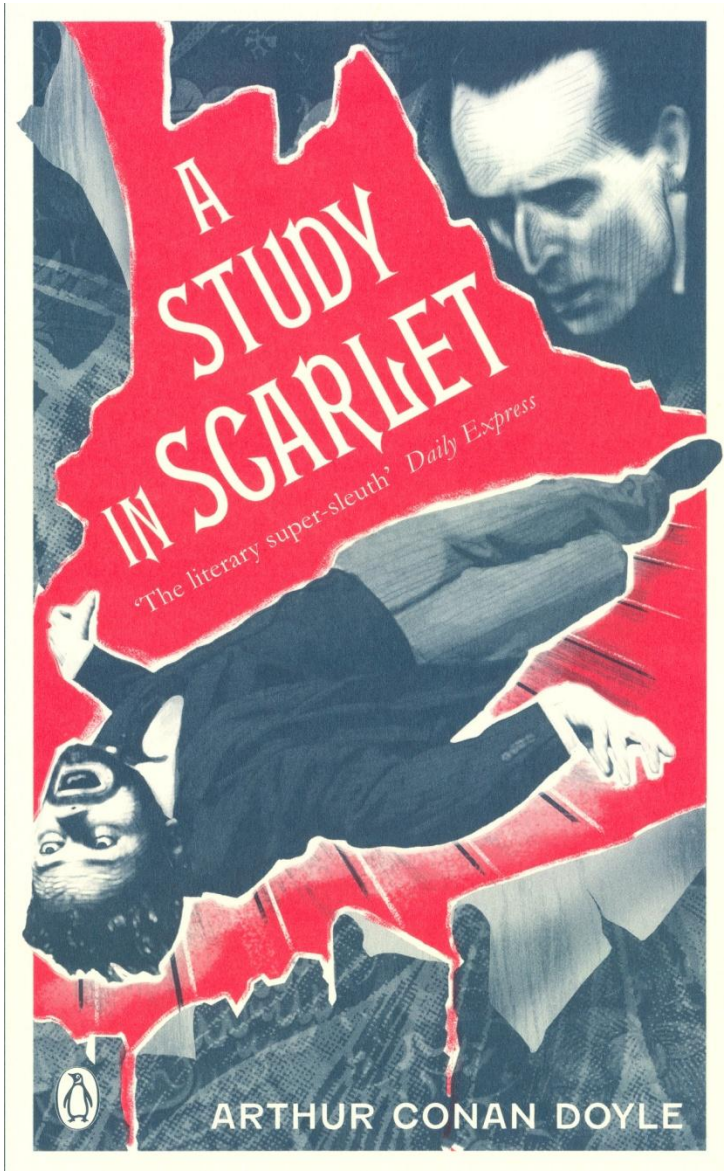
A Study in Scarlet

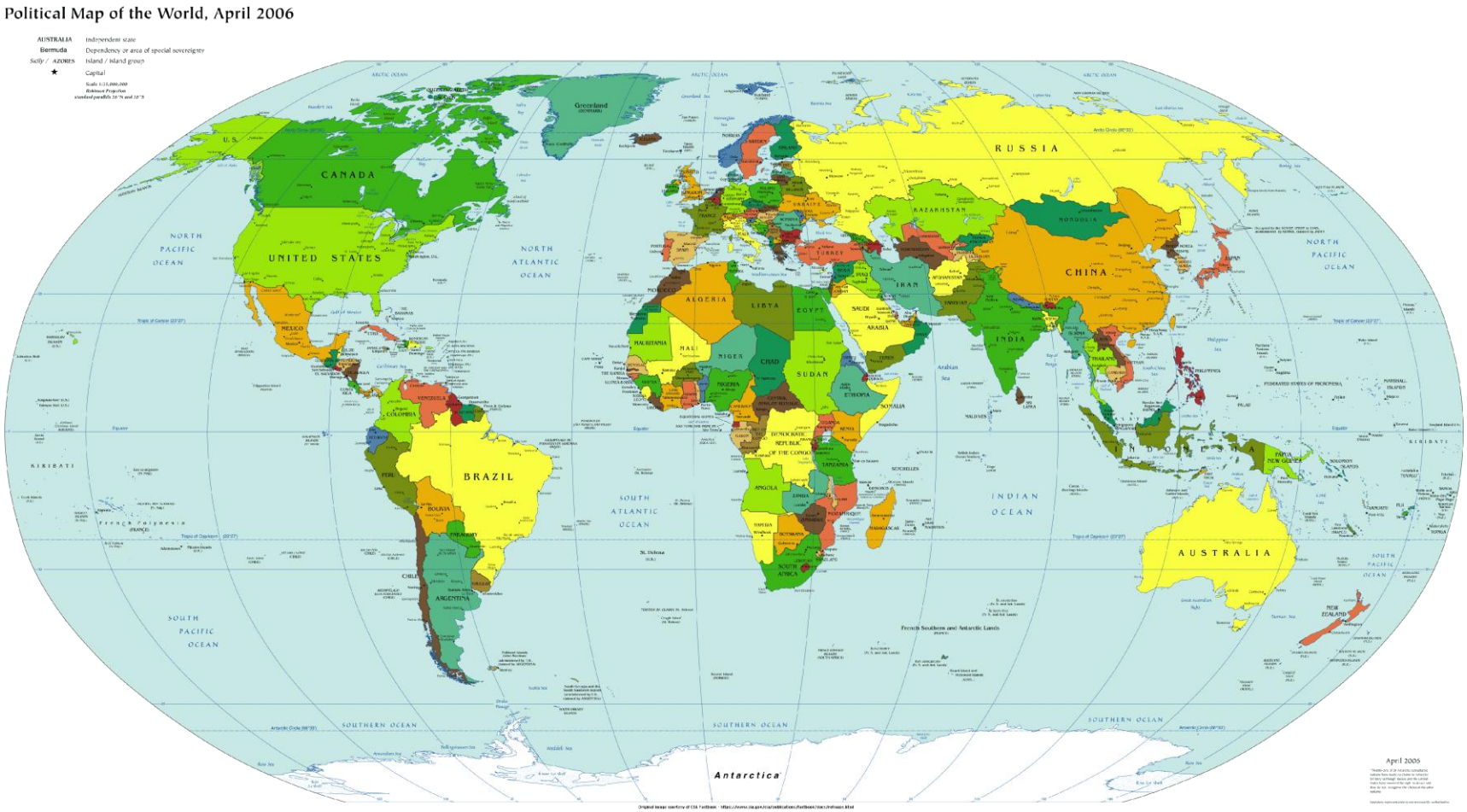


Dr Helena Nixon

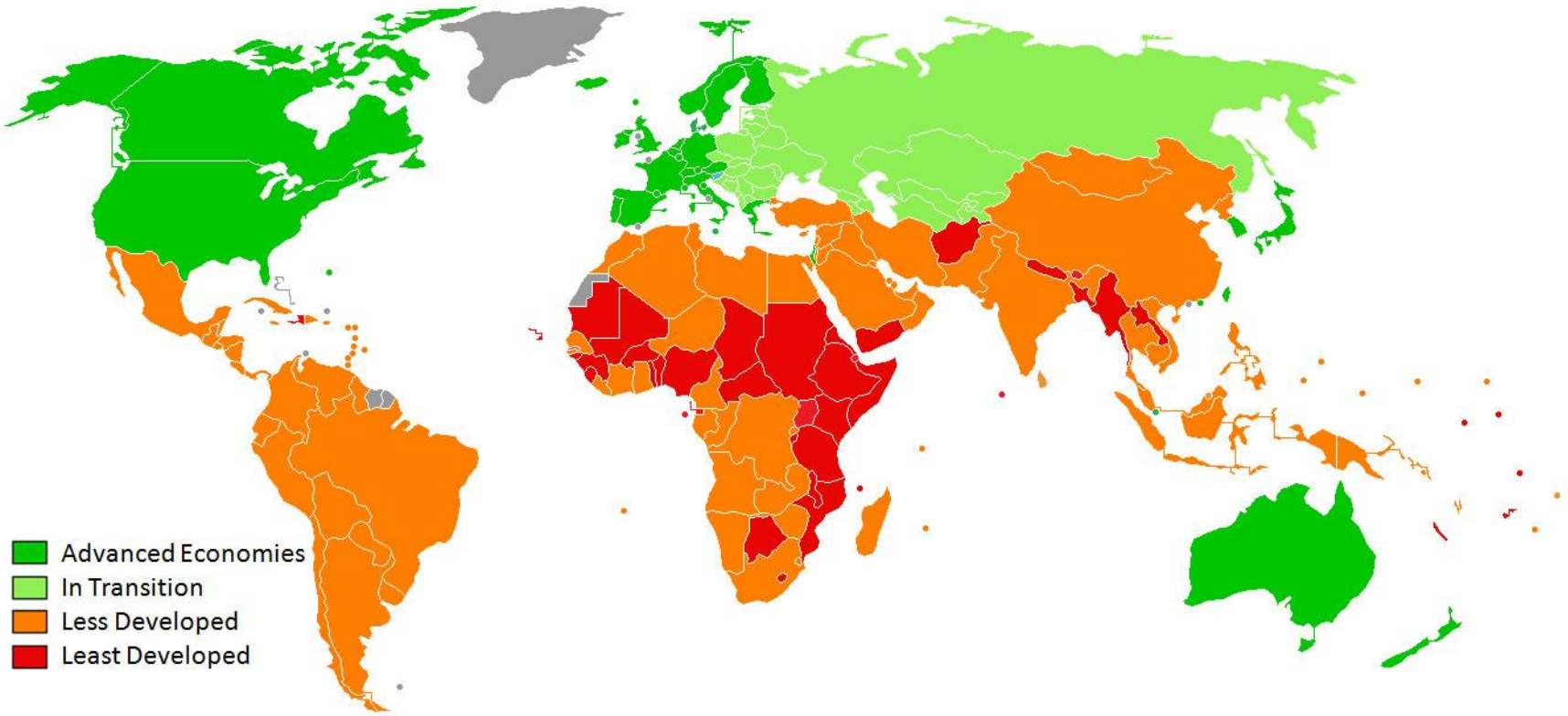
Specialist Occupational Physician

University Hospital Birmingham

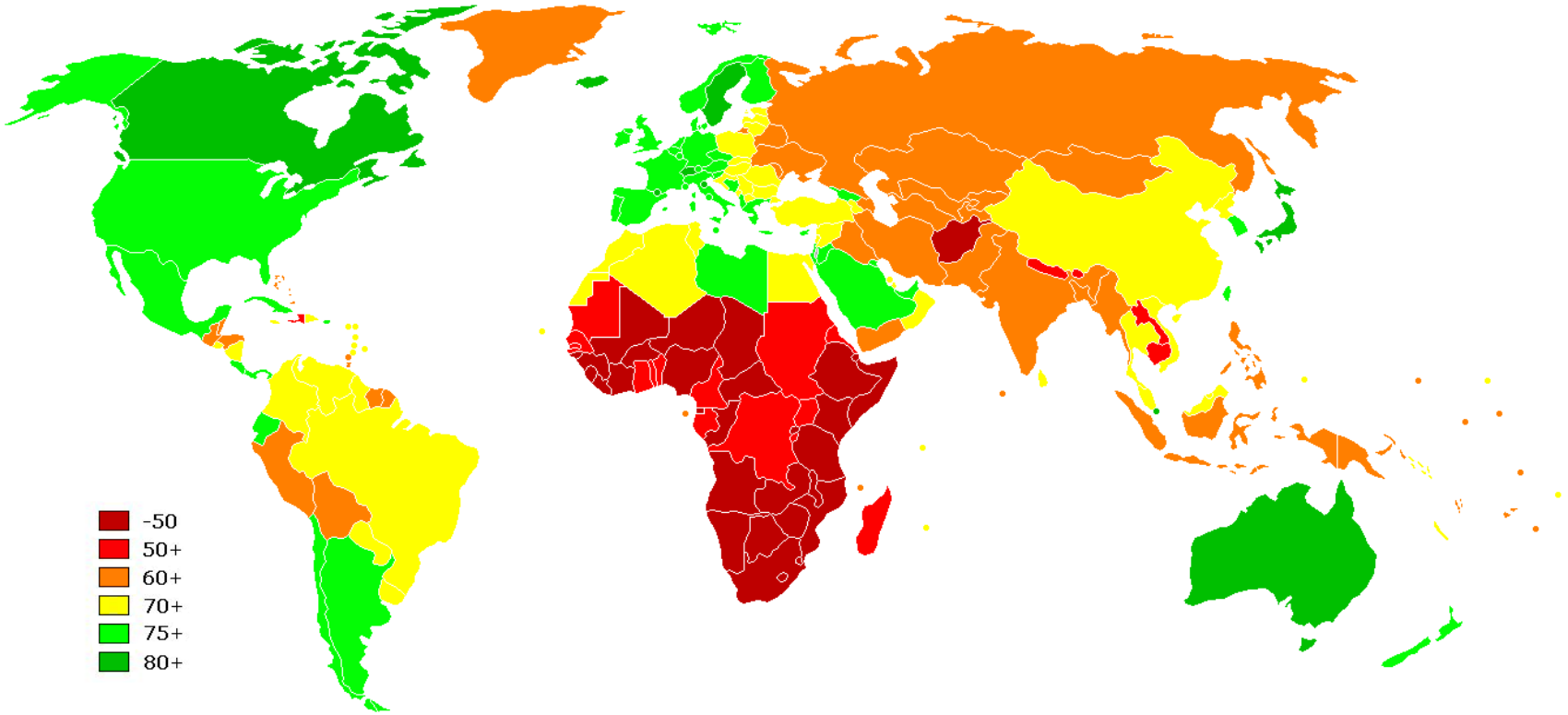
World Map April 2006



World developing nations



World life expectancy



Why the interest in BBVs?

Estimated risk of infection after percutaneous injury:

1 in 3 for HBV,

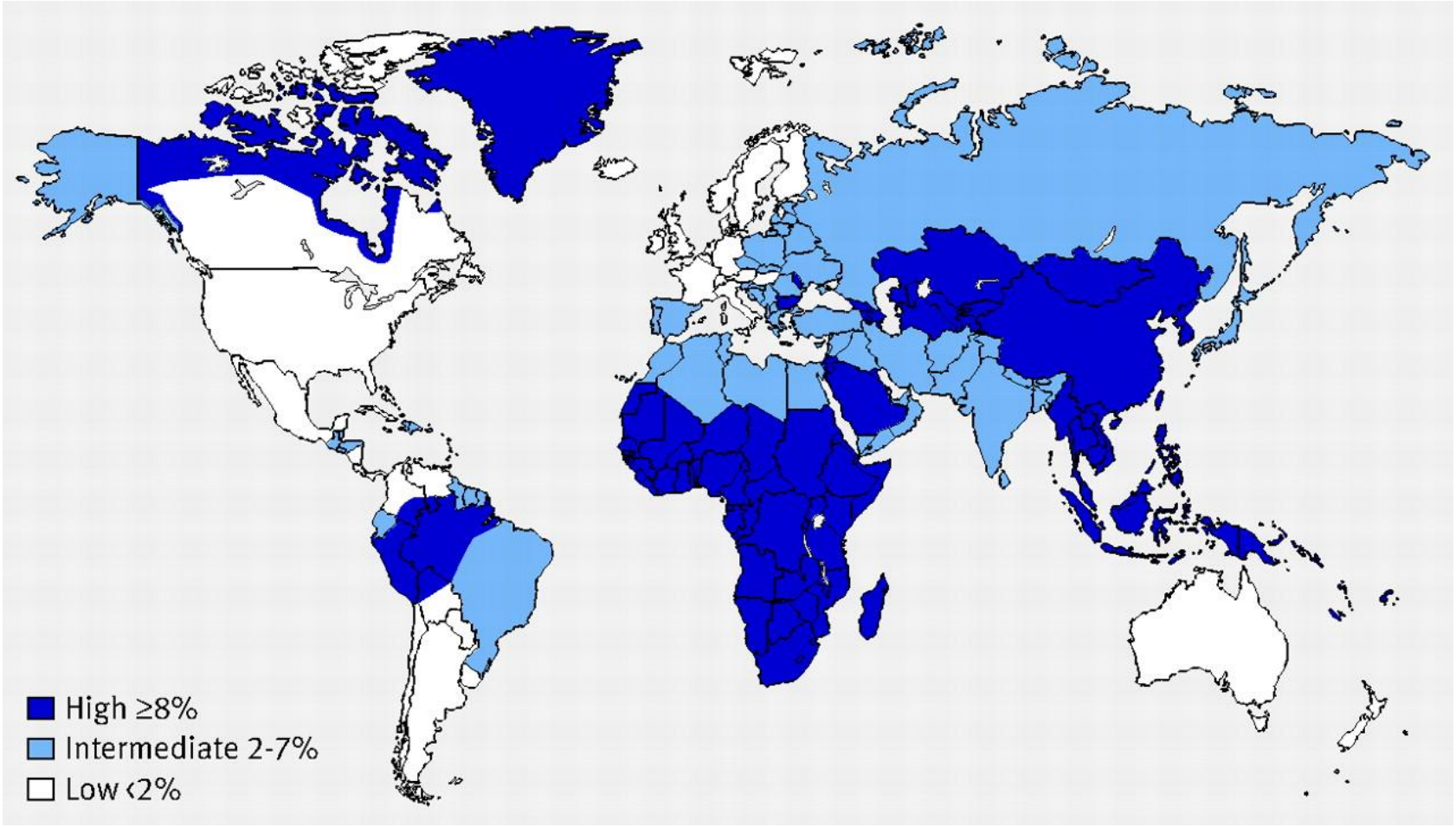
1 in 30 for HCV

1 in 300 for HIV.

