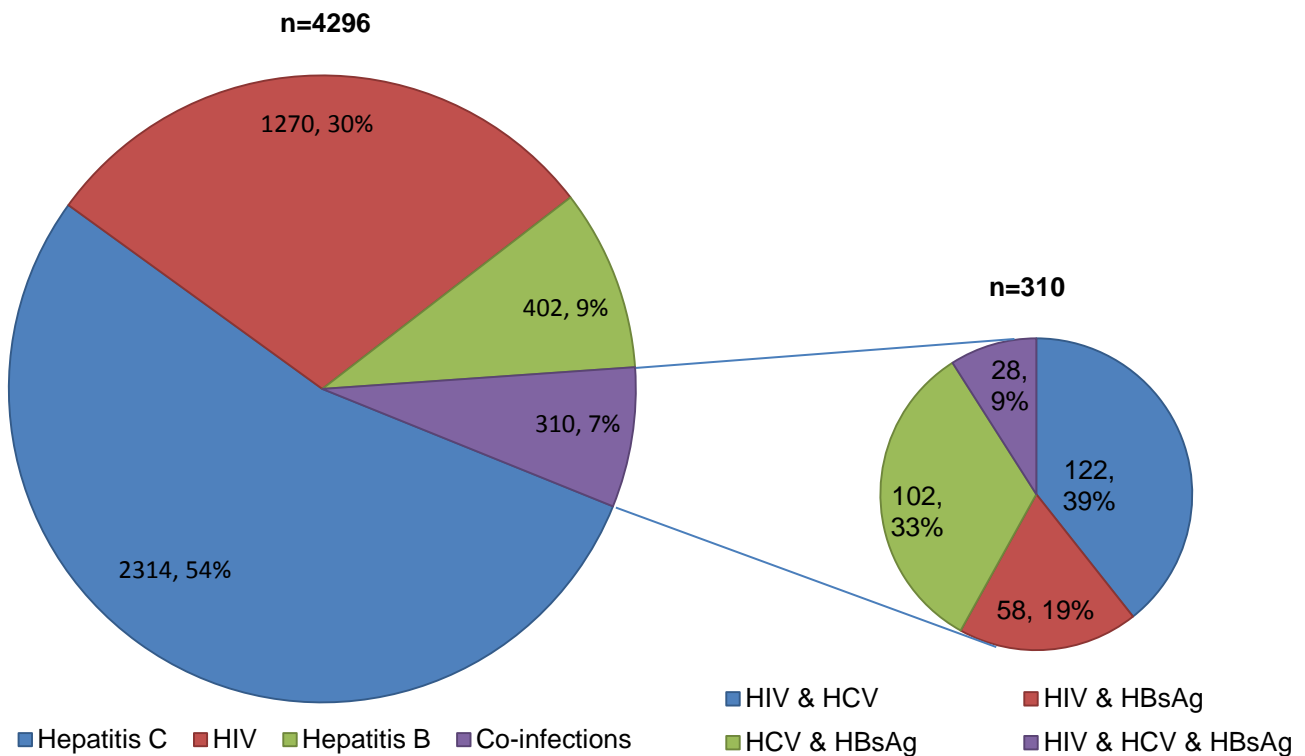
Source patient status

Of all significant occupational exposures reported among healthcare workers between 2004 and 2013, the BBV to which the healthcare worker was exposed was specified for 4296 incidents. Of these, 54% (2314) involved a source patient known or thought to be HCV positive, 30% (1270) involved an HIV positive source patient and 9% (402) an HBV positive source patient. A further 7% (310) of healthcare workers were exposed to a source patient known to be co-infected with two or all three of the BBVs. Figure 3 presents types of exposure by BBV and provides a breakdown of the 310 exposures involving a co-infected source patient.

The annual number of exposures increased from 373 in 2004 to 496 in 2013; exposures involving only HCV positive source patients increased by 29% (from 181 to 233), those involving only HIV positive source patients increased by 50% (from 90 to 135) and those involving only HBV positive source patients increased by 104% (from 25 to 51).

The increase in exposures involving an HIV positive source patient coincides with a substantial increase in the number of people living with HIV in England, Wales and Northern Ireland. Between 2004 and 2013, the estimated number of people living with diagnosed or undiagnosed HIV increased from 41,157 in 2004 to 107,800 in 2013 (1).

