

Attachment

Results of suggested HBV transmission by HCW

Author, country, publication year	Study period	Study type	Occupation	Persons tested (no.)	Assessment of HBeAg, HBsAg subtype	HBV DNA (copies/mL)	Degree of confirmation	Likely mode of transmission
Levin et al., USA, 1974 [19]	1972–1973	Case series	Dentist in private practice	21 (13 patients, 8 staff members)	Not done	Not done	13 (possible)	Small abrasions or cuts on the dentist's hands
Snydman et al., USA, 1976 [20]	1974–1975	Case-control	Respiratory therapist (open heart surgery)	45 (17 patients with open-heart surgery)	Positive, subtype ayw	Not done	4 (4 probable)	HCW did not wear gloves, had an exudative dermatitis on hands, and reused syringes
Rimland et al., USA, 1977 [21]	1971–1974	Retrospective cohort	Oral surgeon in private practice	42	Positive, subtype ay	Not done	32 (10 probable, 22 possible)	HCW did not wear gloves and reported sustaining hand cuts
PHLS, UK, 1980 [22]	Jan–Jul 1978	Case-control	Surgical registrar, gynaecologic surgery	1,332 (589 patients and 743 controls with “known outcome”)	Positive, subtype ad	Not done	8 (6 probable, 2 only possible as in those patient HBsAg titre was too low for sub-typing)	None
Grob et al., Switzerland, 1981 [23]	1973–1979	Cross-sectional	General practitioner	150	Positive, no subtyping	Not done	41 (41 possible)	Wearing no gloves the practitioner sometimes had small lesions on his fingers
Hadler et al., USA, 1981 [24]	1978 (Apr–Sep)	Cross sectional (with nested case-control design)	Dentist in private practice	764	Positive, subtype adw	Not done	6 (2 probable, 4 possible ^a)	HCW did not wear gloves
Haerem et al., Norway, 1981 [25]	1978 (1 st Jan–Jun 30)	Retrospective cohort	Cardiac surgeon	111	Positive, subtype ay	Not done	5 (5 probable)	None
Carl et al., USA, 1982 [26]	1979–1980	Retrospective cohort	Obstetrician gynaecologist	740	Positive, subtype ayw	Not done	4 (1 probable, 3 possible) results	HCW noted several episodes of blood on hands after removing gloves

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Couthino et al., The Netherlands, [27]	1979	Case-control	Cardiac surgeon (source A)	540	Not reported, subtype ayw ₂	Not done	3 (3 probable)	None
[27] Ditto	Ditto	Case-control	Perfusion technician (source B)	Dito	Positive, subtype adw ₂	Not done	11 (8 probable, 3 possible)	Bleeding warts on the technician's hands in 1979
Goodman et al., USA, 1982 [28]	1980	Cross-sectional	Oral surgeon	570	Not done, subtyp adw	Not done	3 (3 probable)	HCW did not wear gloves
Reingold et al., USA, 1982 [29]	1977–1979	Retrospective cohort	Oral surgeon	511	Positive, subtype dy	Not done („strongly positive for HBsAg and HBe“)	52 (4 probable, 48 possible)	HCW did not wear gloves and had a generalised eczematous dermatitis
Ahtone et al., USA, 1983 [30]	1980	Cross-sectional ^b	Dentist in private practice	9 (5 staff members; 4 patients)	Positive, no subtyping	Not done	4 possible (no subtyping reported)	HCW did not wear gloves; returned to practice with gloves
Lettau et al., USA, 1986 [31]	1983–1984	Case-control	Obstetrician gynaecologist	683 (274 exposed, 409 control patients)	Positive, subtype aw	Not done	5 (5 probable; 1 additional patient had distinct subtype ayw)	None
Polakoff et al., UK, 1986 [32]	1980–1983	Case series	Perfusion technician	153 (patients with recent operations)	Positive, subtype ay	Not done	6 (6 probable)	HCW did not wear gloves, and had cuts and abrasions on hands
[32] Ditto	1980–1983	Ditto	Surgical registrar	Ditto.	Not reported, subtype ad	Not done	5 (5 probable)	None
Shaw et al., USA, 1986 [33]	1984–1985	Retrospective cohort	Dentist	1,133	Positive, subtype ad	Not done	24 (6 probable, 18 possible)	HCW did not wear gloves
Anonymous, UK, 1987 [34]	1976–1979	Retrospective cohort	Surgical (gynaecological)	735	Positive, sub-group ay.	Not done (HBsAg “positive to a high titre”)	9 (7 probable, 2 possible [anti-HBc positive but HBsAg negative])	None
Welch et al., UK, 1989 [35]	1985–1987	Cross-sectional	Obstetrician-gynaecologist	247	Positive, subtype ad	Not done	22 (6 probable, 16 possible)	None
Anonymous, UK, 1991 [36]	Unknown, publ. in 1991	Case series	Surgeon („surgical colleague“)	3	Positive, no subtyping	Not done	3 (3 possible)	None