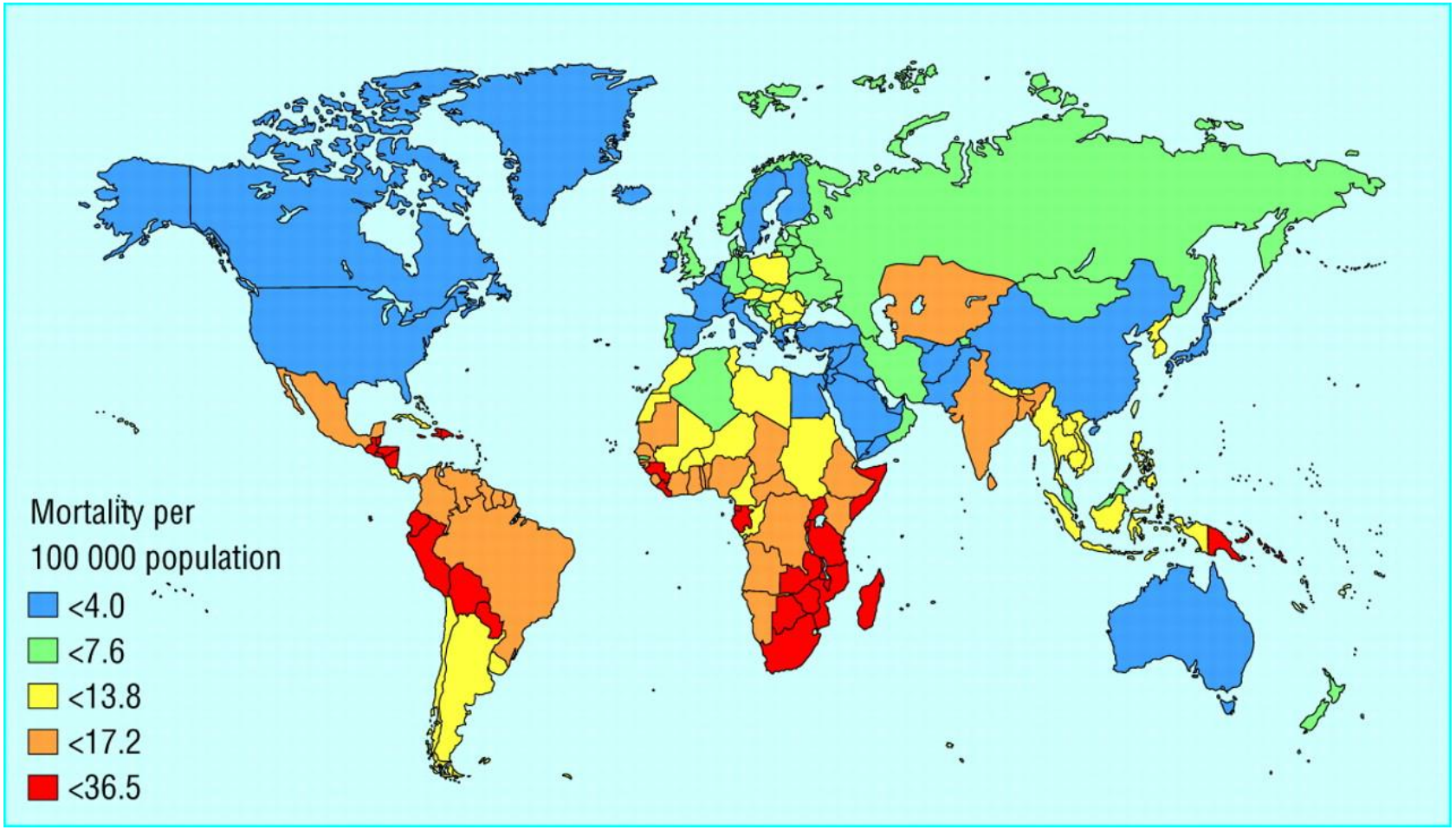
Hepatitis B “*Australia Antigen*”

First isolated by Baruch S. Blumberg in serum of an Australian Aborigine. Discovered to be part of the virus that caused “serum hepatitis” by virologist Alfred Prince in 1968.