Figure 3. Significant occupational exposures by bloodborne virus, 2004-2013

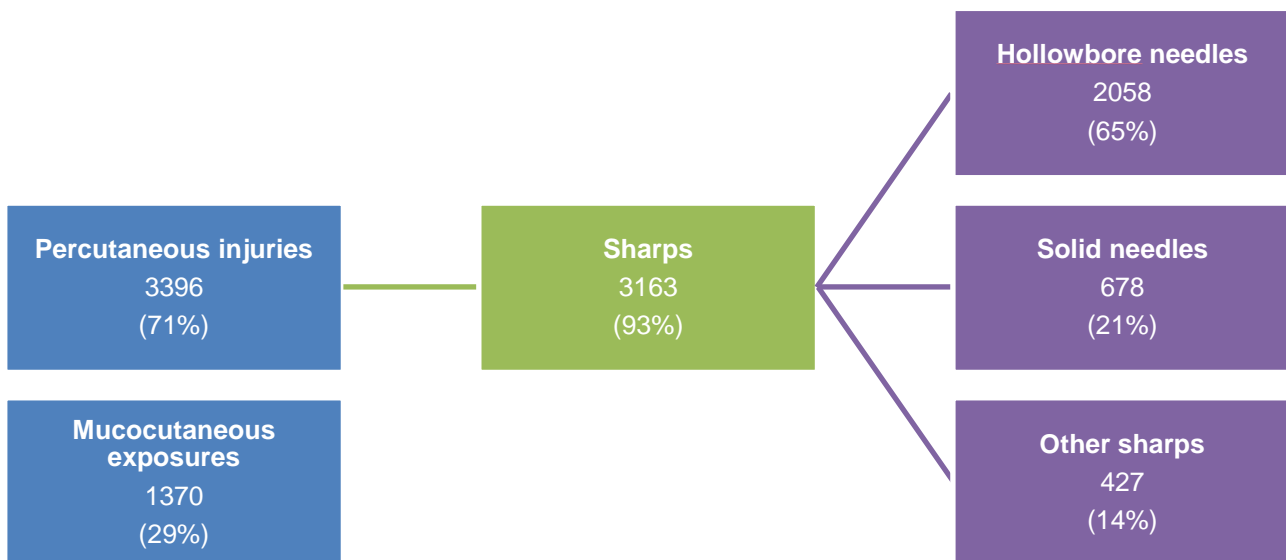


Type of exposure and location

Of the 4830 injuries reported between 2004 and 2013, type of injury was specified for 4766 incidents. Of these, 71% (3396) involved a percutaneous injury (Figure 4). Among all occupational groups, percutaneous injuries were the most frequently reported exposure route. The annual number of percutaneous injuries reported increased by 22% between 2004 and 2013, from 283 to 344. Of all percutaneous injuries, 93% (3163) involved a sharps instrument (Figure 4). Of these sharps injuries, 65% (2058) involved a hollowbore needle. This figure is consistent with survey findings published by the Royal College of Nursing (2), showing hollowbore needles to be the most commonly reported devices in occupational exposures to a BBV in the healthcare setting.

Mucocutaneous exposures accounted for 29% (1370) of reports between 2004 and 2013. Over the ten year period, the annual number of mucocutaneous exposures increased by 61%, from 90 to 145. Although numbers are smaller, the percentage increase in reported mucocutaneous exposures greatly exceeds the corresponding increase in reported percutaneous injuries.

Figure 4. Significant occupational exposures by exposure type, 2004-2013¹



¹ Figures apply to reports where type of exposure was reported; type of exposure was missing for 1.3% (64) of reports.

Of the 4830 injuries reported between 2004 and 2013, location of exposure was specified for 3683 incidents. Of these, 41% (1547) were sustained while working on a ward^f, 16% (626) in theatres and 10% (377) in A&E departments. The percentage of exposures occurring on wards declined from 46% (148/321) in 2004 to 37% (110/294) in 2013. In contrast, the percentage of injuries occurring in theatres increased slightly between 2004 and 2013, from 16% (54/321) to 17% (51/294), while those taking place in A&E departments increased from 11% (34/321) to 14% (40/294). Of injuries occurring in ward settings, 38% (1065) resulted in percutaneous exposures and 42% (476) in mucocutaneous exposures. Meanwhile, the percentage of injuries sustained in community settings^g has declined from 7% (21/321) in 2004 to 3% (10/294) in 2013.