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Prendergast et al., USA, 1991 [37]	1987	Case series	General surgeon	5 (acute HBV cases)	Positive, subtype ay	Not done	5 (3 probable, 2 possible)	None
Johnston et al., Canada, 1992 [38]	1991	Case series	Orthopaedic surgeon	2	Positive, subtype ay	Not done	2 (1 probable, 1 possible [subtyping not possible])	None
Prentice et al., UK, 1992 [39]	1987–1988	Retrospective cohort	Cardiothoracic surgeon, trainee	280 (of 361 patients at risk)	Positive, subtype ad	Not done	17 (9 probable, 8 possible)	None
Anonymous, UK, 1996 [40]	1996	Cross sectional	Member of the operating team (hip surgery)	200 (“approximately”)	Negative	Not done	1 (1 possible)	None
Harpaz et al., USA, 1996 [41]	1991–1992	Retrospective cohort	Cardiothoracic surgeon	187 (144 included in study)	Positive, subtype adw ₂	≈2.5×10 ⁹ copies/mL	19 (9 confirmed, 4 probable, 6 possible w/o typing)	None
Halle, UK, 1996 [42], [43]	1996	Case report	Orthopaedic surgeon	1 (230 ^d)	Negative and HBsAg-positive (precore mutation)	NA (“low concentrations”)	1 (1 confirmed)	None
Heptonstall et al., UK, 1996 [44]	1992–1993	Retrospective cohort study	Cardiothoracic surgeon	310	Positive, subtype adr	Not done	20 (14 confirmed, 2 probable, 4 possible)	None
Mukerjee et al., UK, 1996 [45]	1993	Case-control	General surgeon	16	Positive, subtype adr	Not done	2 (2 confirmed)	None
Incident Investigation Team et al., UK, 1997 [46]	1988	Cross-sectional	General surgeon	1	Negative (anti-HBe-positive)	1×10 ⁷ copies/mL	1 (1 confirmed)	None (double-gloving practice unknown)
[46] Ditto.	1988	Ditto	Obstetrician-gynaecologist, trainee	92	Negative (anti-HBe-positive)	4.4×10 ⁶ copies/mL	3 (3 confirmed)	None (double-gloving practice only occasionally)
[46] Ditto	1988	Ditto	Obstetrician-gynaecologist, trainee	111	Negative (anti-HBe-negative)	5.5×10 ⁶ copies/mL	1 (1 confirmed)	None (double-gloving practice only occasionally)
[46] Ditto	1988	Ditto	General surgeon, urologist, clinical assistant	21	Negative (anti-HBe-positive)	2.5×10 ⁵ copies/mL	1 (1 confirmed)	None (double-gloving practice only occasionally)
Sundkvist et al., UK, 1996 [47]	1996	Cross-sectional	Orthopaedic surgeon	189	Negative (anti-HBe-positive)	Not done	1 (1 confirmed)	None