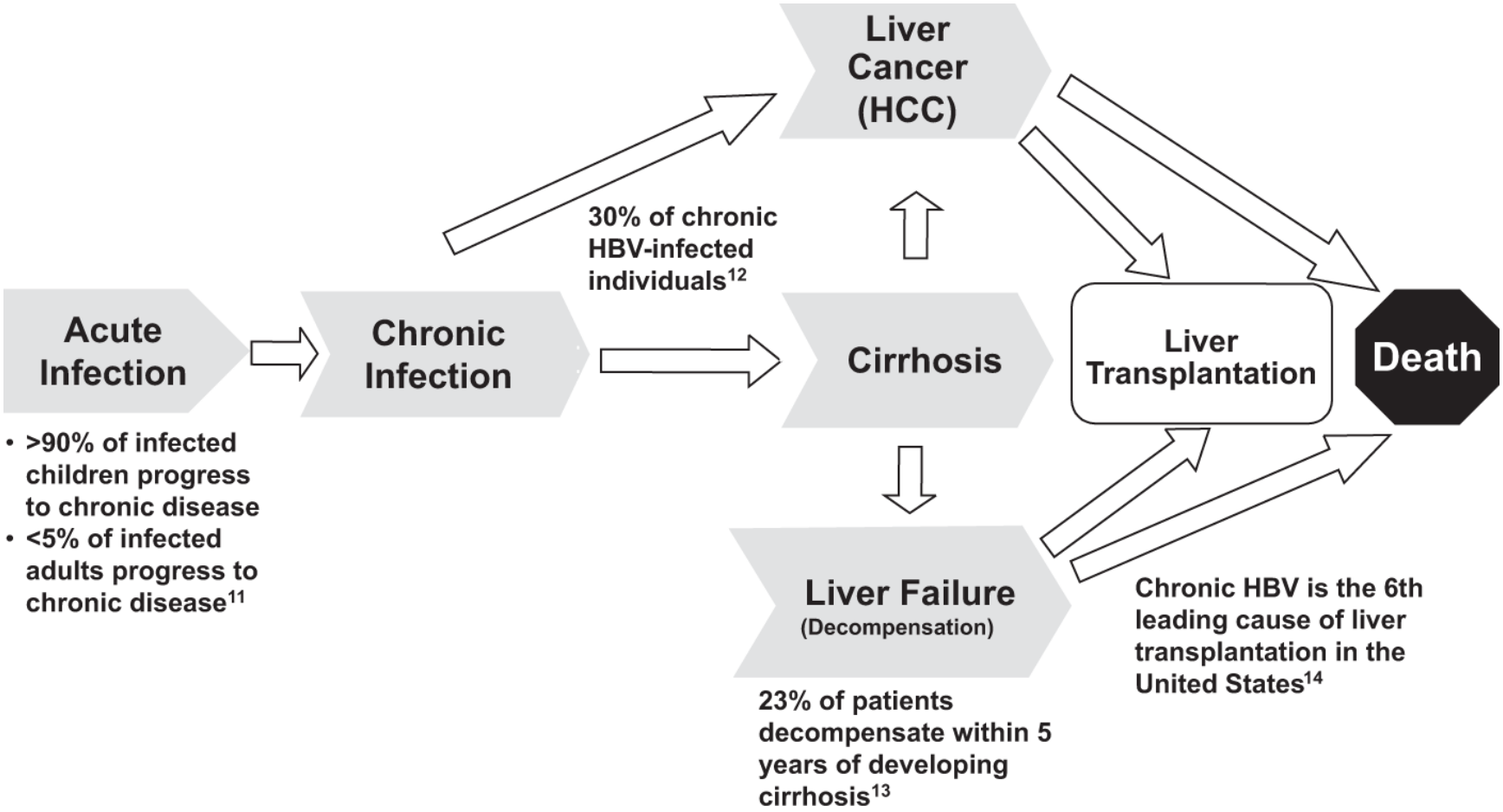
World prevalence Hepatitis B 2006



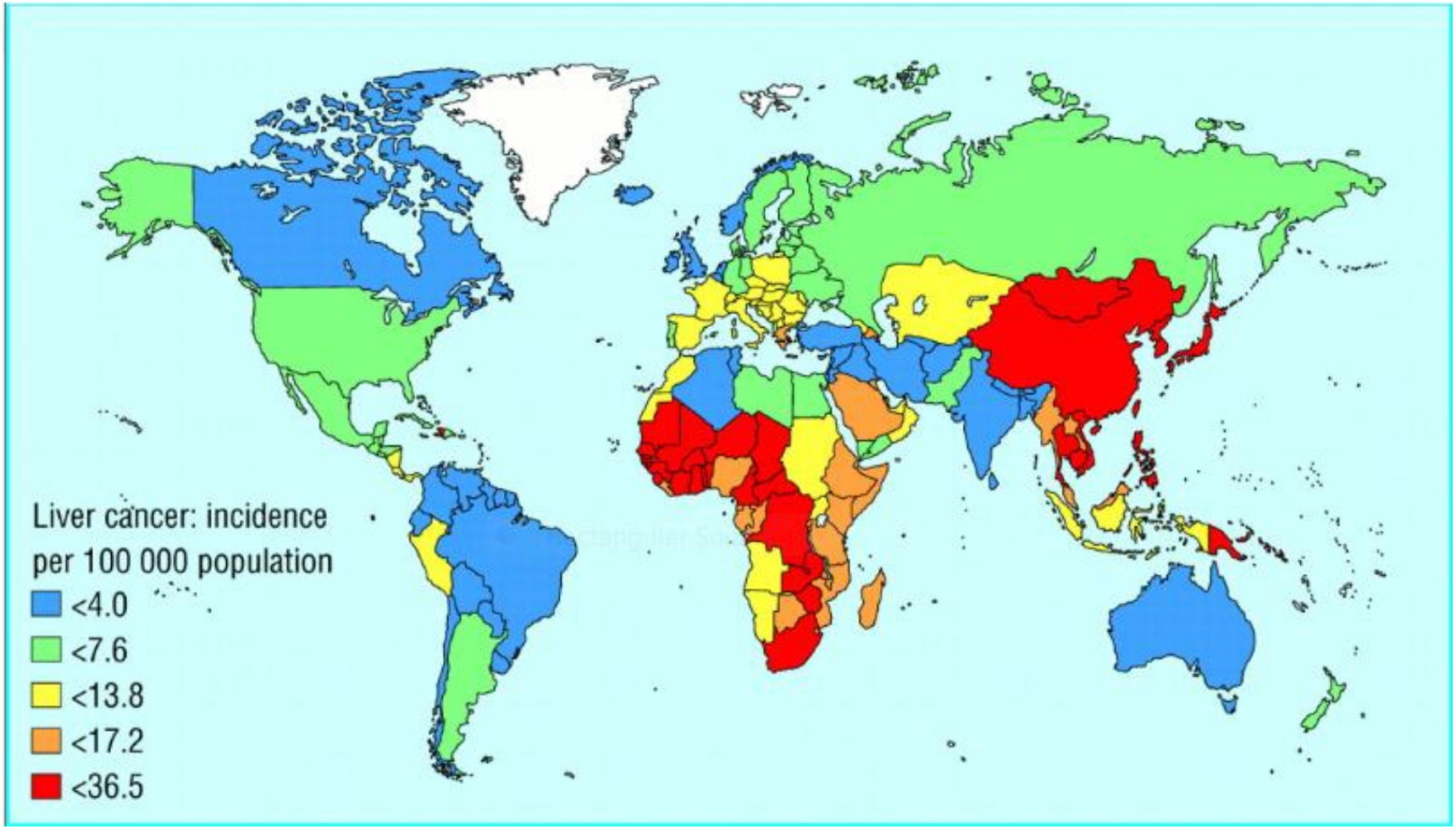
Hepatitis B mortality



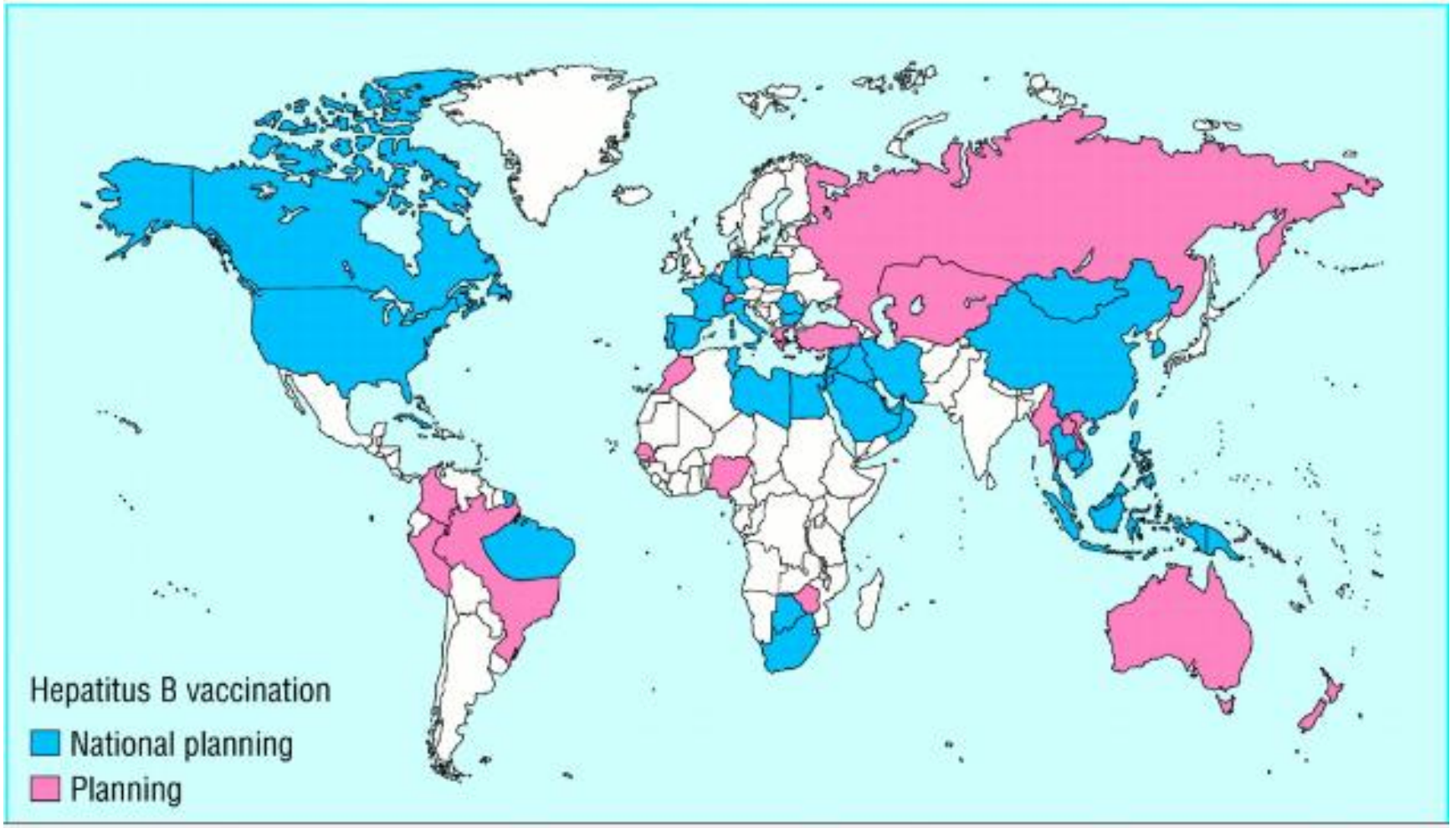
HBV morbidity & mortality



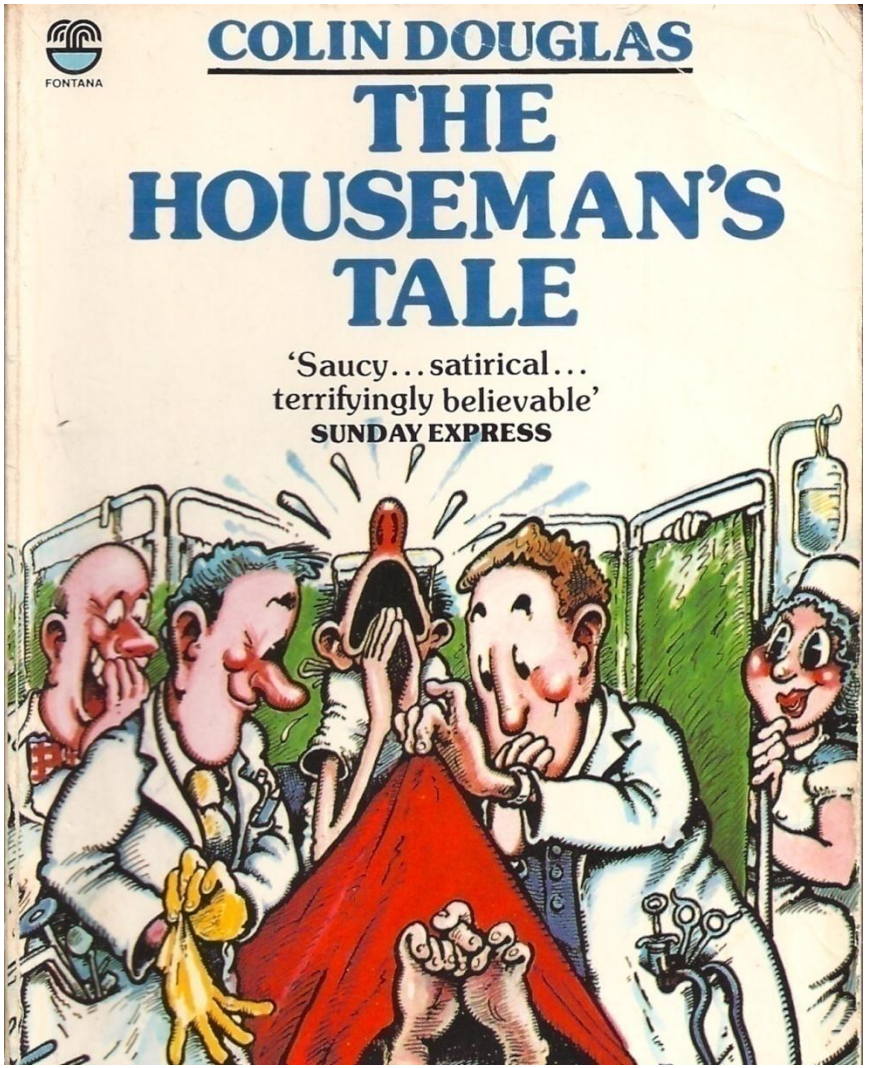
Liver cancer



Immunisation



Edinburgh Hepatitis outbreak



Transmission

Vertical: Mother to child

Horizontal: chewing gum, toothbrushes, scratches,

Medical and as illustrated

HBV

hepadnavirus,

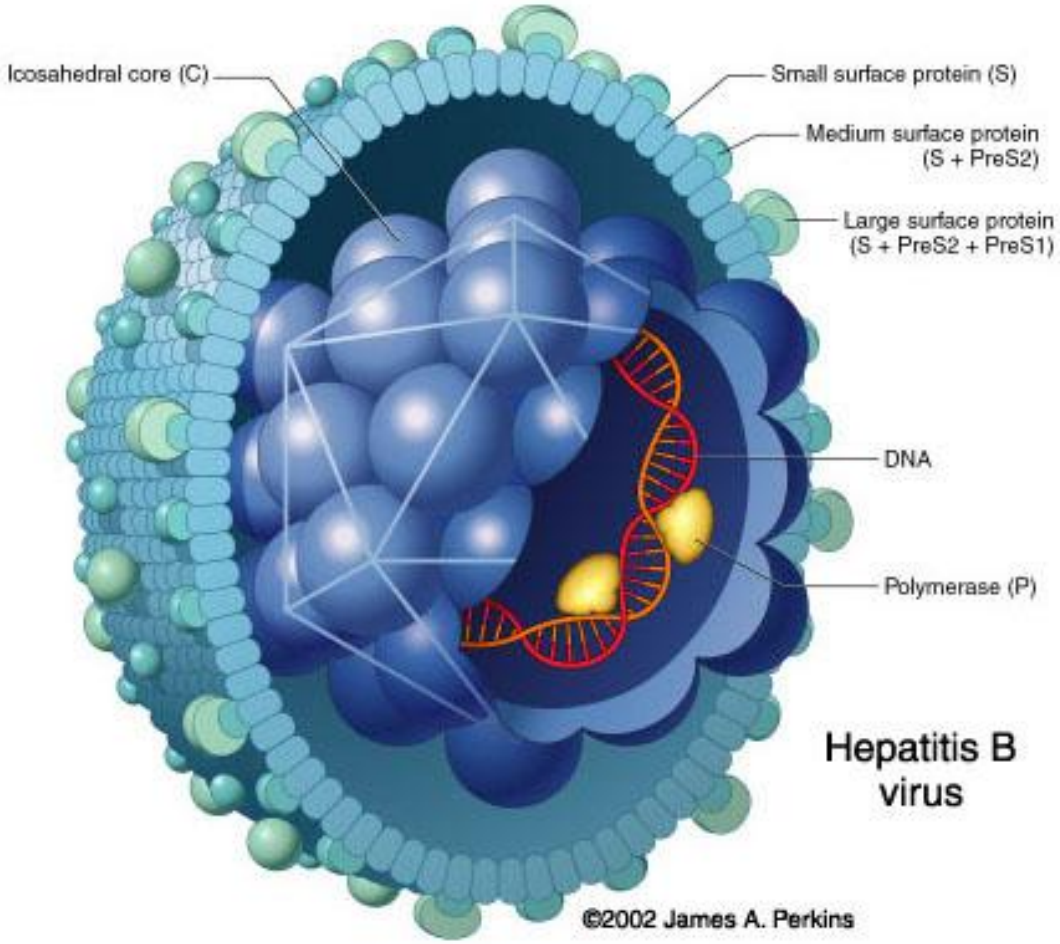
DNA

nucleocapsid core (HBcAg),

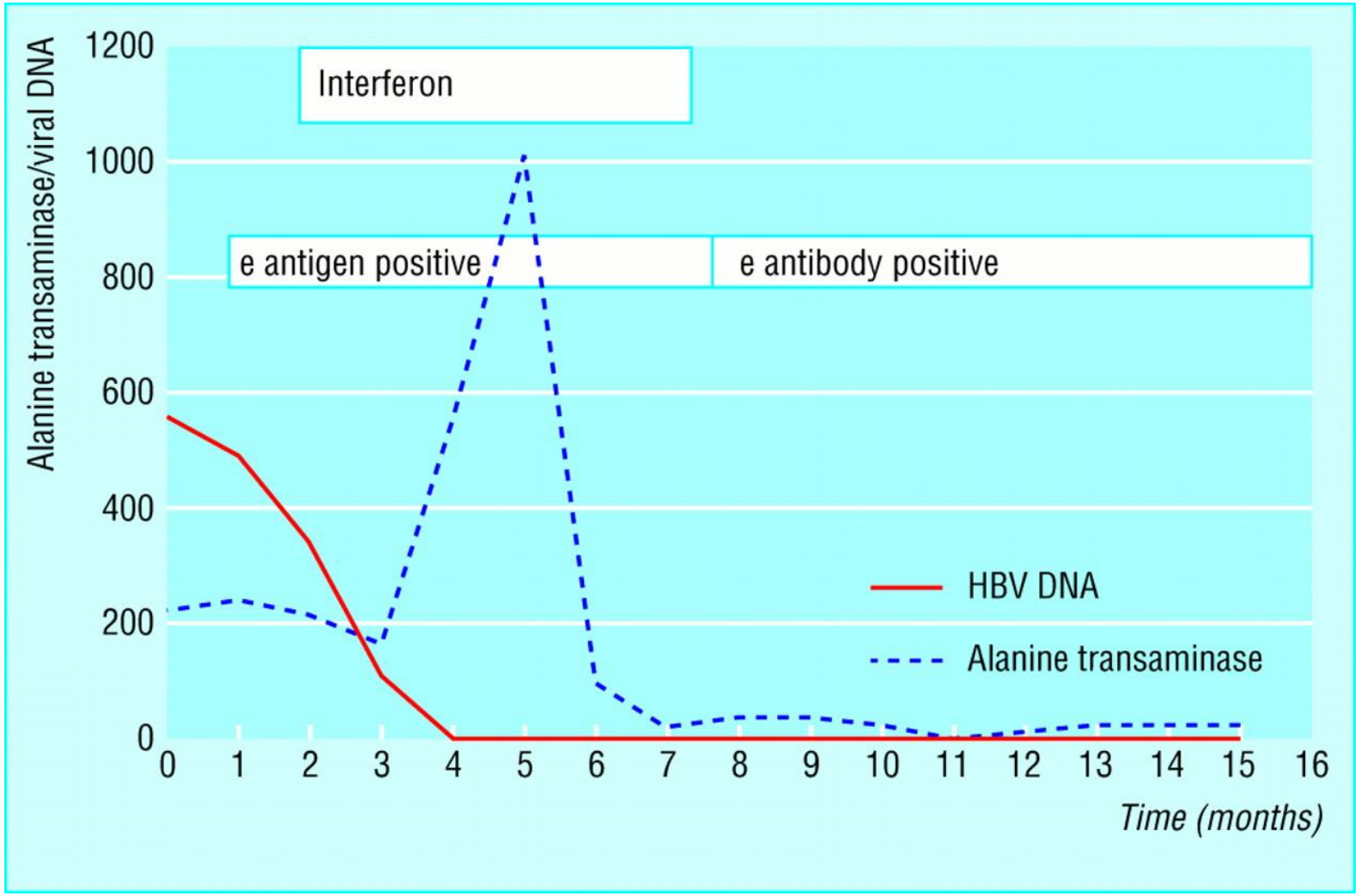
lipoprotein

envelope

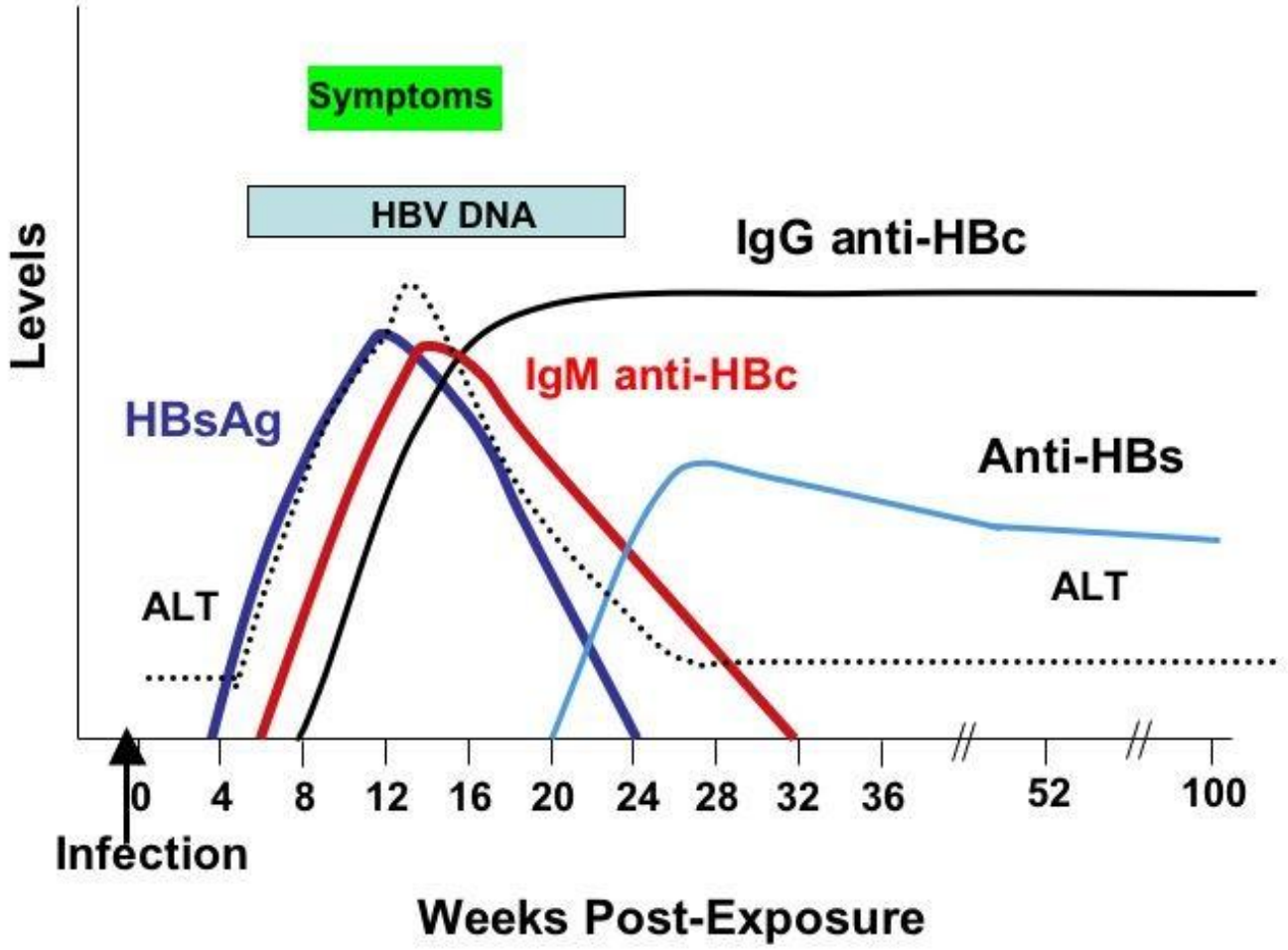
surface antigen (HBsAg).



HBV Timelines



HBV antigens & antibodies



HBV still infectious

when stored at 30°C to 32°C for at least 6 months and

when frozen at –15°C for 15 years. In blood can withstand drying on a surface for at least a week.

HBV inactivated by

sodium hypochlorite (500 mg free chlorine per litre) for 10 min,

2% aqueous glutaraldehyde at room temperature for 5 min,

heat treatment at 98°C for 2 min, formaldehyde at 18.5 g/l (5% formalin in water),

70% isopropylalcohol,

80% ethyl alcohol at 11°C for 2 min,

or combined β-propriolactone and UV irradiation

Tests	Results	Interpretation
HBsAg Anti-HBc Anti-HBc IgM Anti-HBs HBeAg Anti-HBe	*Positive* *Positive* *Positive* Negative Positive or negative Positive or negative	Acute infection; e antigen levels drop as e antibody levels rise
HBsAg Anti-HBc Anti-HBc IgM Anti-HBs HBeAg Anti-HBe	*Positive* *Positive* Negative Negative Positive or negative Positive or negative	Chronic infection; HBsAg persists more than 6 months. High risk carriers are HBeAg+, Anti HBe-

Tests	Results	Interpretation
HBsAg Anti-HBc Anti-HBs HBeAg Anti-HBe	Negative Negative Negative Negative Negative	Susceptible
HBsAg Anti-HBc Anti-HBs HBeAg Anti-HBe	Negative *Positive* Negative Negative Positive or negative	1. Recovery from acute HBV 2. Low Anti-HBs 3. False + Anti-HBc 4. HBsAg too low to detect. Chronic Infection

Tests	Results	Interpretation
HBsAg Anti-HBc Anti-HBs HBeAg Anti-HBe	Negative Negative *Positive ≥ 10mIU/ml** Negative Negative	Immune due to vaccination. Post vaccination testing 1-2 months after last dose.
HBsAg Anti-HBc Anti-HBs HBeAg Anti-HBe	Negative *Positive* *Positive* Negative Negative	Immune due to natural infection

Immunisation

Where good compliance is likely:
Zero, one and six months with five year booster if adequate response
check Abs at 1-4 months after course

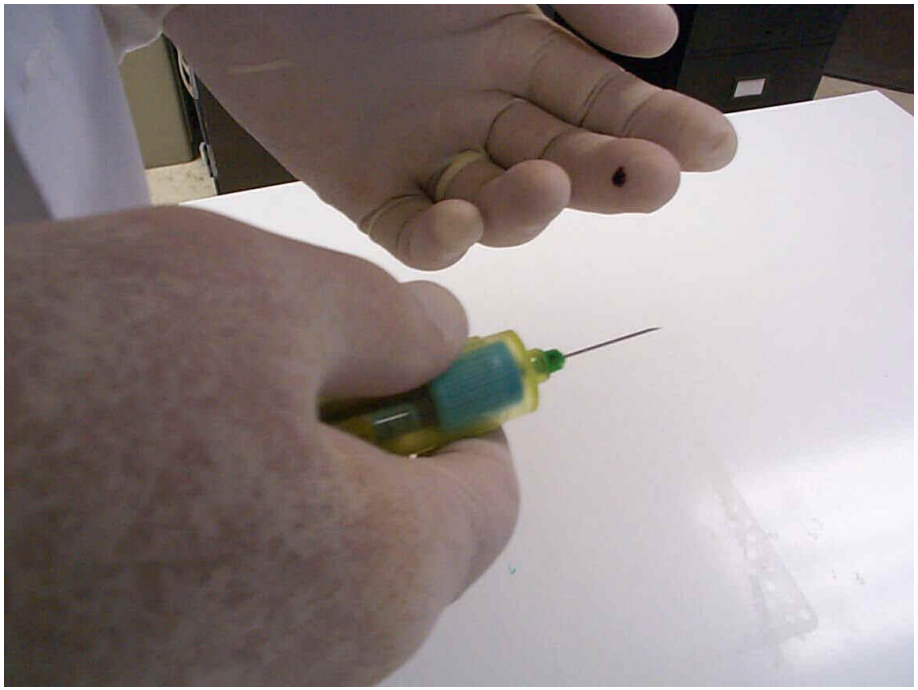
Where compliance is difficult:
Zero, one and two months (HB Vax)
Zero, seven and twenty one days (Engerix B), boost at 12 months

Post exposure treatment

HBIG (hep B immune globulin)

Immunisation if not given before

No contraindication in pregnancy or breast feeding



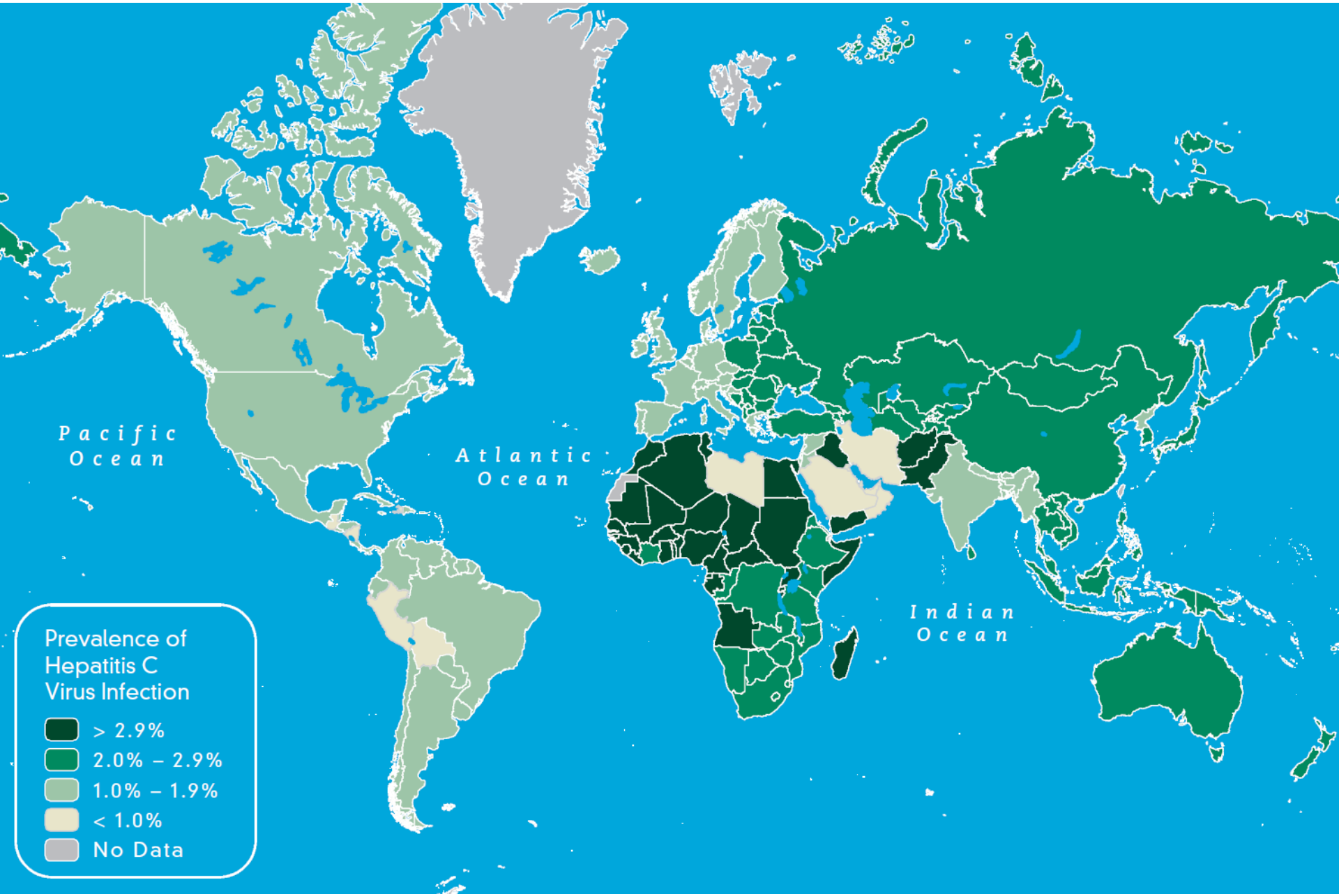
Treatment of Hepatitis B

Interferon Alpha	Daily injections	6-12 /12
Pegylated Interferon	Weekly injections	6-12 /12
Lamivudine	Daily oral	At least 12/12
Adefovir Dipivoxil	Daily oral	At least 12/12
Entecavir	Daily oral	At least 12/12
Telbivudine	Daily oral	At least 12/12
Tenofovir	Daily oral	At least 12/12