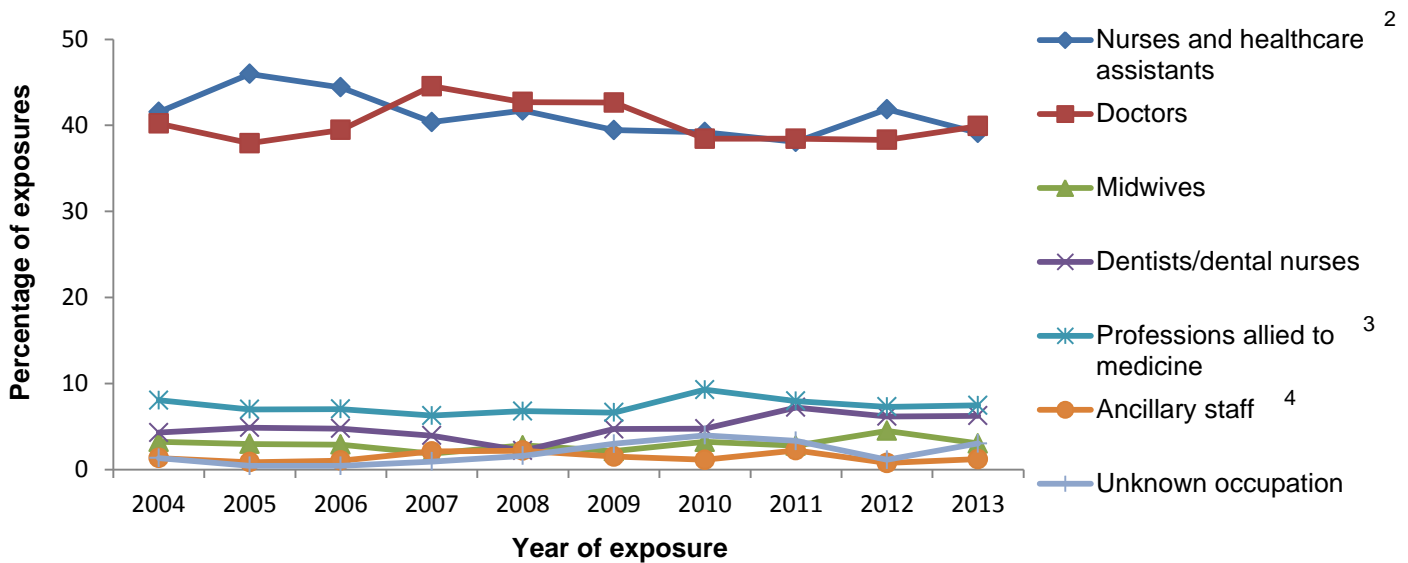
^f Wards include HIV or infectious disease wards, psychiatric wards, renal and dialysis wards, liver wards, maternity wards and surgical wards.

^g Community settings include GP surgeries, prisons and ambulances.

Reported exposures among different occupational groups

All staff working in a healthcare or hospital environment who provide clinical or domestic care are at risk of exposure to a BBV. Those performing exposure prone procedures^h are at an increased risk. Of the 4830 injuries reported between 2004 and 2013, the occupation of the healthcare worker was specified in 4735 incidents. Of these, 42% (1986) were experienced by nurses and healthcare assistants. Over the same period, a similar percentage of exposures (41%, 1940) were reported by doctors. Figure 5 presents exposures by occupational group between 2004 and 2013. Under typical circumstances, ancillary staff do not provide direct clinical care to individuals, yet between 2004 and 2013, 1.5% (69) of significant occupational exposures were reported by this group. This evidence of ancillary staff experiencing significant occupational exposures highlights the need to provide safe working conditions for all staff working in healthcare settings.

Figure 5. Significant occupational exposures by occupational group, 2004-2013 (n=4830)¹



¹The number of reports received as a percentage of all reports by occupational group for that year. Incidents where occupational group is unknown have been included. Date of exposure up to 31 December 2013. The number may rise as further reports are received.

² Nurses and healthcare assistants include nurses, midwives and healthcare assistants and auxiliary nurses.

³ Professions allied to medicine include paramedic or ambulance staff, phlebotomist, physiotherapist, mortuary technician, embalmer, operating department assistant, dialysis technician, laboratory worker, general technician and radiographer.