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Oliver et al., UK, 1999 [48]	1993–1994	Retrospective cohort	General surgeon, trainee	390 ^e	Positive, no subtyping	Not done	11 (1 confirmed, 10 possible)	None
[48] Ditto	1994	Ditto	General surgeon, trainee	96	Positive, no subtyping	Not done	2 (2 possible)	None
[48] Ditto	1994	Ditto	Urologist, trainee	28	Positive, no subtyping	Not done	1 (1 possible)	None
Walsh et al., UK, 1999 [49]	1990–1992	Retrospective cohort	Acupuncture practitioner	360 (39% of all patients identified)	Positive, subtype adw2	Not done	5 (2 confirmed by PCR-SSCPA [Polymerase Chain Reaction – Single-Strand Conformation Polymorphism Analysis, 3 possible])	None
Hepatitis B Outbreak Investigation Team, Canada, 2000 [50]	1991–1996	Retrospective cohort	Electroencephalogram technician	9,620	Positive, no subtyping	Not done (HBV DNA patterns were identical, but copies/mL were not determined)	75 (4 confirmed, 71 possible)	HCW did not wear gloves and used reusable subdermal EEG electrodes
Molynaux et al., UK, 2000 [51]	1999	Cross-sectional	Cardiothoracic surgeon	123	Negative (anti-HBe-positive)	1.03×10 ⁶ copies/mL	2 (2 confirmed)	None
Spikermann et al., The Netherlands, 2002 [52],	1995–1999	Retrospective cohort	General surgeon	1,564	Positive, subtype adw2	5.0×10 ⁹ HBV copies/mL	27 (7* confirmed, 20 possible) ^f ; 1 secondary transmission to a patient's wife excluded.	HCW noted glove perforations
Cordon et al., UK, 2003 [53]	1988–1997	Cross-sectional	Surgeons (n=8)	8	Negative (all 8 surgeons)	4×10 ⁴ –1.5×10 ⁹ copies/mL (Roche assay values)	8 (confirmed). All surgeons carried codon 28 variants and transmitted these variants to their patients	None
Poujol et al., France, 2005 [54]	2005	Case-contact tracing	Anaesthetic nurse (vascular surgery)	28 (6 patients, 22 HCW)	Not reported (HBsAg-positive)	Not done	1 (1 confirmed by molecular analysis of HBV gene S and C)	HCW did not wear gloves and reported needle sticks on several occasions
Smellie et al., UK, 2006 [55]	1998	Case-contact tracing	Surgical house officer	3,381 (231 staff members and 3,150 potentially treated patients)	Positive, no subtyping	Not done	2 (2 confirmed)	When performing venepuncture or inserting intravenous lines, the HCW did not wear gloves.

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Laurenson et al., UK, 2007 [56]	2001	Case series	General surgeon	3	Negative, subtype ayw2	>10 ⁶ copies/mL	3 (3 confirmed)	None
Enfield et al., USA, 2013 [57]	2009	Retrospective cohort	Orthopaedic surgeon	232	Positive, subtype ayw3	≈9.42×10 ⁷ copies/mL (17.9 million IU/mL) ^g	8 (2 confirmed, 6 possible)	None
Sugimoto et al., Japan, 2013 [58]	2010	Case-contact tracing	Obstetrician-gynaecologist	63	Positive, no subtyping	1.6×10 ⁹ copies/mL	1 (1 confirmed)	None

^a No subtyping done in 1 HBsAg-positive patient and 3 patients were HBsAg-negative.

^b Patients with clinical HBV infection treated in the preceding 3 years by the dentist were found by comparing a list of HBV cases reported to the county in the same time period.

^c HBV DNA concentration of 15 ng/mL corresponds to approximately 2.5×10⁹ copies/mL.

^d A total of 230 patients were checked for HBV markers but the results were not reported.

^e 514 patients were asked by questionnaire but only those who had previously contracted acute hepatitis B were serologically tested.

^f Although 55 patients were stated “associated”, only 42 patients had been tested for HBsAg, of those were 33 positive. Subtyping of HBsAg-positive samples was only available for 11 patients; of whose 1 HBsAg-positive patient with subtype ad differed from the surgeon’s subtype.

^g For the VERSANT HBV bDNA 3.0 Assay used in this study, a study reports a conversion factor of 1 IU/mL≈5.26 copies/mL. Therefore, a viral load of 17.9 million IU/mL corresponds to approximately 9.42×10⁷ copies/mL.

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