DH guidance for infected HCWs

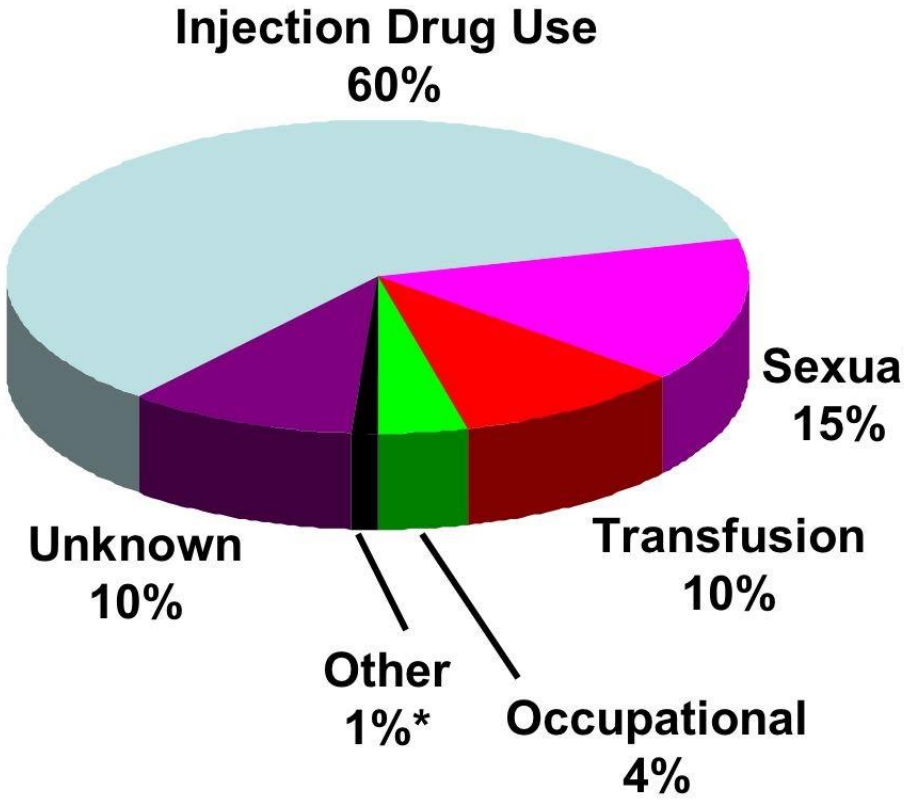
- Hepatitis B infected healthcare workers on treatment who are
- **HBeAg negative** and
- who have pre-treatment HBV DNA levels **between 1000 and 100,000 geq/ml** could be allowed to perform exposure prone procedures on oral antiviral therapy, if their viral load is suppressed to
- **below 1000 geq/ml**

Hepatitis C

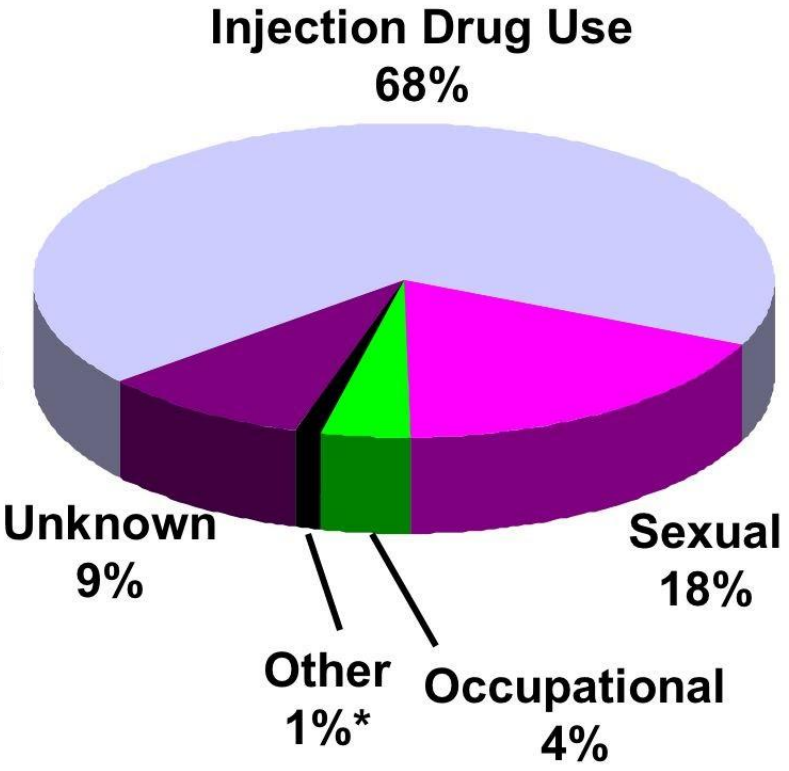

Pacific Ocean
Atlantic Ocean
Indian Ocean
Prevalence of Hepatitis C Virus Infection
> 2.9%
2.0% – 2.9%
1.0% – 1.9%
< 1.0%
No Data

Egypt iatrogenic transmission

HCV Infection Acquired <1990s



HCV Infection Acquired >1995



* Other includes mother-to-infant infections and infections related to medical care

HCV

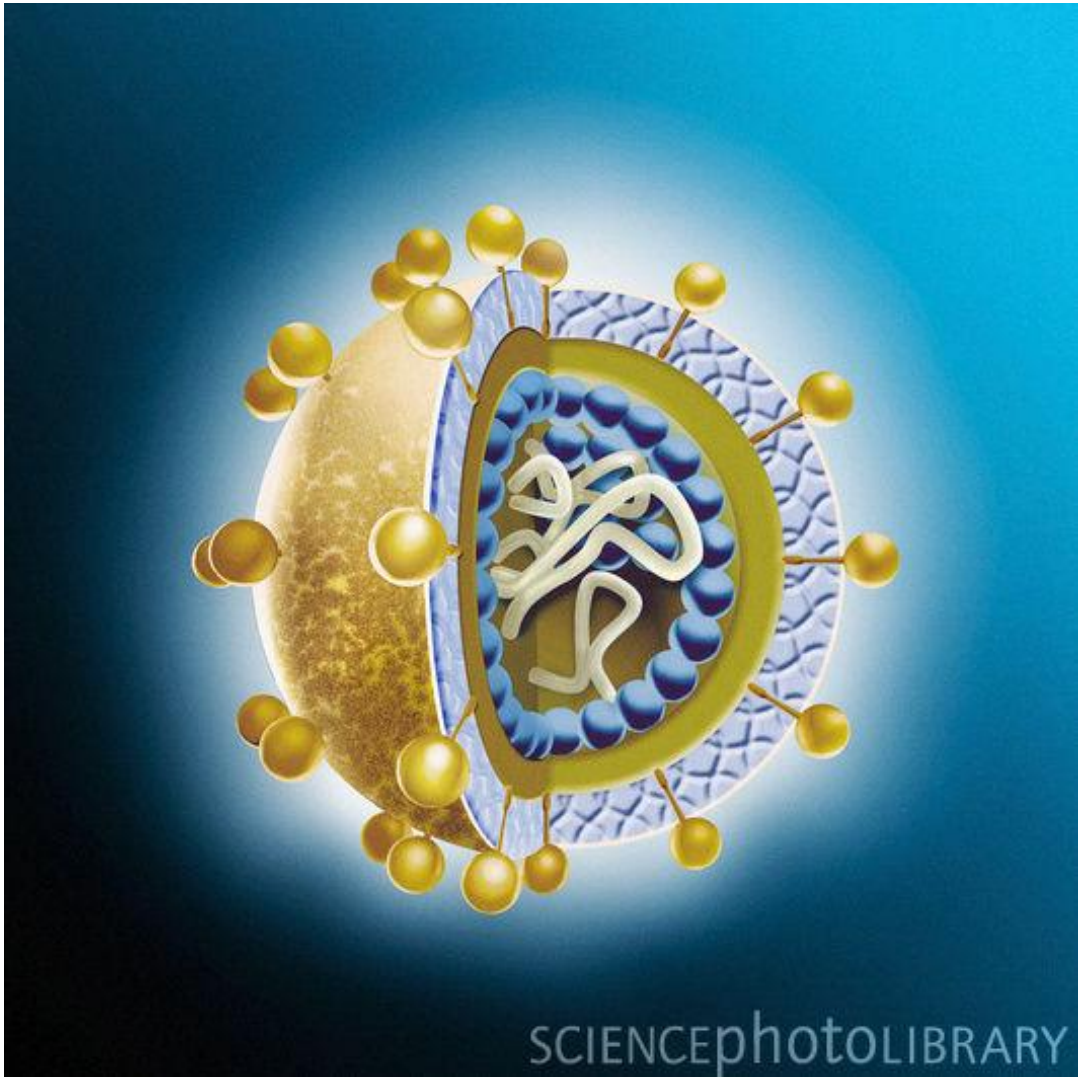
Flavivirus

RNA core

Protein capsid

Glycoprotein envelope

Surface proteins help adherence



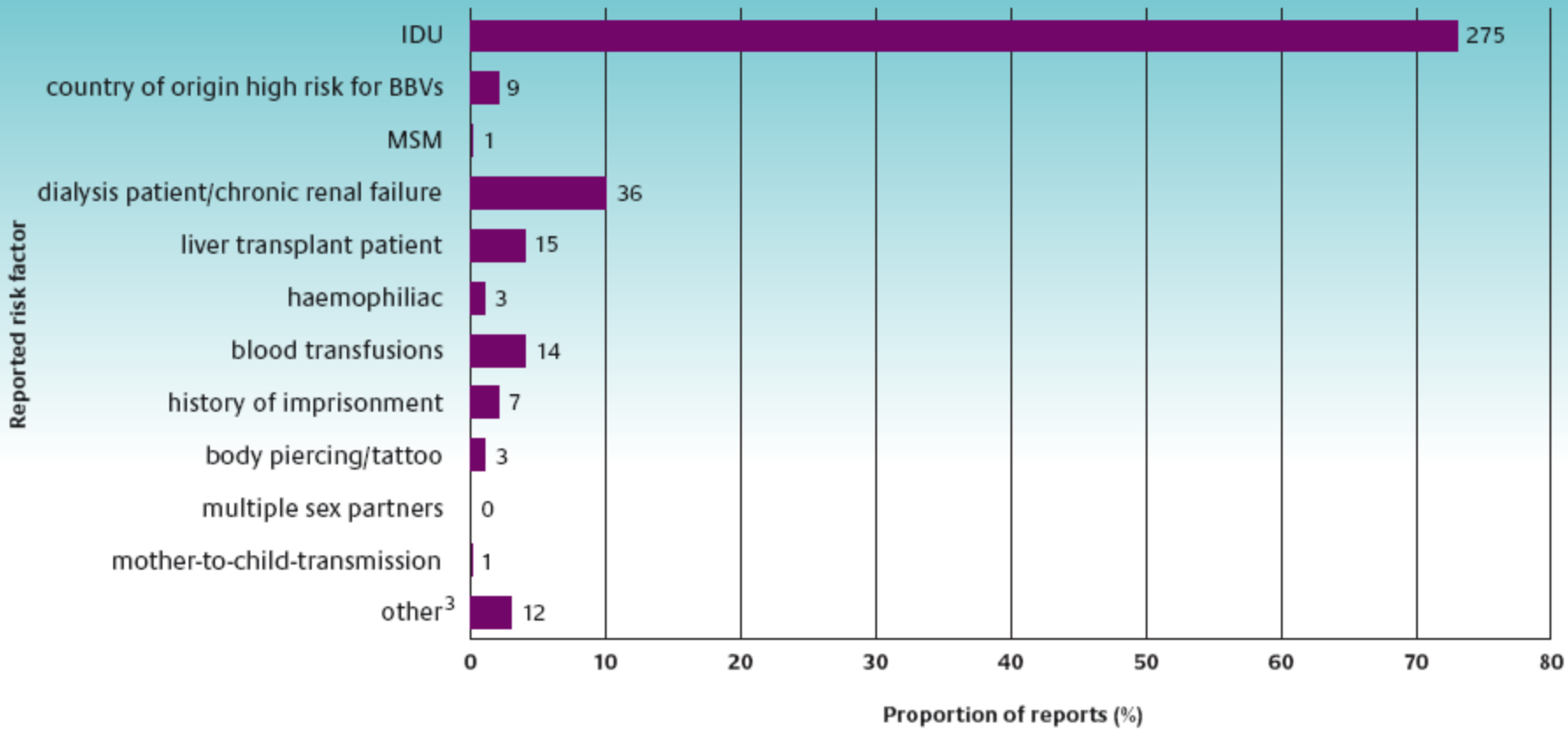
Tests Used in the Diagnosis of Hepatitis C

Anti-HCV EIA*	HCV RNA**	Interpretation
Negative	Negative	Not infected
Positive	Negative	Resolved HCV infection
Negative	**Positive**	Early acute HCV infection or chronic HCV infection in immune compromised person
Positive	**Positive**	Acute or chronic HCV infection

* EIA = enzyme-linked immunoassay is the type of antibody test used to screen for hepatitis C.

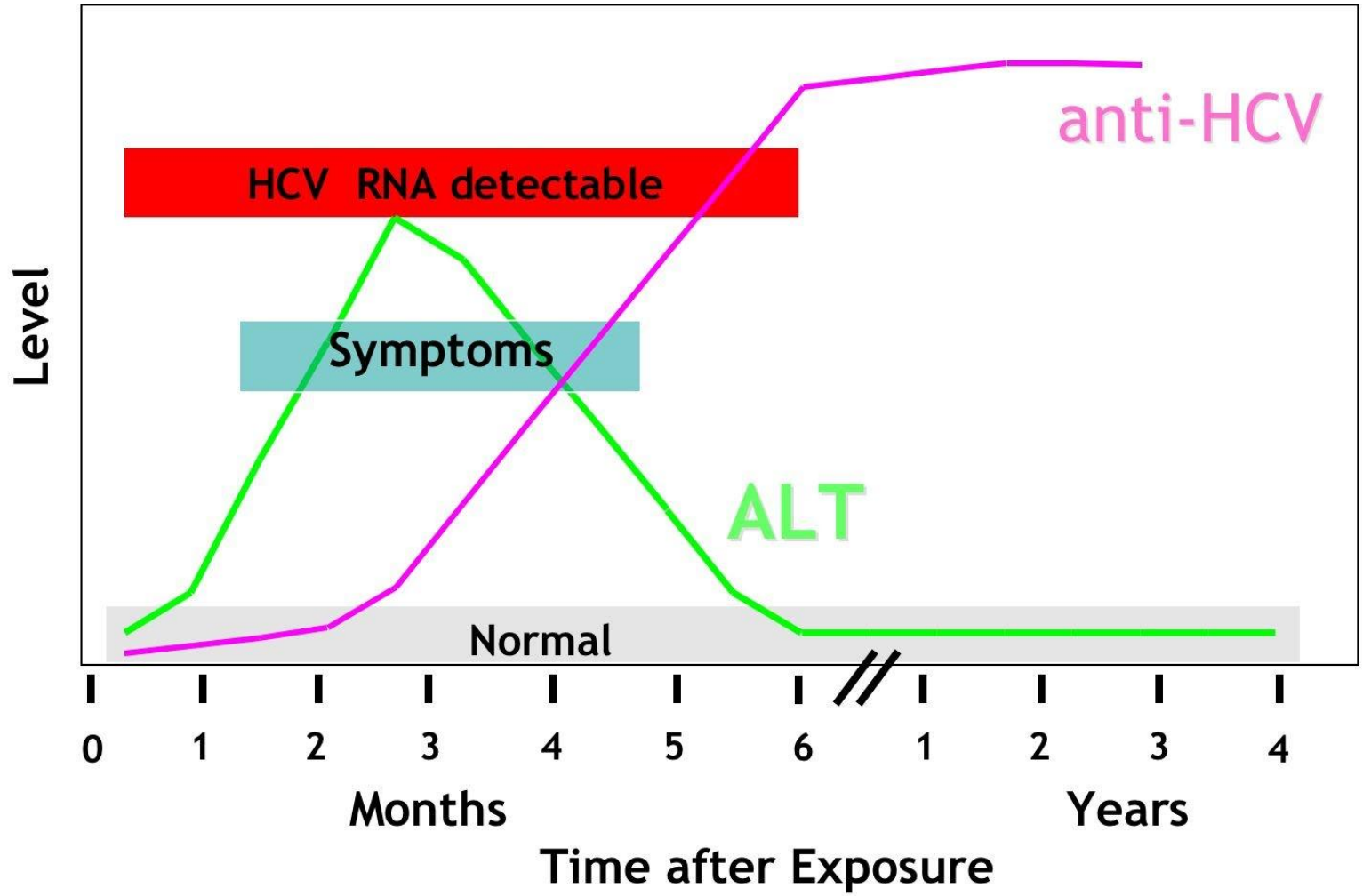
** There are many different types of tests available to measure HCV RNA. When used to make or exclude a diagnosis of hepatitis C, the assay must have a lower limit of detection of 50 IU/ml or less of HCV RNA.

Figure 11a: Reported risk factors for infection, HCV positive patients[1], 2005-2007[2]



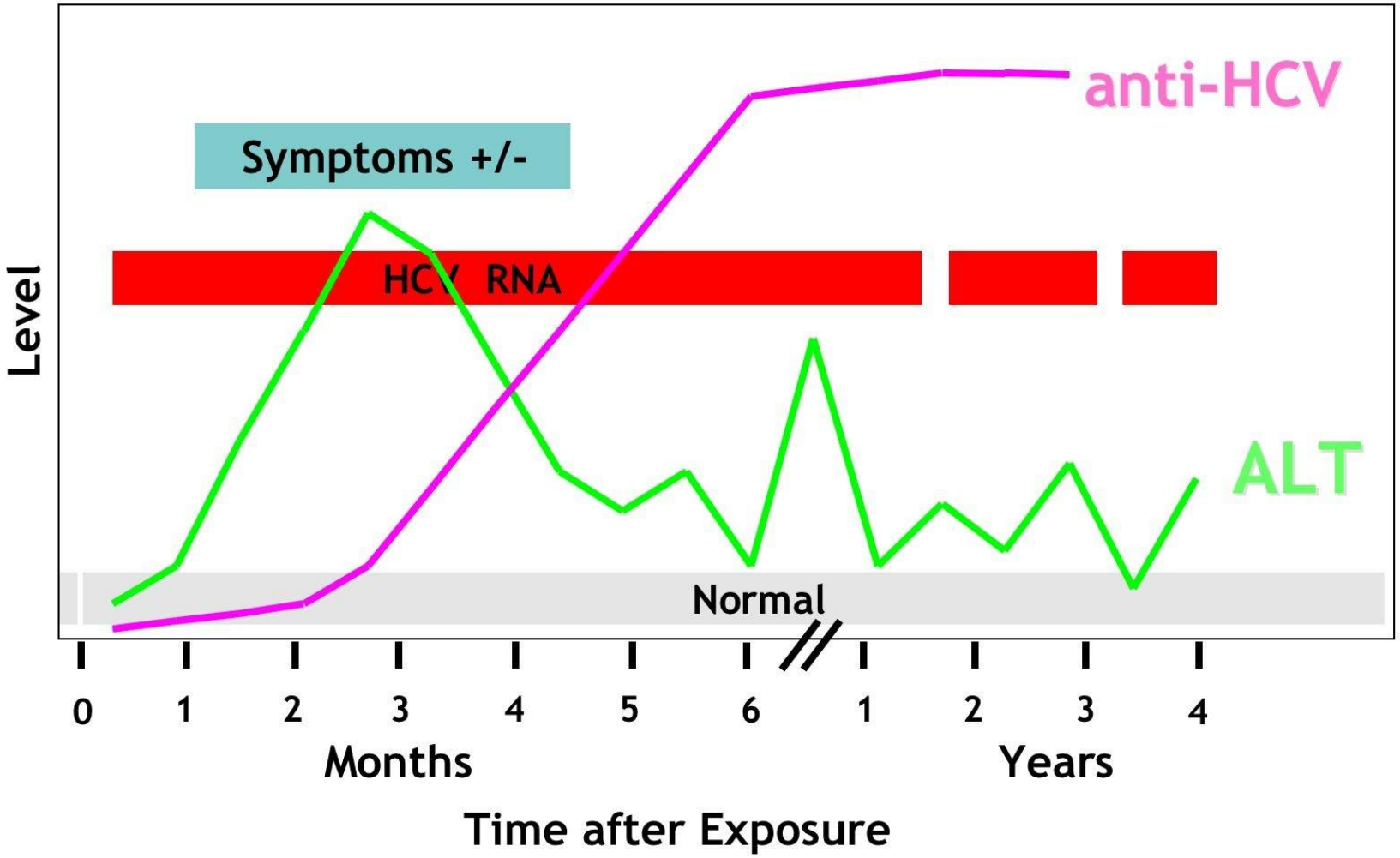
Proportion (%) = the number of reports received as a proportion of reports by HCV incidents for that time period.
[1] These are single infections only and do not include reports of dual/triple-infected source patient.
[2] Date of incident up to 31st December 2007. The number may rise as further reports are received.
[3] Other includes: liver condition; sickle cell anaemia ?transfusions; long-term residential care; occupational exposure only risk factor.
A small number of source patients reported more than one risk factor; these additional risks have not been included in the figure.