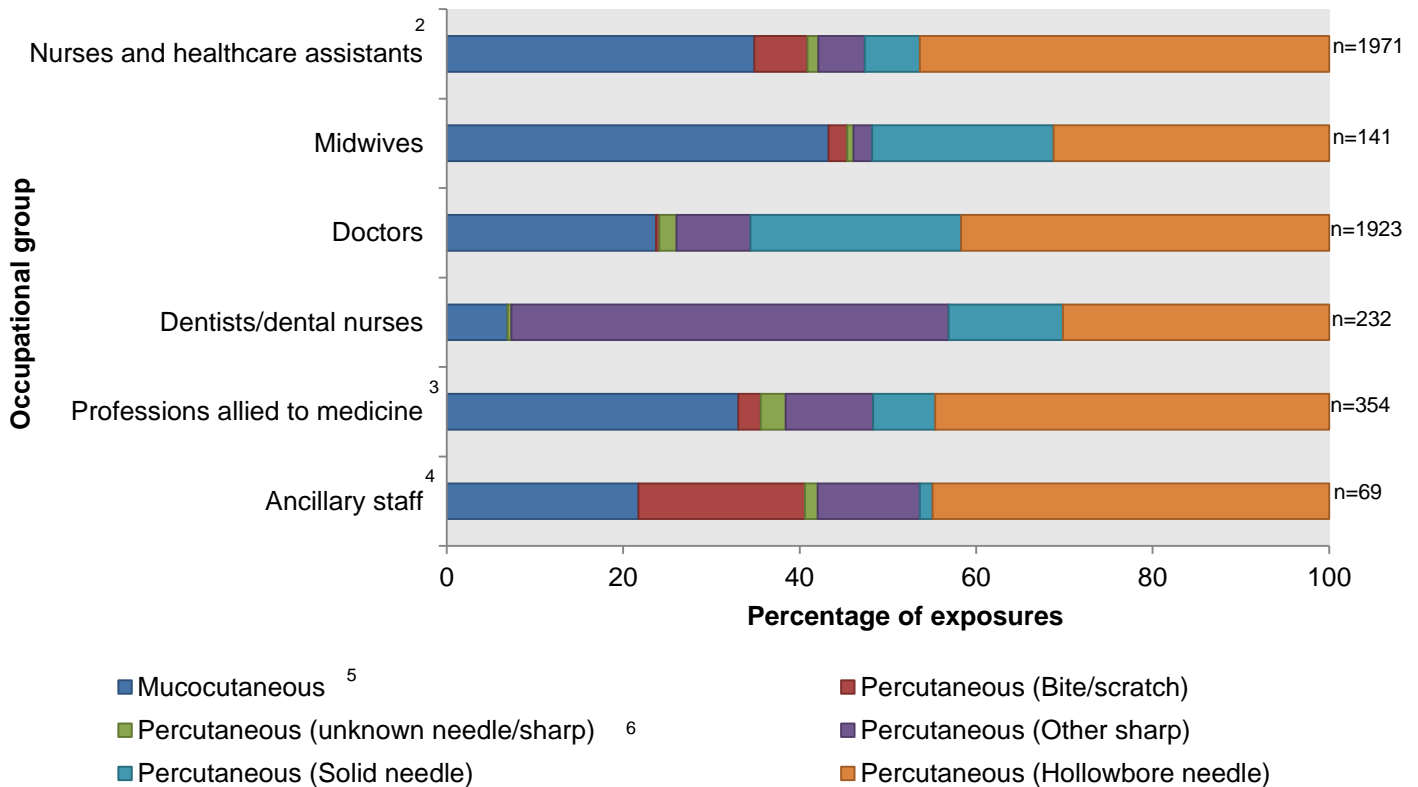
⁴ Ancillary staff include porters, security, domestic, housekeeping and clerical staff.

^h Exposure prone procedures are where a healthcare worker may be exposed to the blood or open tissues of the patient (through contact with sharp instruments, needle tips or sharp tissues (3).

Between 2004 and 2013, the percentage of percutaneous injuries involving a hollowbore needle remained unchanged among nurses and healthcare assistants (2004: 73%, 78/107; 2013: 74%, 84/113) and declined among doctors (2004: 61%, 75/122; 2013: 52%, 77/148). The percentage of percutaneous injuries attributable to solid needles declined slightly from 9% (10/107) in 2004 to 7% (8/113) in 2013 among nurses and healthcare assistants, and increased from 30% (37/122) in 2004 to 36% (54/148) in 2013 among doctors.

Mucocutaneous exposures accounted for 31% (47/154) of reports among nurses and healthcare assistants in 2004, increasing to 40% (75/188) in 2013. Among doctors, the percentage of reports attributable to mucocutaneous exposure increased from 19% (28/150) in 2004 to 23% (43/191) in 2013. Figure 6 presents exposures by type and occupational group.

Figure 6. Significant occupational exposures by exposure type and occupational group, 2004-2013¹

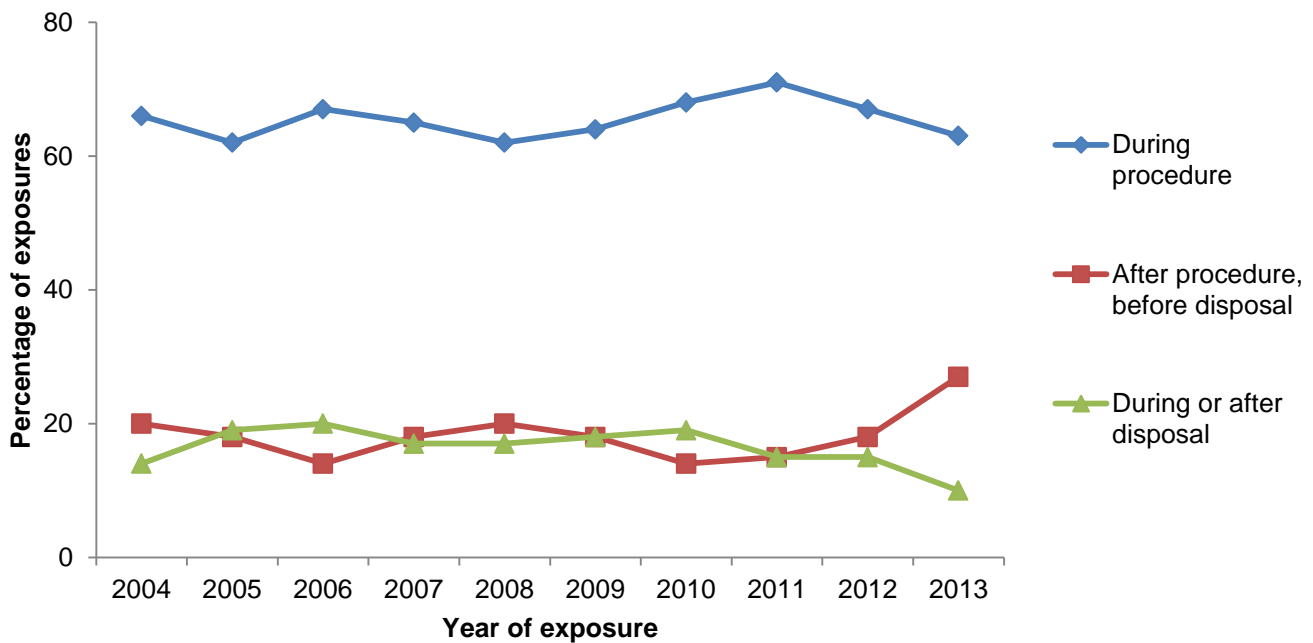


¹ The number of reports received as a percentage of all reports by occupational group for that year; date of exposure up to 31 December 2013. The number may rise as further reports are received.
² Nurses and healthcare assistants include nurses, midwives and healthcare assistants and auxiliary nurses.
³ Professions allied to medicine include paramedic or ambulance staff, phlebotomist, physiotherapist, mortuary technician, embalmer, operating department assistant, dialysis technician, laboratory worker, general technician and radiographer.
⁴ Ancillary staff include porters, security, domestic, housekeeping and clerical staff.
⁵ Mucocutaneous includes where the mucous membranes (mouth, nose or eyes) or non-intact skin (such as broken skin through cuts and abrasions or skin conditions).
⁶ Percutaneous includes where the skin has been broken by a needle or other sharp object, or a human scratch or bite.

Exposures in relation to procedure phase

Of the 4830 injuries reported between 2004 and 2013, the phase of procedure at which an injury was sustained was specified for 3494. Of these, 65% (2288) of injuries were sustained during a clinical procedure. Figure 7 shows this percentage to have remained high over time. Between 2012 and 2013, the percentage of injuries occurring after the procedure and before disposal increased from 18% (65/360) to 27% (69/251). In contrast, the percentage of injuries sustained during and after disposal declined from 14% (44/313) to 10% (24/251) over the same period. Between 2004 and 2013, 35% (1206) of injuries occurred after the procedure.

Figure 7. Significant occupational exposures by procedure phase, 2004-2013 (n=3494)