Acute HCV Infection with Recovery



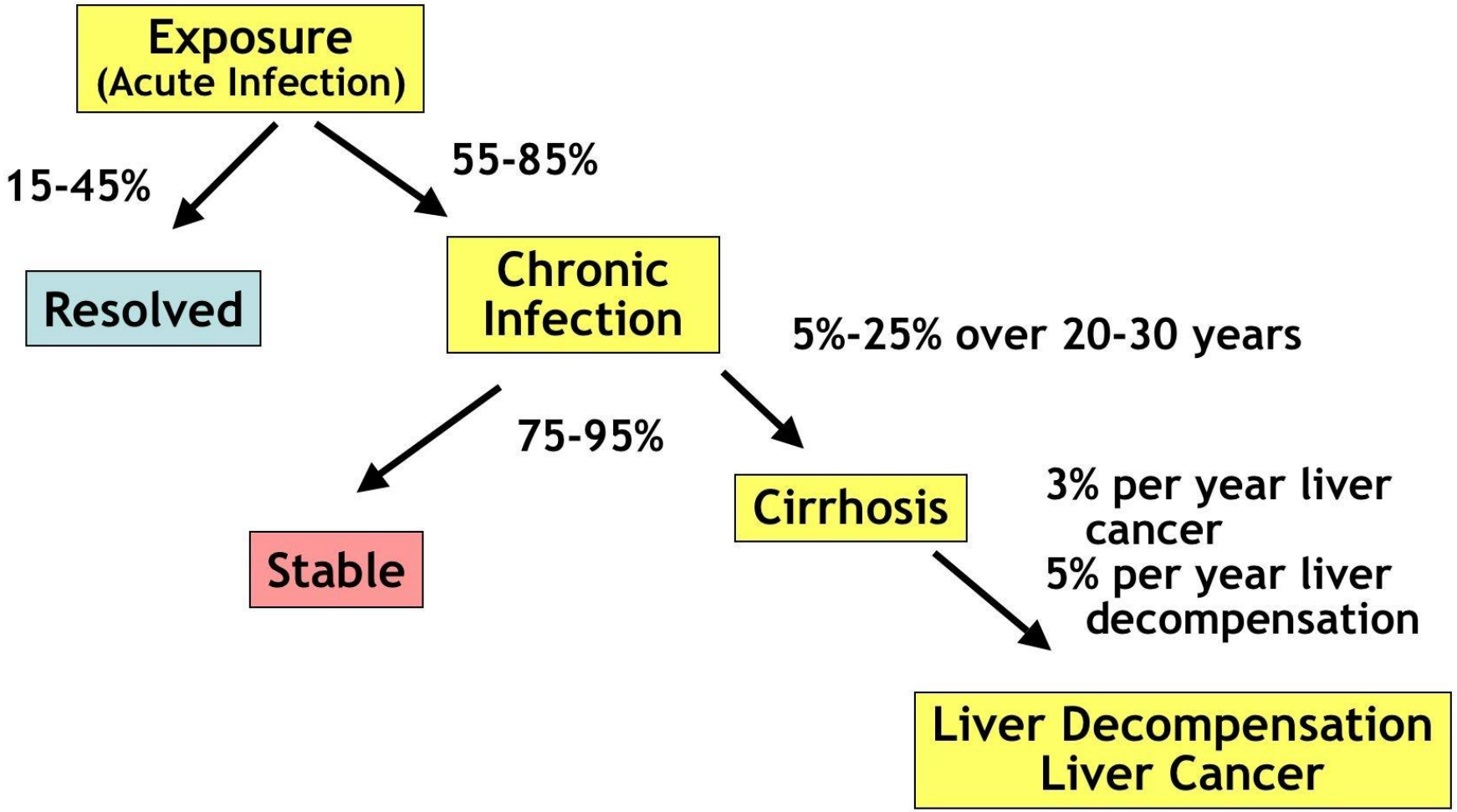
Source: Adapted from MMWR 1998; 47(No. RR19)

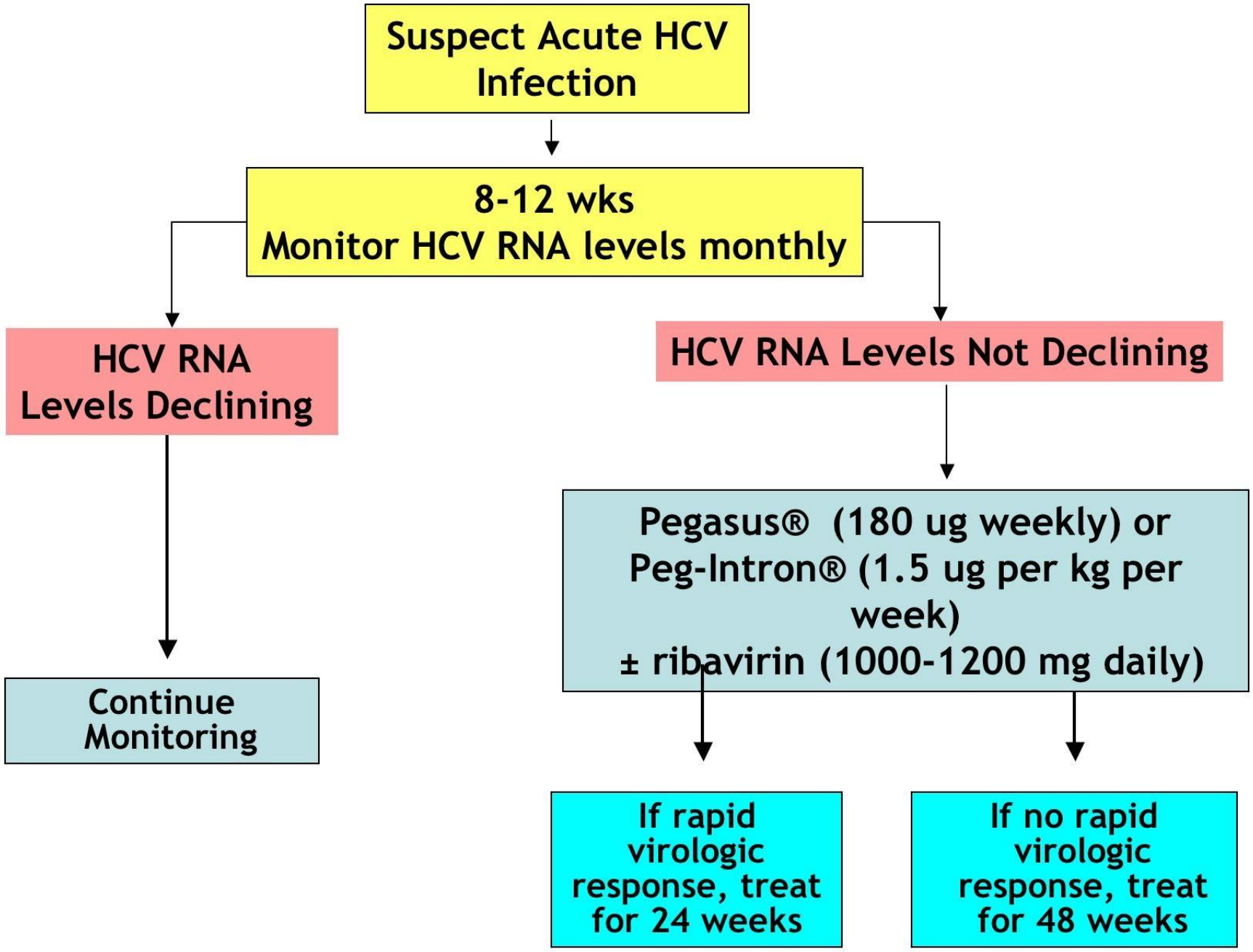
Acute HCV Infection Evolving to Chronic Infection



Source: Adapted from MMWR 1998; 47(No. RR19)

Risk of Complications in Patients with Hepatitis C Infection




Suspect Acute HCV Infection
8-12 wks
Monitor HCV RNA levels monthly
HCV RNA Levels Declining
HCV RNA Levels Not Declining
Continue Monitoring
Pegasus® (180 ug weekly) or
Peg-Intron® (1.5 ug per kg per week)
± ribavirin (1000-1200 mg daily)
If rapid virologic response, treat for 24 weeks
If no rapid virologic response, treat for 48 weeks

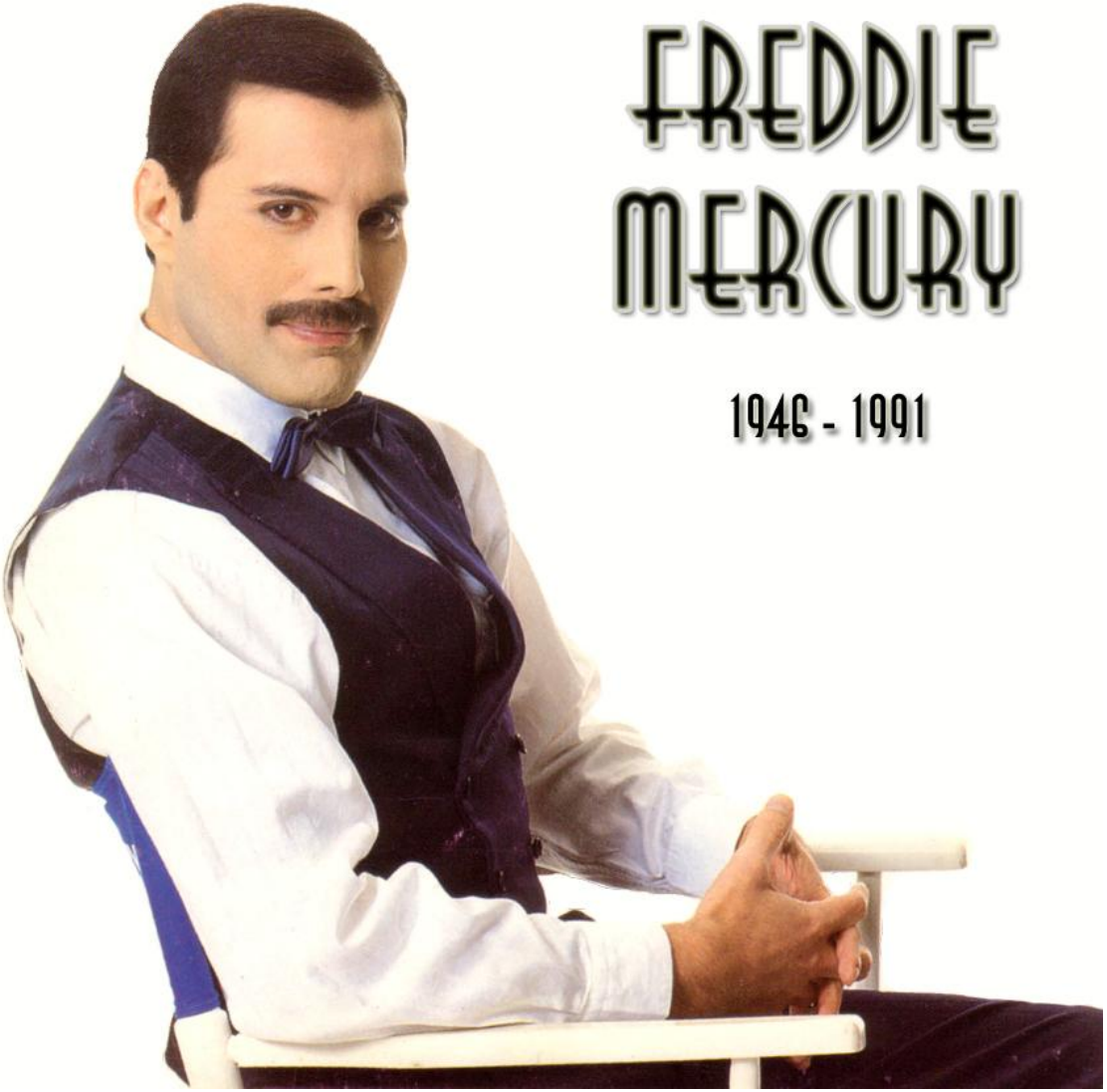
NICE guidelines Hep C treatment

- peginterferon alfa and ribavirin
- HCV of genotype 2 +/3 treated for 24 weeks
- HCV of genotype 1, 4, 5 or 6, initial treatment 12 weeks
- If at 12 weeks the viral load has dropped to 1%, carry on for further 12 weeks
- If not reduced by that amount, stop treating
- Infection with one or more of genotypes 1, 4, 5, or 6 should be treated as for genotype 1.

Why treat?

- Aim to reduce viral load to undetectable 6 months after cessation of treatment
- Maternal transmission rate 6% untreated
- 85% of exposed people will not clear the virus
- 1/3 develop cirrhosis within the first 20 years, 1/3 not before 50 years
- High risk of hepatocellular carcinoma

HIV



Live and let die

Haemophiliacs

Heroin Addicts

Homosexual men

Haitians

Hookers


KEEP
CALM
I'M A
HIGH
FUNCTIONING
SOCIOPATH
DO YOUR RESEARCH

Epidemiology goes to Hollywood

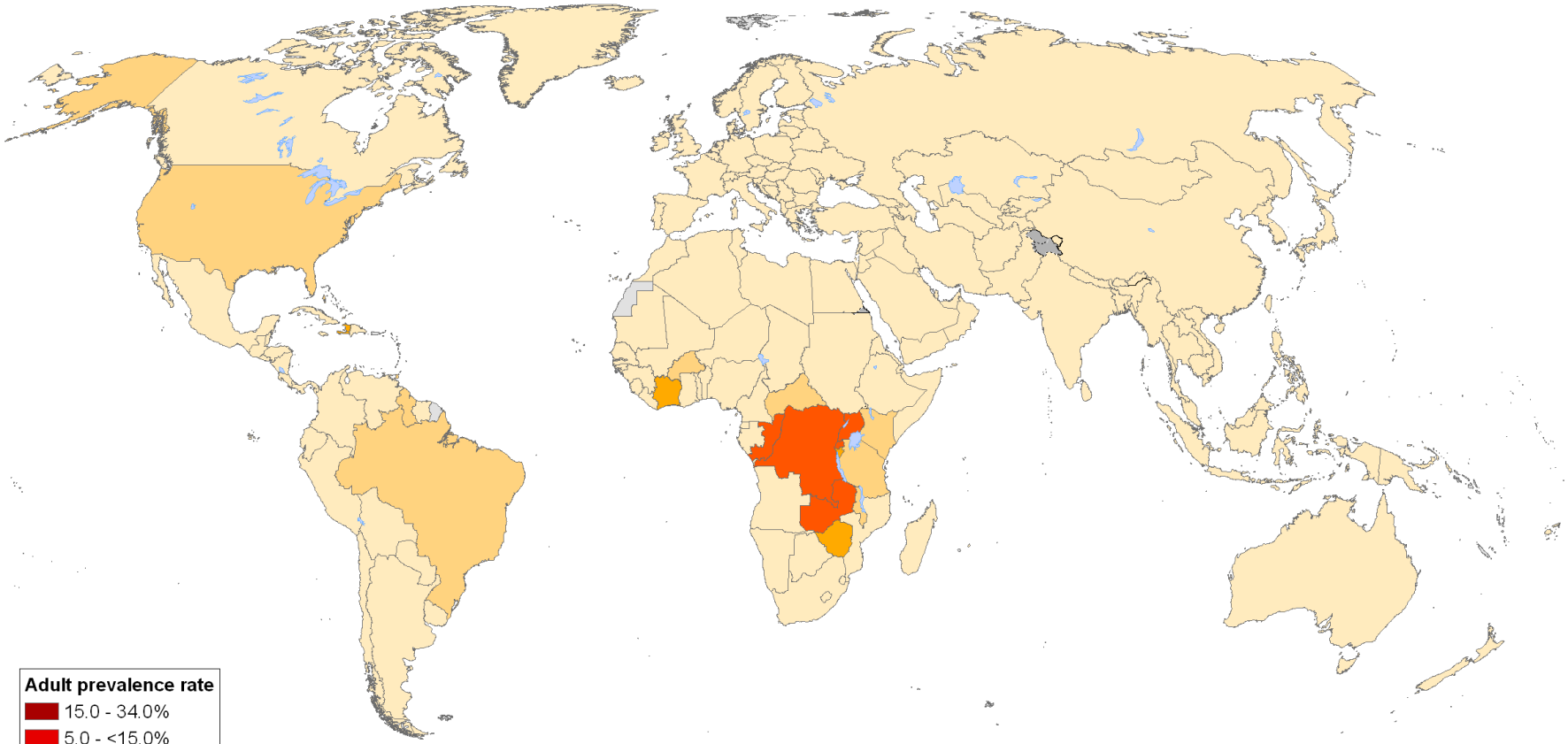
Contact tracing

Replacing “GRID” with “HIV”