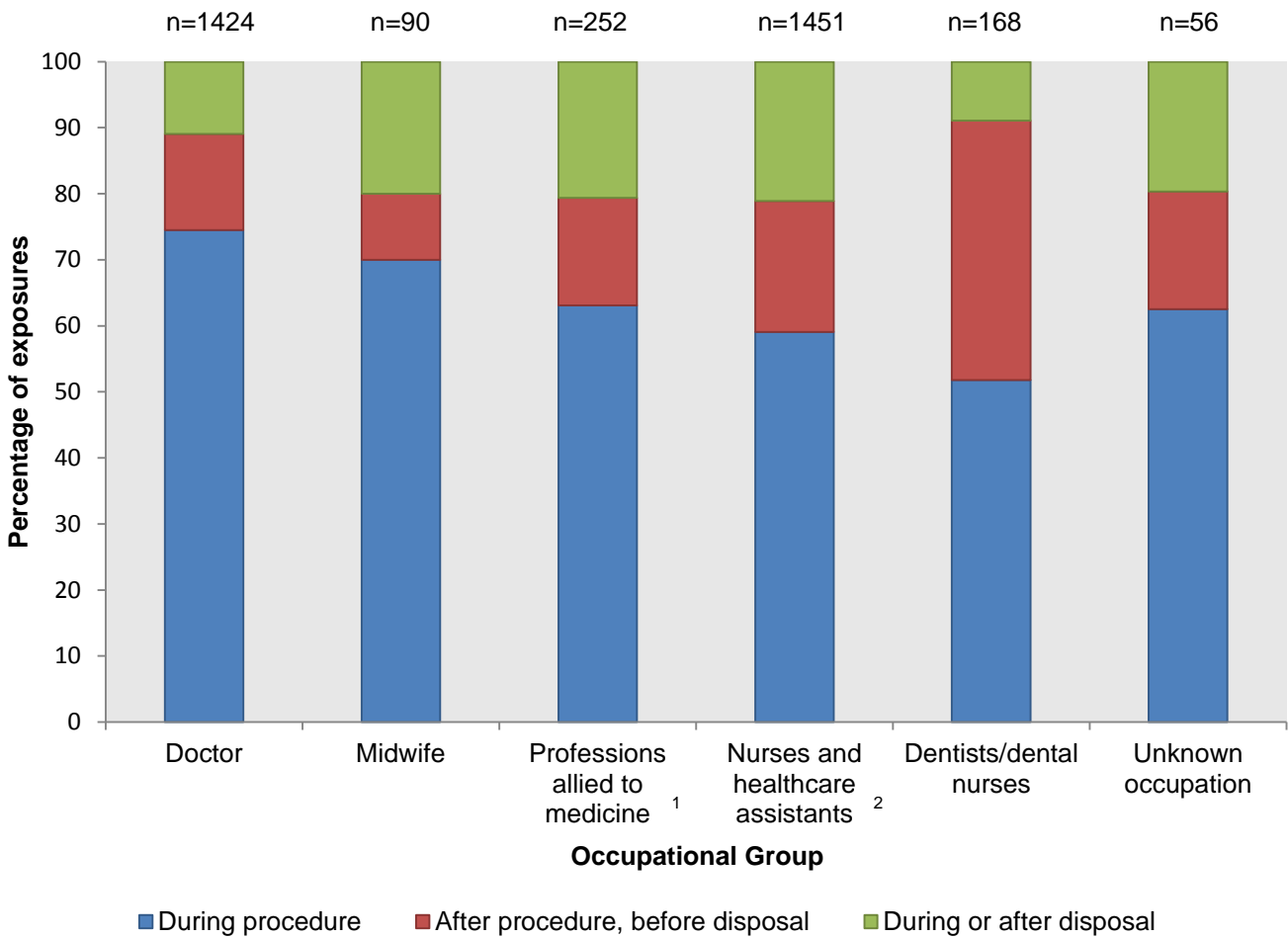


The recent EU Directive states that safe working conditions must be created for healthcare workers to help reduce the risk of sharps injury (4). Safe working conditions include providing safety devices and appropriate training to staff performing clinical procedures. Several factors may contribute to a significant occupational exposure; these are referred to as contributory factors. Contributory factors may be healthcare worker related (for example non-compliance with standard precautions), equipment related (for example faulty equipment) or procedure related (for example emergency procedure)ⁱ.

ⁱ Information about the use of safety devices and protective equipment was collected during the follow-up stage. This information is currently collected 6 weeks after the date of injury. Completion of this variable is currently low. It is anticipated that as the use of safety devices becomes more widespread, reporting of safety device usage will increase. From this time, it will become possible to compare the risk of exposure among healthcare workers using protective equipment, safety devices and those using other devices.

Of the 4830 injuries reported between 2004 and 2013, the occupational group and phase in clinical procedure at which the injury occurred was specified for 3385 incidents. Figure 8 highlights that the procedure phase at which reported significant occupational exposures occur differs by occupational group. Between 2004 and 2013, 75% (1061) of exposures among doctors occurred during the procedure. Among dental professionals, the figure was lower, with only 52% (87/168) of injuries occurring during the procedure. Among dentists and dental nurses, 39% (66/168) of exposures occurred after the procedure but before disposal.

Figure 8. Significant occupational exposures by procedure phase and occupational group, 2004-2013






¹ Professions allied to medicine include paramedic or ambulance staff, phlebotomist, physiotherapist, mortuary technician, embalmer, operating department assistant, dialysis technician, laboratory worker, general technician and radiographer.

² Nurses and healthcare assistants include nurses, midwives and healthcare assistants and auxiliary nurses.

Risk and outcome of exposures

Percutaneous injuries present the greatest risk of BBV transmission in the healthcare setting (5). Figure 9 compares published estimates of risk (5-7) and observed transmission risk among healthcare workers reporting a percutaneous injury. Based on data reported to the surveillance of significant occupational exposure system, the observed rates of BBV transmission are significantly lower than the published risk of transmission.

Figure 9. Published and observed risk of bloodborne virus transmission among healthcare workers following a percutaneous injury (5-7)¹

| Virus | Published risk of transmission | Healthcare workers exposed, 2004-2013 | Seroconversions, 2004-2013 | Observed risk of transmission |
|-------|------------------------------------------------------------------------------------------------|---------------------------------------|----------------------------|-------------------------------|
| HBV | One in 3  | 590 | 0 | - |
| HCV | One in 30  | 2566 | 9 | 1 in 285 |
| HIV | One in 300  | 1478 | 0 | - |

¹ This figure includes data from England, Wales and Northern Ireland only.

The disparity between the published estimates of risk and observed risk is likely due to a combination of the success of the HBV immunisation programme among healthcare workers and prevention and risk-reduction strategies implemented in the healthcare setting. Clinical management of exposures^j has also been effective in preventing the transmission of BBVs among healthcare workers. Underreporting of exposures by healthcare workers and organisations may lead to the risk of seroconversion being underestimated.

Mucocutaneous exposures carry a lower risk of BBV infection than percutaneous injuries. The estimated risk of HIV transmission is one per 1000 mucocutaneous exposures (5). Currently no equivalent estimates are available in relation to the risk of HBV or HCV transmission. The risk of BBV transmission from a human scratch or bite will vary according to the severity of the injury, the source patient’s oral hygiene and the disease stage in the source patient.

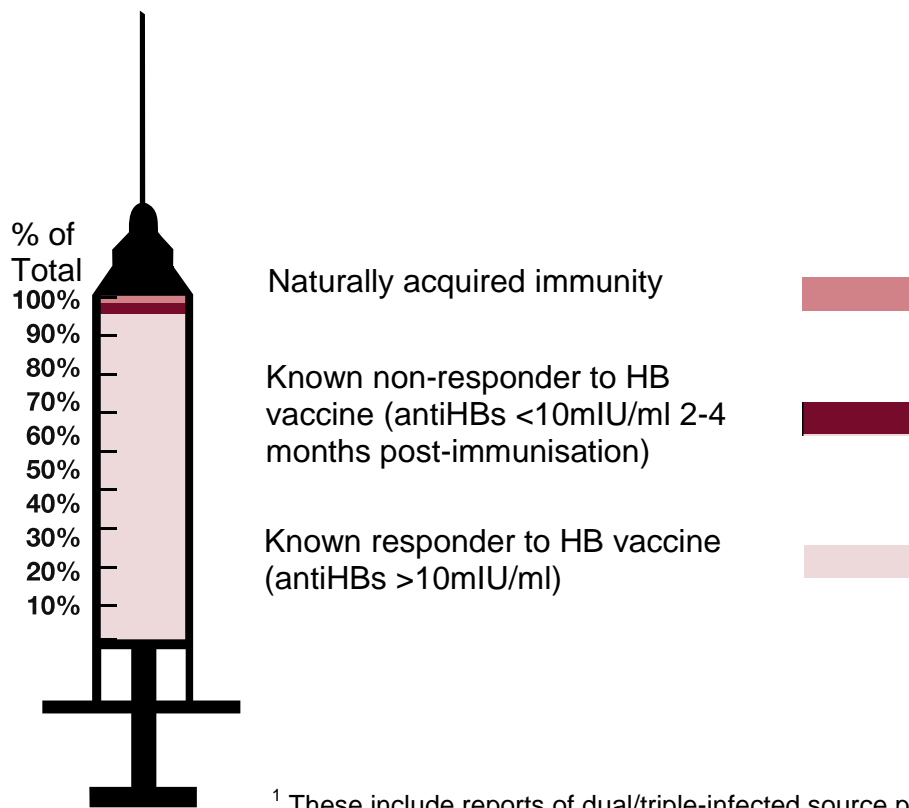
^j A flow-chart for the clinical management of exposures to HCV is available in the 2012 [Eye of the Needle Report \(8\)](#).

Hepatitis B immunisation status of exposed healthcare workers

Information on HBV immunisation status is available for the period 2009 to 2013. During this period, 331 HBV exposures (including those involving a source patient co-infected with HCV and/or HIV) were reported among healthcare workers. The national policy on HBV immunisation states that all healthcare workers who may have direct contact with patients' blood, blood-stained body fluids or tissues require immunisation against HBV (6). As shown in Figure 10, 96% (300/313)^k of healthcare workers exposed to HBV, with reported immunisation status, were known responders to the HBV vaccine.

Where healthcare workers are exposed to HBV, the management of cases should comply with national guidelines (6). To date, there have been no reports to the significant occupational exposures surveillance system of a healthcare worker acquiring HBV following an occupational exposure.

Figure 10. Healthcare worker HBV immunisation status, 2009-2013¹ (n=313)



^k Although 331 healthcare workers were reportedly exposed to HBV, the immunisation status was known for 313.

Management of hepatitis C seroconversions among healthcare workers

The management of HCV exposures has previously been documented in the 2012 Eye of the Needle Report (9). In total, since 1997, 17 HCV seroconversions have been reported in England, Wales and Northern Ireland, with a further four reported in Scotland.

Between 2004 and 2013, nine occupationally related HCV seroconversions were reported among healthcare workers in England, Wales and Northern Ireland. All four seroconversions in Scotland were reported during this period. The nine exposures in England, Wales and Northern Ireland all involved percutaneous injuries from hollowbore needles. Of the nine healthcare workers exposed, eight received antiviral therapy and one was lost to follow-up (10). Of the eight healthcare workers in receipt of antiviral therapy, seven are known to have achieved viral clearance; the viral status of the remaining healthcare worker remains unknown.