Written by Randy Shilts who died from AIDS in 1994

HIV 1985

Adult (15-49) HIV prevalence rate (%), 1985

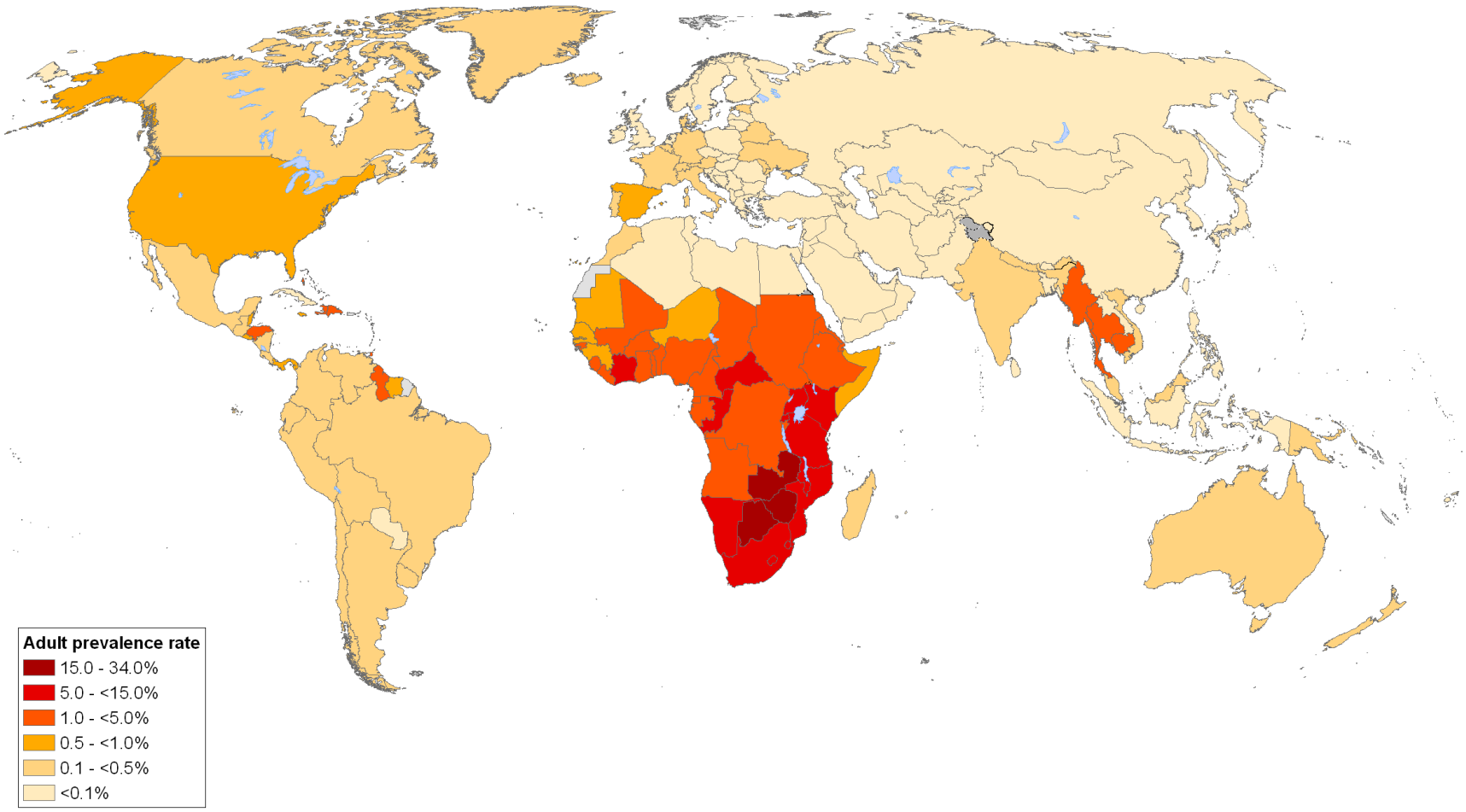


World Health Organization

Data Source: UNAIDS
Map Production:
Public Health Mapping and GIS, Communicable Diseases (CDS)
World Health Organization

HIV 1995

Adult (15-49) HIV prevalence rate (%), 1995



World Health Organization

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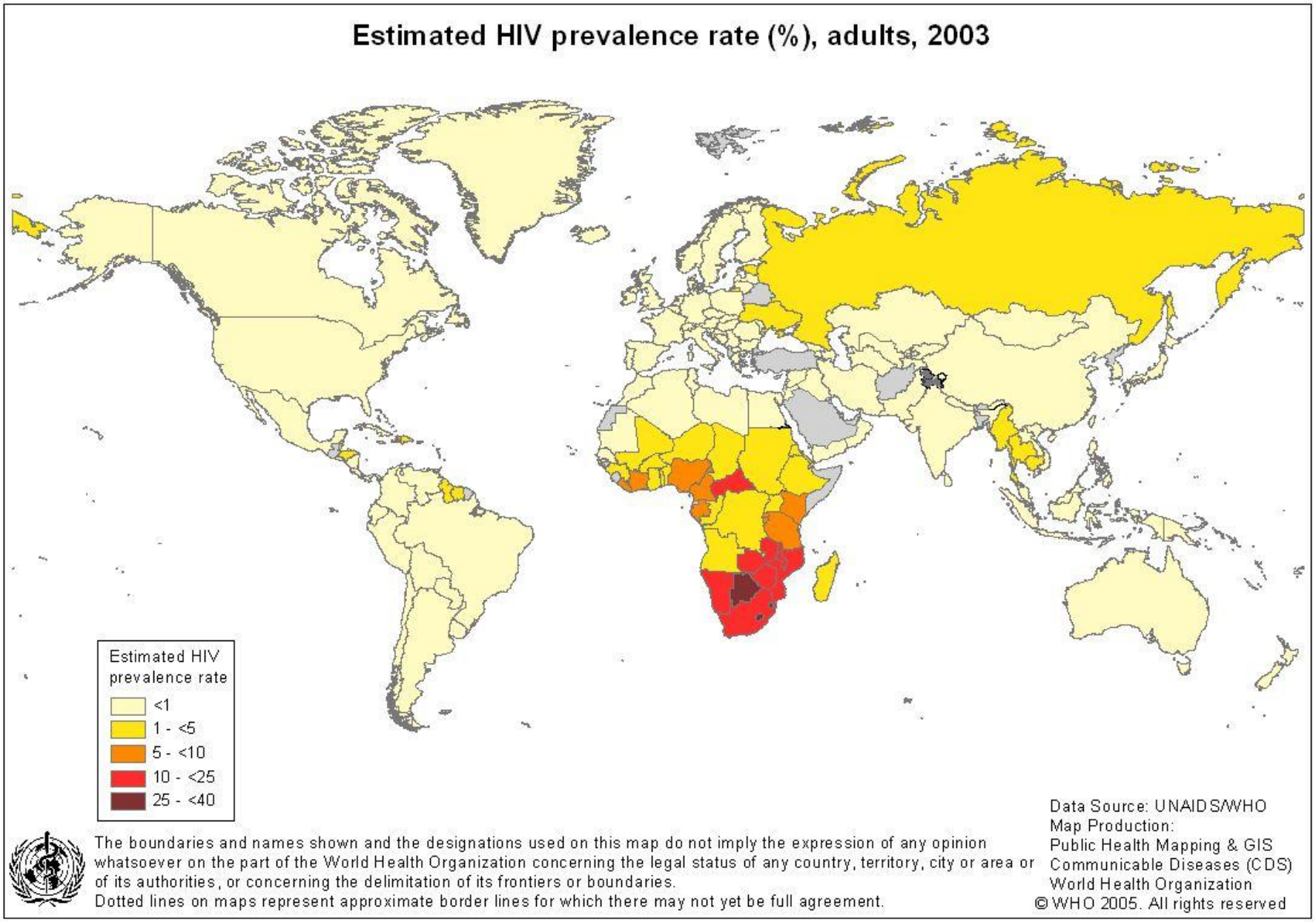
Data Source: UNAIDS
Map Production:
Public Health Mapping and GIS, Communicable Diseases (CDS)
World Health Organization

HIV 2003


Estimated HIV prevalence rate (%), adults, 2003
Estimated HIV prevalence rate
<1
1 - <5
5 - <10
10 - <25
25 - <40
The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.
Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.
Data Source: UNAIDS/WHO
Map Production:
Public Health Mapping & GIS
Communicable Diseases (CDS)
World Health Organization
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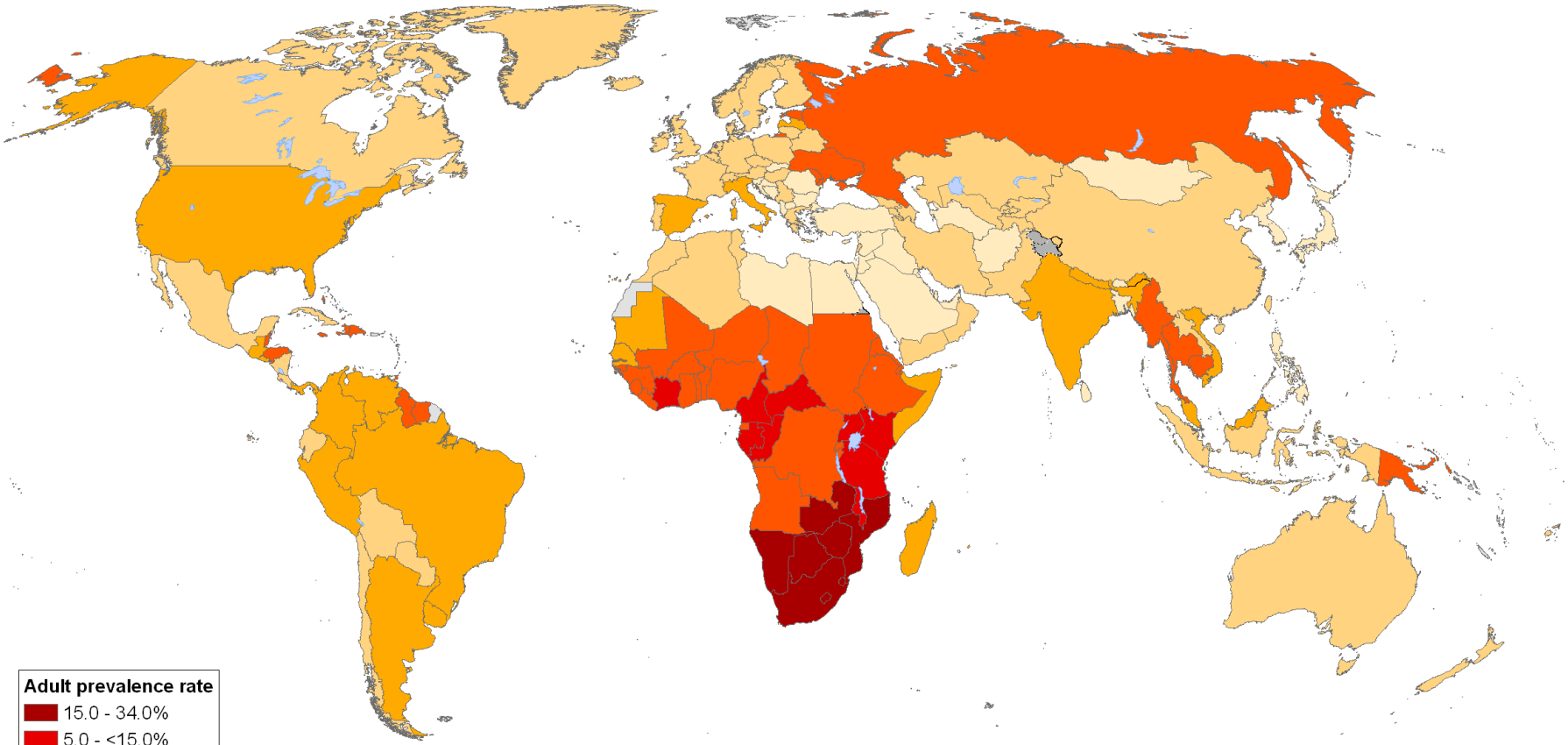
HIV 2005

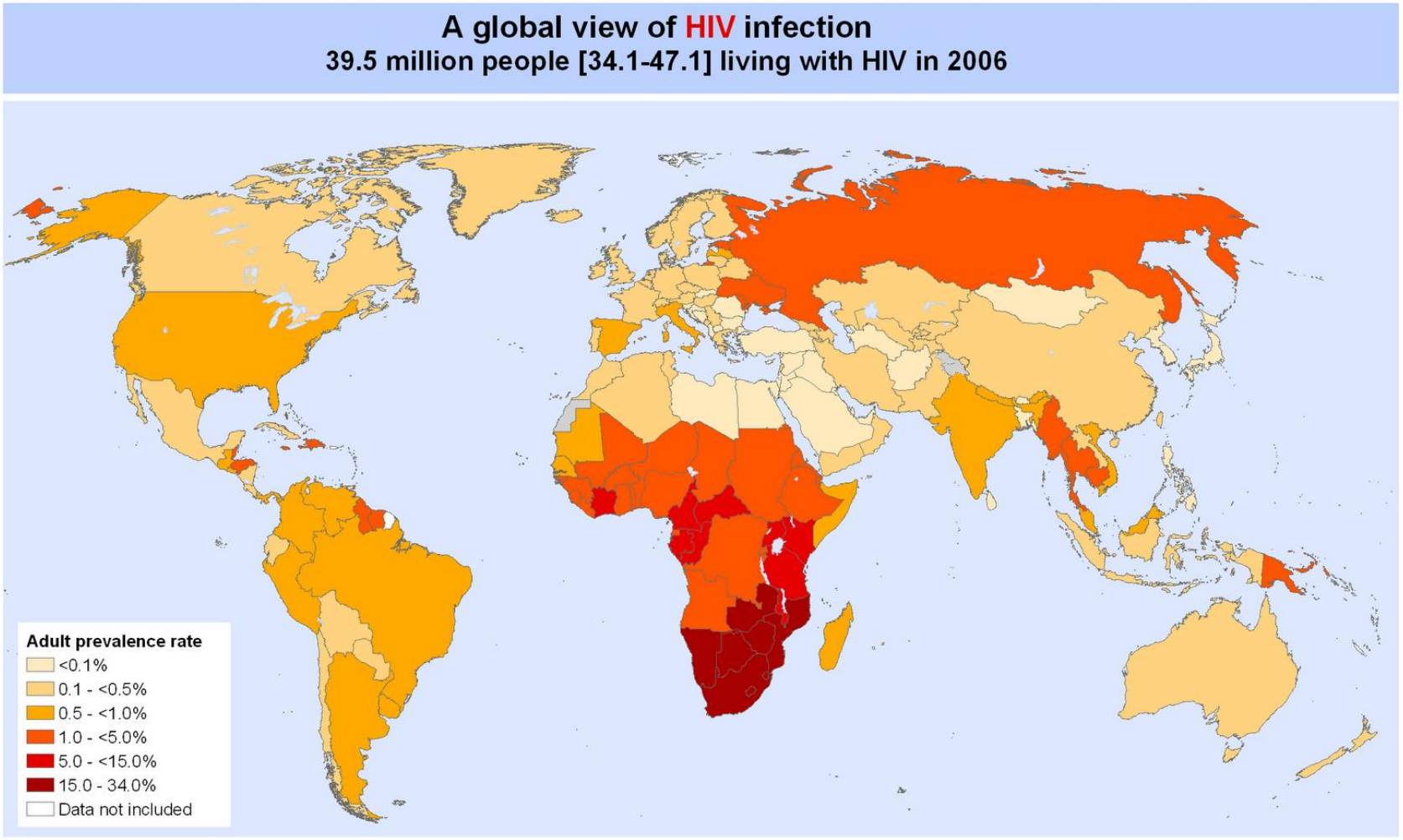
Adult (15-49) HIV prevalence rate (%), 2005



World Health Organization

Data Source: UNAIDS
Map Production:
Public Health Mapping and GIS, Communicable Diseases (CDS)
World Health Organization

HIV 2006



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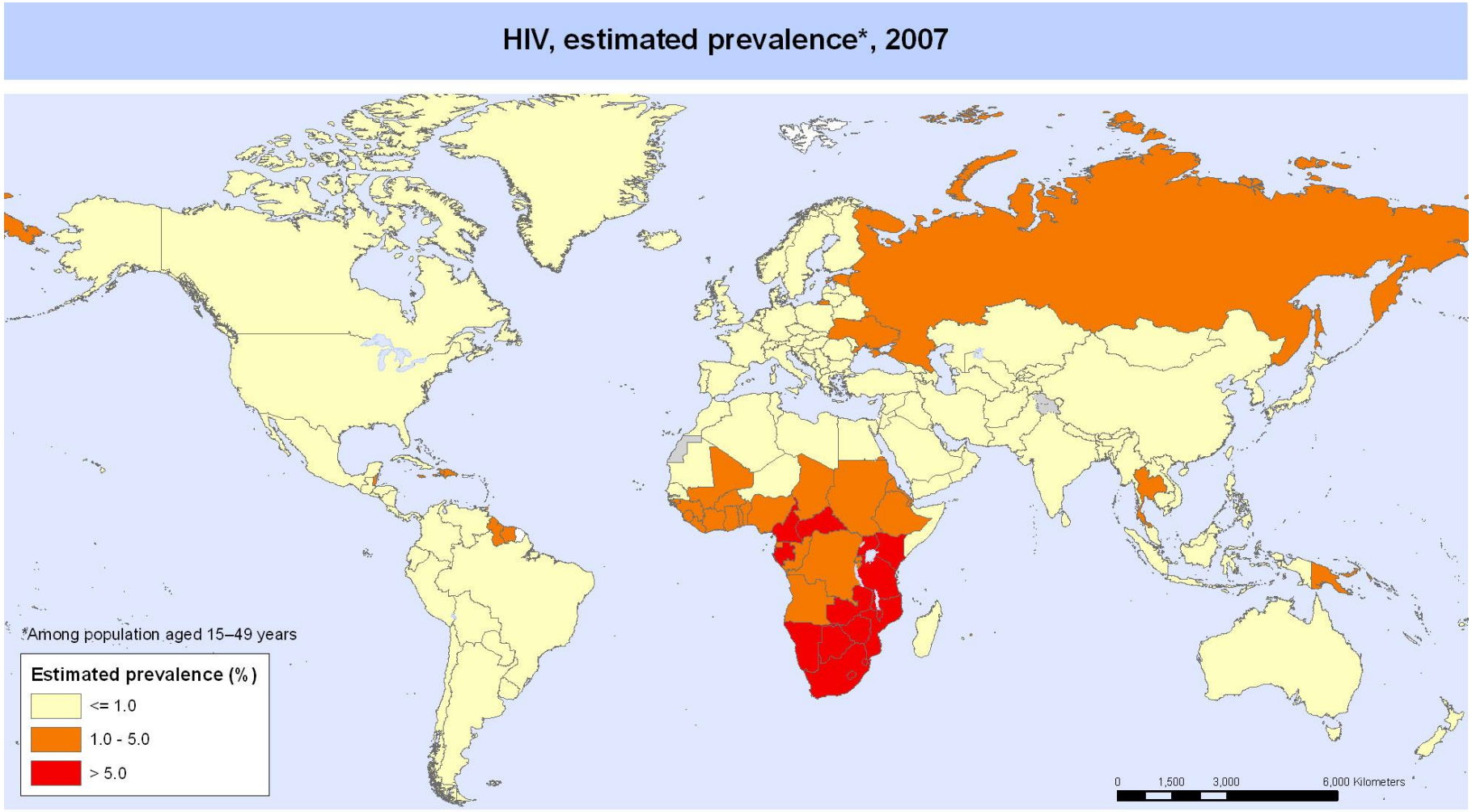
Data Source: WHO / UNAIDS
Map Production: Public Health Mapping and GIS
Communicable Diseases (CDS)
World Health Organization

World Health Organization

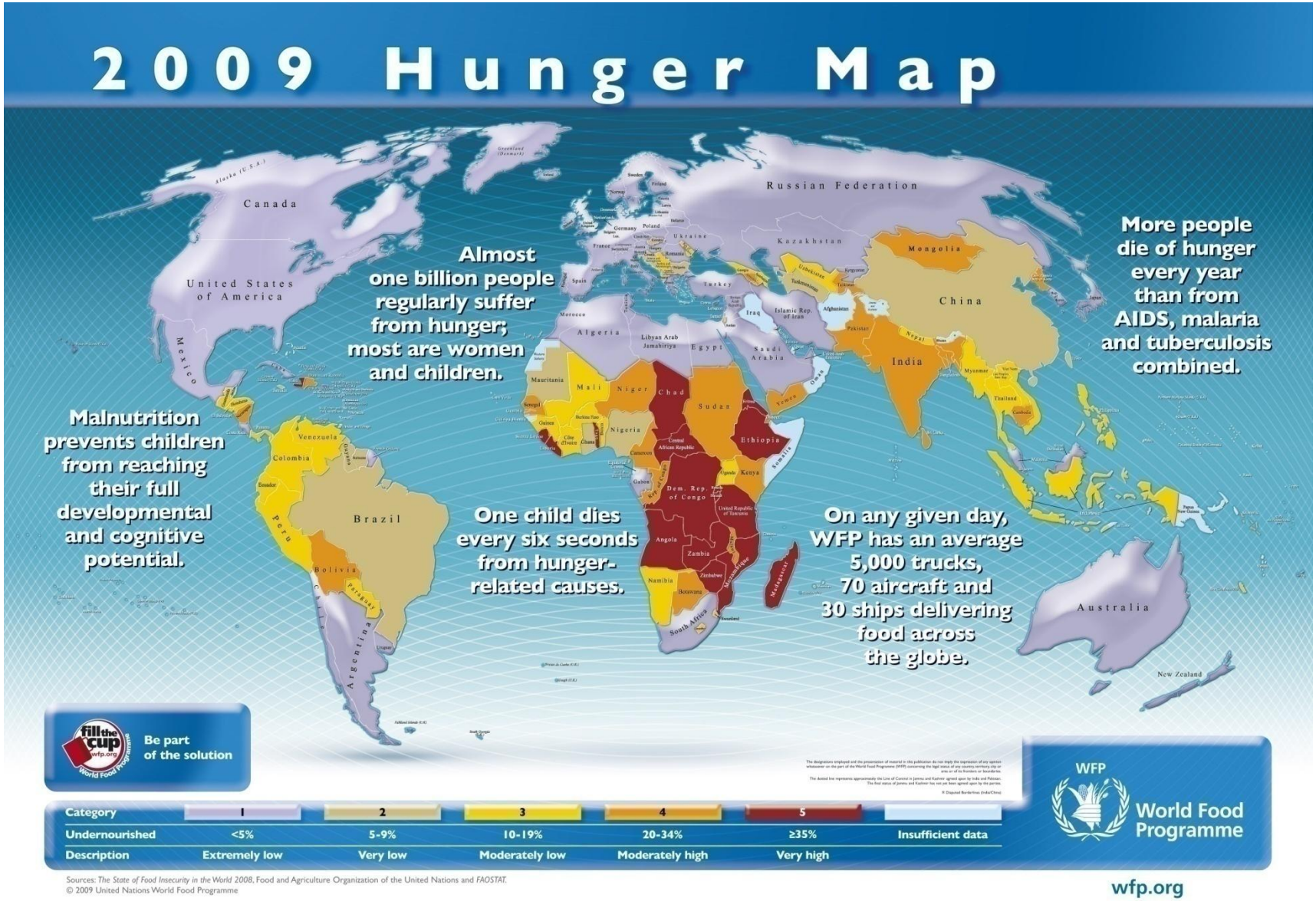
HIV 2007 in 15-49 year olds



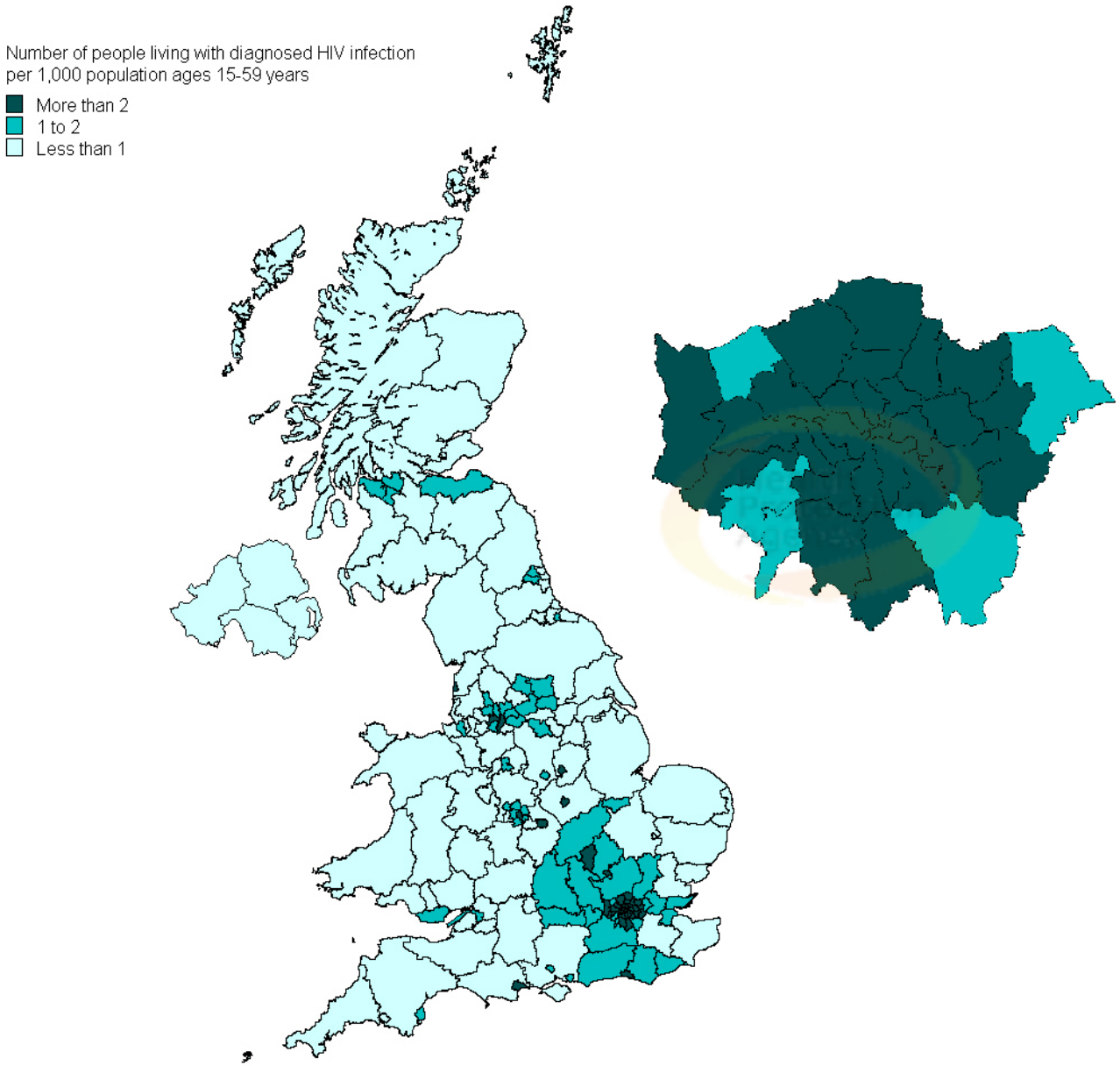
Data Source: WHO/UNAIDS
Map Production: Public Health Information and Geographic Information Systems (GIS)
World Health Organization

World Health Organization

World Hunger



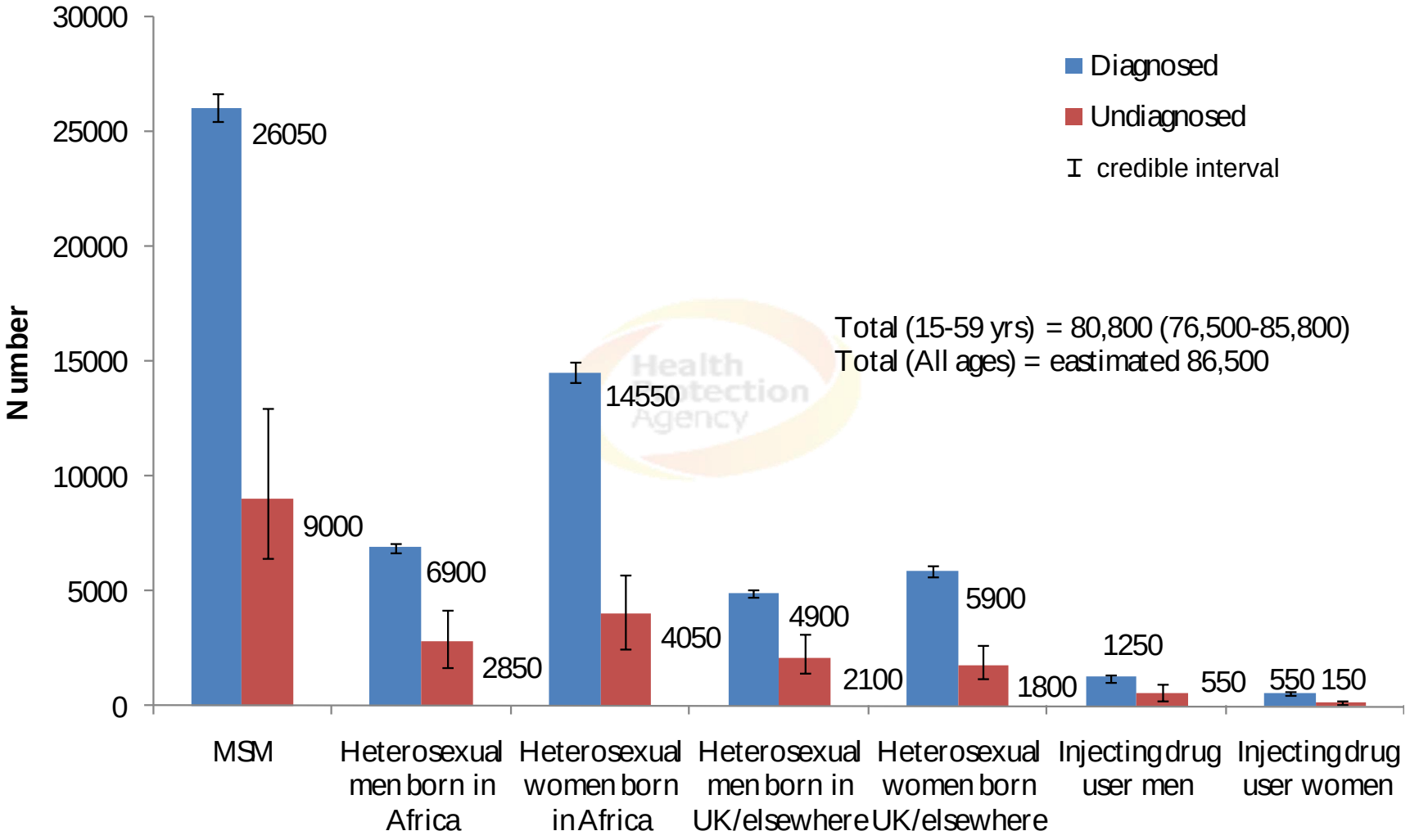
Prevalence of diagnosed HIV infection, UK: 2009



The UK national guidelines for testing advocate the offer and recommendation to accept an HIV test to all adults registering in general practice and general medical admissions patients in areas where diagnosed HIV prevalence is greater than 2 per 1,000 population.

Annual survey of HIV-infected persons accessing care

Estimated number of adults (15-59 years) living with HIV (both diagnosed and undiagnosed) in the UK: 2009



HIV

Retrovirus

RNA core

Capsid also contains enzymes

Lipid membrane

Glycoprotein

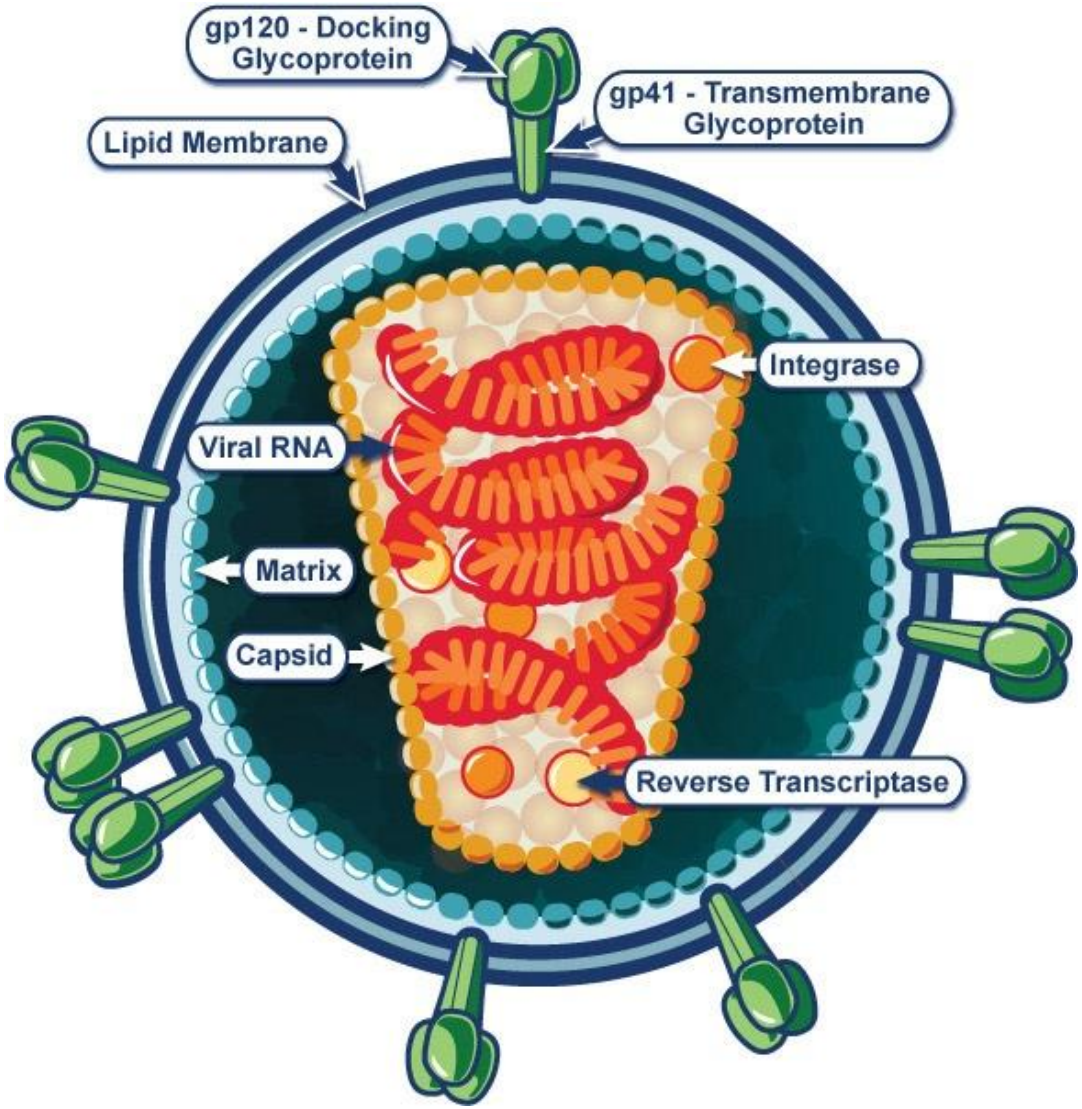


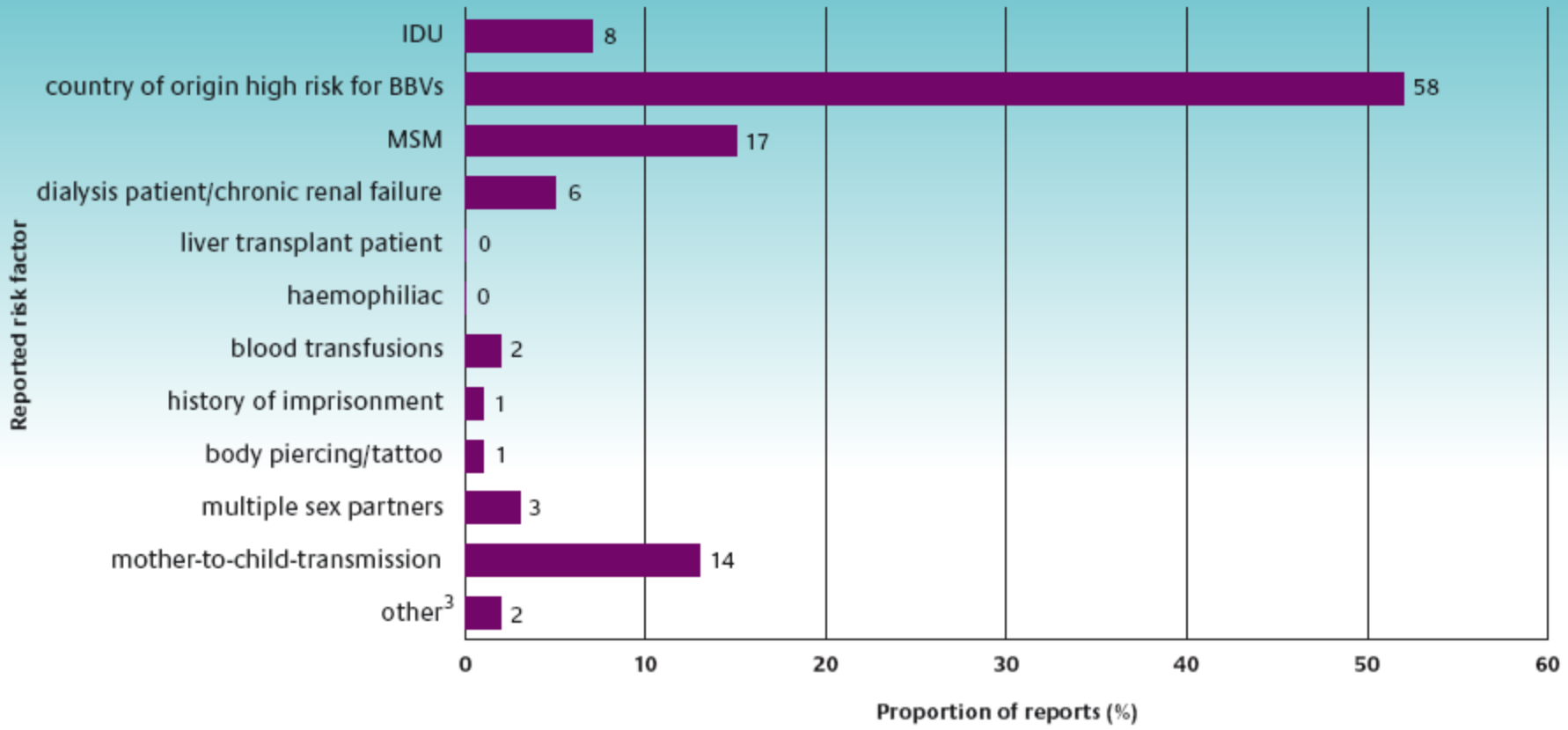
Table 1: Clinical indicator diseases for adult HIV infection