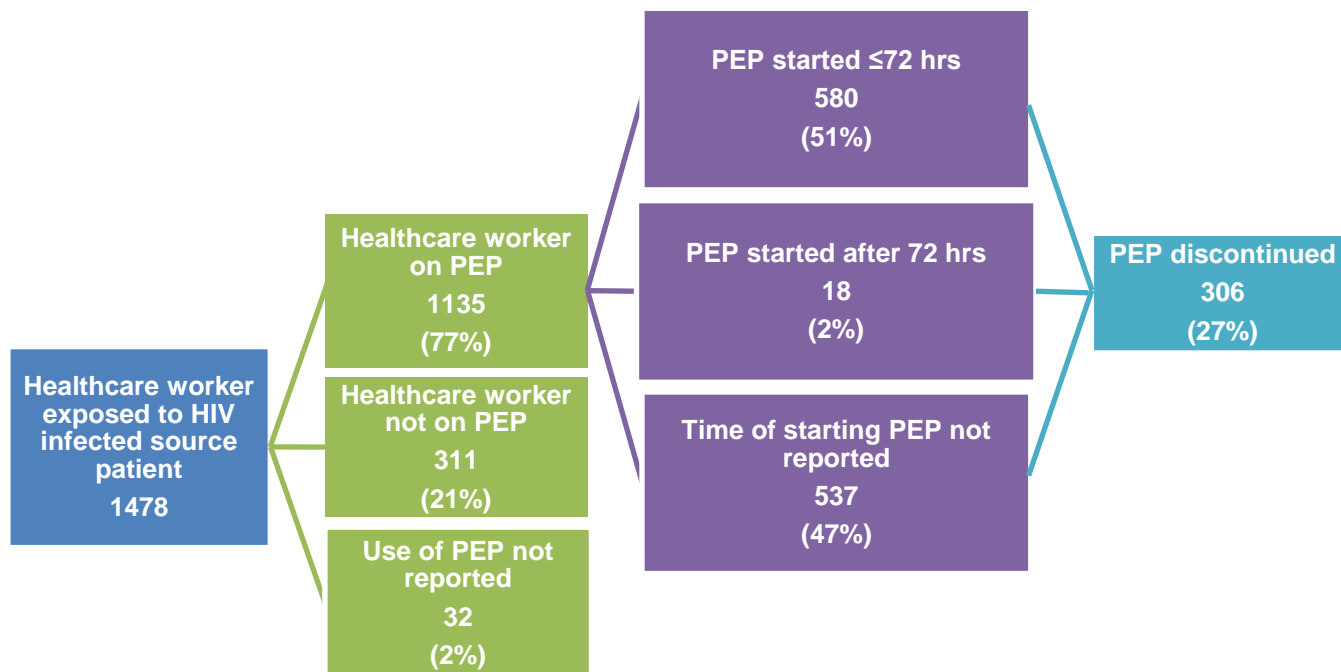
Management of HIV exposure among healthcare workers

When healthcare workers experience a significant exposure to blood or body fluids from individuals known or thought to be infected with HIV, it is recommended that the healthcare worker starts HIV PEP within 72 hours of the exposure (5). Of healthcare workers exposed to HIV, 77% (1135/1478) started PEP (Figure 11). The effectiveness of PEP is maximised when the interval between exposure and the treatment start date is short. Based on reported exposures to HIV, compliance with national PEP guidelines is high. Of healthcare workers starting PEP, 97% (580/598)¹ did so within 72 hours of exposure and 89% (535/598) started treatment within 24 hours. Twenty-seven percent (306/1135) discontinued PEP and therefore did not complete the recommended treatment course. Reasons for this included reassessment of risk by the consulting physician or experience of side effects.

The risk of HIV transmission to a healthcare worker following an occupational exposure is also greatly reduced when a source patient achieves viral suppression through successful antiretroviral therapy. In 2013, 90% of people seen for HIV care in the UK were prescribed antiretroviral therapy, of whom 90% were virally suppressed (1).

¹ While 97% of healthcare workers are reported to have started PEP within 72 hours of exposure, PEP start time was unknown for 47% of healthcare workers who started PEP following exposure to an HIV infected source patient.

Figure 11. Overview of HIV clinical management (2004-2013)¹



¹ Figures are provided for incidents where both use of PEP and time of starting PEP were reported; figures include healthcare workers exposed to HIV, regardless of co-infection status.

Key messages:

- healthcare workers across all occupational groups continue to be at risk of infections from BBVs as a result of occupational injuries
- NHS Trusts and all employers in the healthcare setting ought to provide healthcare workers with safety-engineered devices in line with the EU Sharps Directive (2010) and the Health and Safety Executive (Sharps Injuries in Healthcare) Regulations (2013) regarding safer working conditions; this action represents a clear effort towards reducing preventable injuries among healthcare workers
- prevention efforts concentrating on reducing injuries during procedures are likely to have the most significant impact on reducing occupational injuries and exposures across all occupational groups
- HBV immunisation programmes across England, Wales and Northern Ireland are protecting healthcare workers from HBV infection
- Trusts must continue to follow guidelines for prescribing PEP where a healthcare worker is known to have been exposed to HIV infection
- nine HCV seroconversions following occupational exposure were reported in England, Wales and Northern Ireland; eight of the nine healthcare workers received antiviral therapy of whom seven are known to have achieved viral clearance

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