	AIDS-defining conditions	Other conditions where HIV testing should be offered
Respiratory	Tuberculosis	Bacterial pneumonia
	Pneumocystis	Aspergillosis
Neurology	Cerebral toxoplasmosis	Aseptic meningitis/encephalitis
	Primary cerebral lymphoma	Cerebral abscess
	Cryptococcal meningitis	Space occupying lesion of unknown cause
	Progressive multifocal leucoencephalopathy	Guillain–Barré syndrome
		Transverse myelitis
		Peripheral neuropathy
		Dementia
		Leucoencephalopathy
Dermatology	Kaposi's sarcoma	Severe or recalcitrant seborrhoeic dermatitis
		Severe or recalcitrant psoriasis
		Multidermatomal or recurrent herpes zoster
Gastroenterology	Persistent cryptosporidiosis	Oral candidiasis
		Oral hairy leukoplakia
		Chronic diarrhoea of unknown cause
		Weight loss of unknown cause
		Salmonella, shigella or campylobacter
		Hepatitis B infection
		Hepatitis C infection

Table 1: Clinical indicator diseases for adult HIV infection

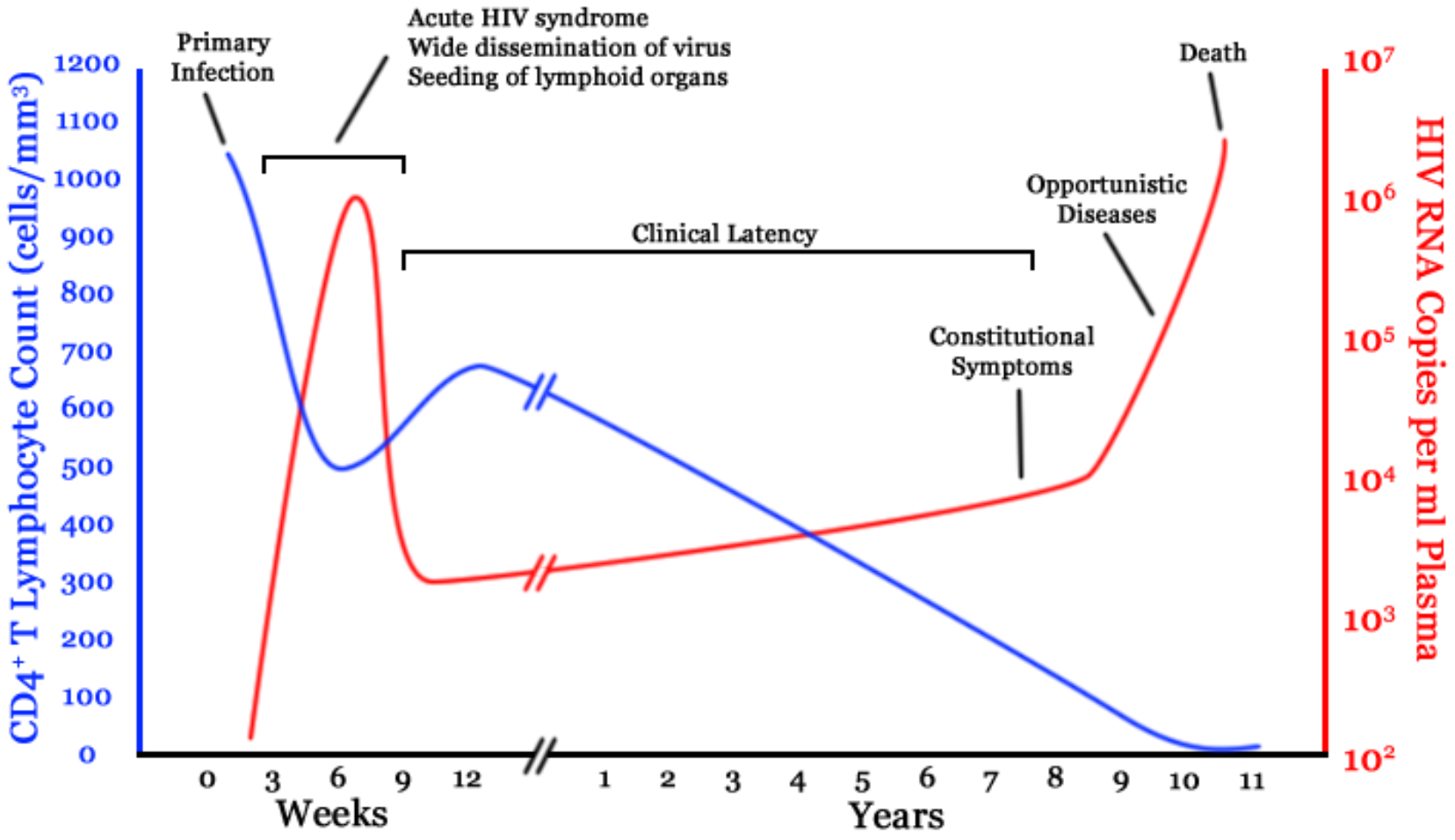
	AIDS-defining conditions	Other conditions where HIV testing should be offered
Oncology	Non-Hodgkin's lymphoma	Anal cancer or anal intraepithelial dysplasia Lung cancer Seminoma Head and neck cancer Hodgkin's lymphoma Castleman's disease
Gynaecology	Cervical cancer	Vaginal intraepithelial neoplasia Cervical intraepithelial neoplasia Grade 2 or above
Haematology		Any unexplained blood dyscrasia including: • thrombocytopenia • neutropenia • lymphopenia
Ophthalmology	Cytomegalovirus retinitis	Infective retinal diseases including herpesviruses and toxoplasma Any unexplained retinopathy
ENT		Lymphadenopathy of unknown cause Chronic parotitis Lymphoepithelial parotid cysts
Other		Mononucleosis-like syndrome (primary HIV infection) Pyrexia of unknown origin Any lymphadenopathy of unknown cause Any sexually transmitted infection

Figure 11b: Reported risk factors for infection, HIV positive patients[1], 2000-2007[2]



Proportion (%) = the number of reports received as a proportion of reports by HIV incidents for that time period.
[1] These are single infections only and do not include reports of dual/triple-infected source patient.
[2] Date of incident up to 31st December 2007. The number may rise as further reports are received.
[3] Other includes: high-risk partner; occupational exposure only risk factor.
A small number of source patients reported more than one risk factor; these additional risks have not been included in the figure.

CD4 and viral load



Purpose of HAART

(1) Preservation of specific anti-HIV immune responses that would otherwise be lost, and which are associated with long-term non-progression in untreated individuals.

(2) Reduction in morbidity associated with high viraemia and CD4 depletion during acute infection.

(3) Reduction in the risk of onward transmission of HIV

PEP starter pack

- After due consideration of storage/stability issues, side effect profiles (41–43), drug interactions, drug resistance and regimen simplicity (i.e. reduced pill burden and food restrictions), the following regimen is now recommended for PEP starter packs:
- One Truvada tablet (245mg tenofovir and 200mg emtricitabine (FTC)) once a day
- *plus*
- Two Kaletra film-coated tablets (200mg lopinavir and 50mg ritonavir) twice a day

Long term treatment WHO

1. Start antiretroviral treatment in all patients with HIV who have CD4 count $\leq$350 cells/mm^3 irrespective of clinical symptoms.
   (Strong recommendation, moderate quality of evidence)
2. CD4 testing is required to identify if patients with HIV and WHO clinical stage 1 or 2 disease need to start antiretroviral treatment.
   (Strong recommendation, low quality of evidence)
3. Start antiretroviral treatment in all patients with HIV and WHO clinical stage 3 or 4 irrespective of CD4 count.
   (Strong recommendation, low quality of evidence)

WHO

RECOMMENDATION 2
What to start

Start one of the following regimens in ART-naïve individuals eligible for treatment.

AZT + 3TC + EFV

AZT + 3TC + NVP

TDF + 3TC or FTC + EFV

TDF + 3TC or FTC + NVP

(Strong recommendation, moderate quality of evidence)

Algorithm for Occupational exposure within the past 72 hours

Risk of exposure ⇨ / Risk Donor is HIV positive ⇩	Low	Medium	High
Low	*No PEP*	*No PEP*	*No PEP*
Medium	*No PEP*	Discuss	**Give PEP**
High	*No PEP*	**Give PEP**	**Give PEP**

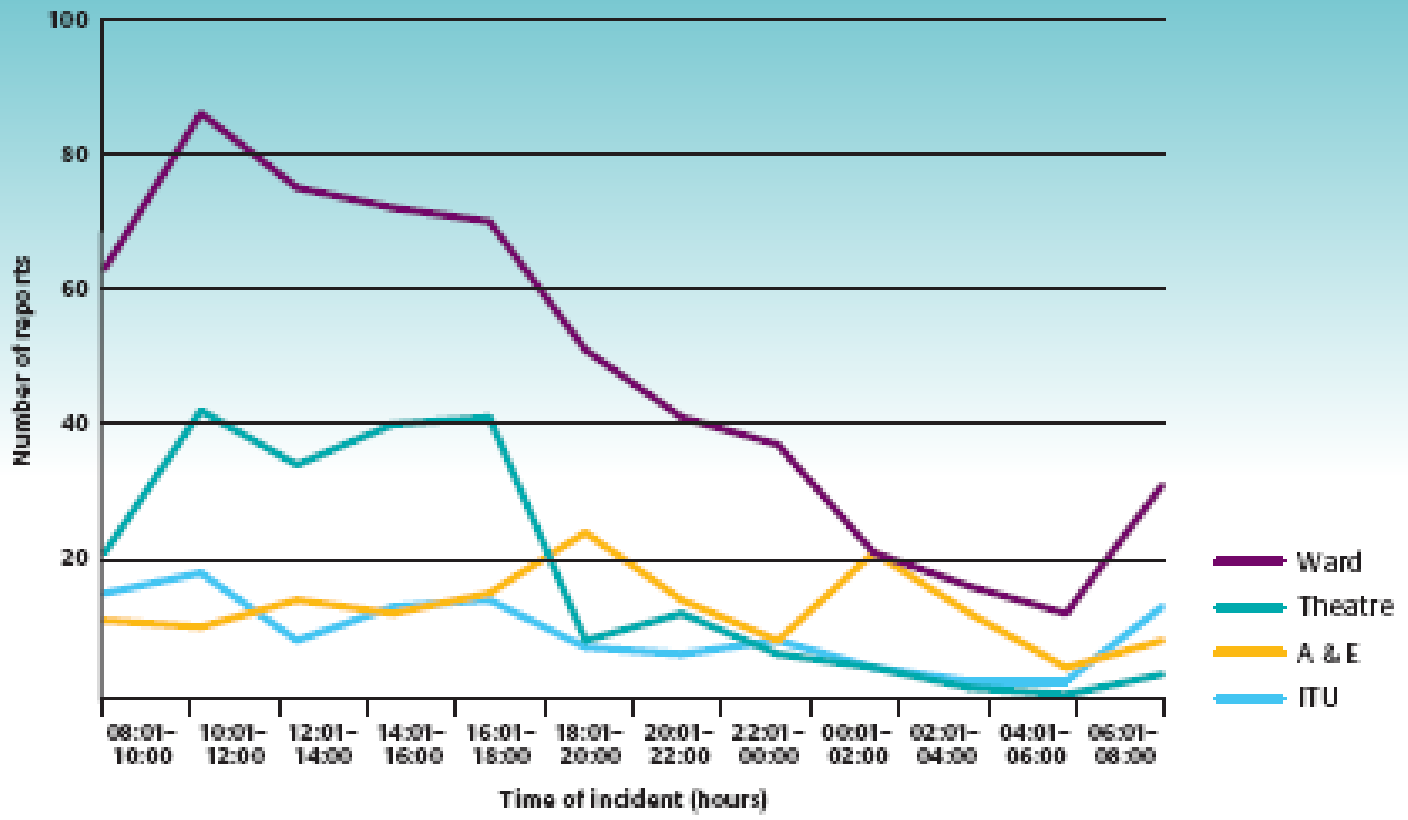
	Risk that source is HIV positive
High	Homosexual male, injecting drug user, commercial sex worker, haemophiliac who received blood products before 1985, heterosexual from Sub-Saharan Africa,
Medium	Heterosexuals from Eastern Europe, Central Asia, North Africa, Middle East, Caribbean, Latin America, S& SE Asia Blood transfusion outside the UK
Low	Known to be HIV negative, Heterosexuals with no risk factors

	Risk of exposure from body fluids
High	Blood, amnoiotic fluid, vaginal secretions, semen, human breast milk, cerebrospional fluid, peritoneal fluid, pleural fluid, pericardial fluid, synovial fluid, saliva in association with dentistry (likely to be contaminated with blood even if not visible), Blood stained vomit, unfixed tissues and organs, exudates & tissue fluids from burns and skin lesions
Low	Faeces, saliva, urine, vomit

	Risk of transmission from type of exposure
High	Injury breaking the skin (any sharp or blunt object or instrument drawing blood), exposure of mucous membranes including the eye, sexual contact (refer to GUM clinic)
Medium	Superficial injury with any sharp or blunt instrument- no blood drawn, Bite with blood drawn, exposure of broken skin (lacerations, eczema)
Low	Bodily fluid or blood on intact skin Mucous membrane or broken skin exposed to urine, saliva, faeces or vomit that is not blood stained, Bite with no blood drawn Injury from sterile, uncontaminated instrument/ sharp, Injury from discarded sharp of unknown origin

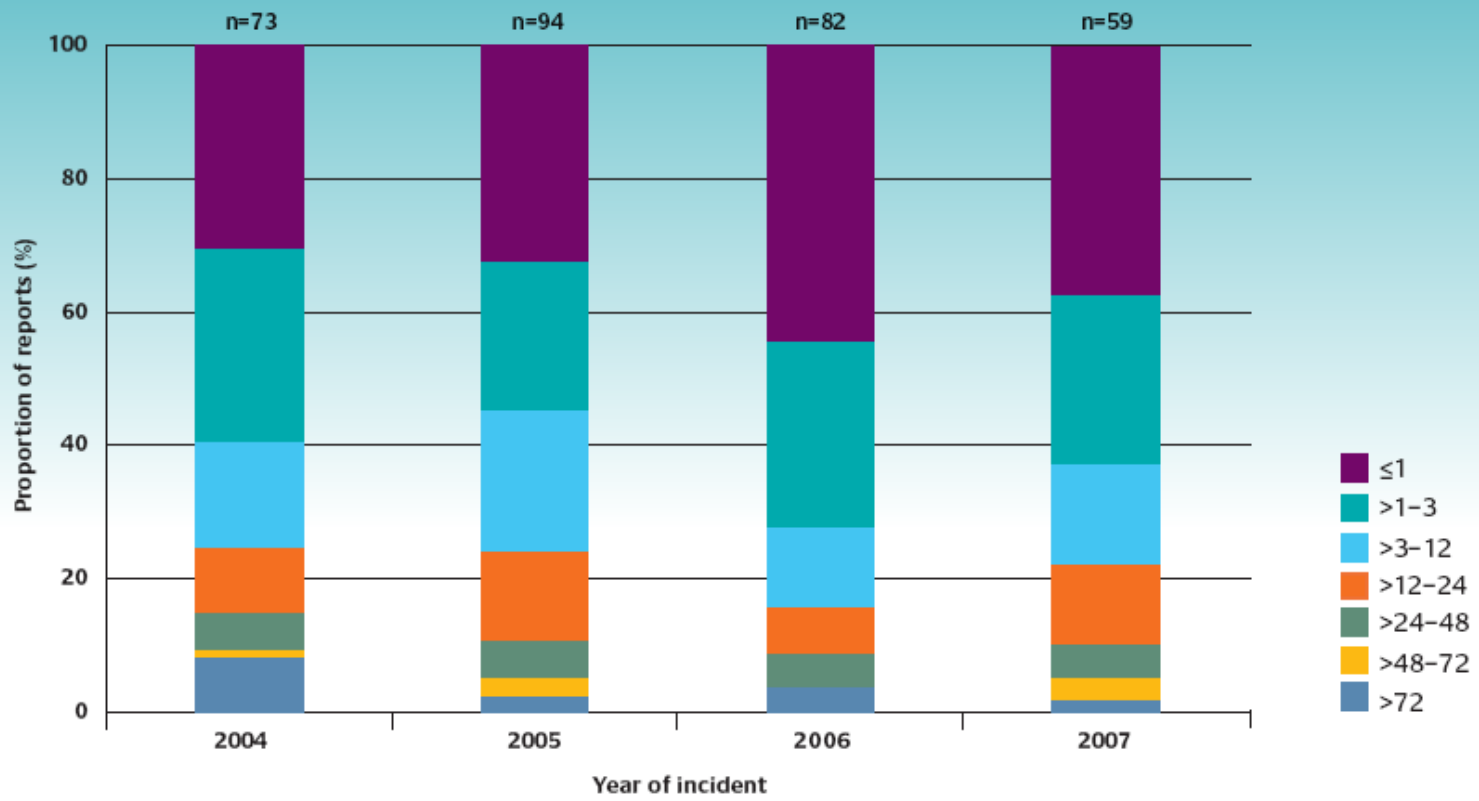
Treatment failure criteria	WHO Stage I	WHO Stage II	WHO Stage III	WHO Stage IV
Clinical (CD4 testing unavailable)	Do not switch	Do not switch	Consider switching	Switch
CD4 failure (viral load testing unavailable)	•Do not switch •repeat CD4 test in three months	•Do not switch •repeat CD4 test in three months	Consider switching	Switch
CD4 failure and viral load failure	Consider switching	Consider switching	Switch	Switch

Figure 4: Time of incident, by location, 2004-2007[1]



Proportion [%] = the number of reports received as a proportion of reports by location and time of incident for that time period.
[1] Date of incident up to 31st December 2007. The number may rise as further reports are received.

Figure 7: Number of hours between exposure and initiation of HIV PEP, HIV positive source, 2004-2007[1]

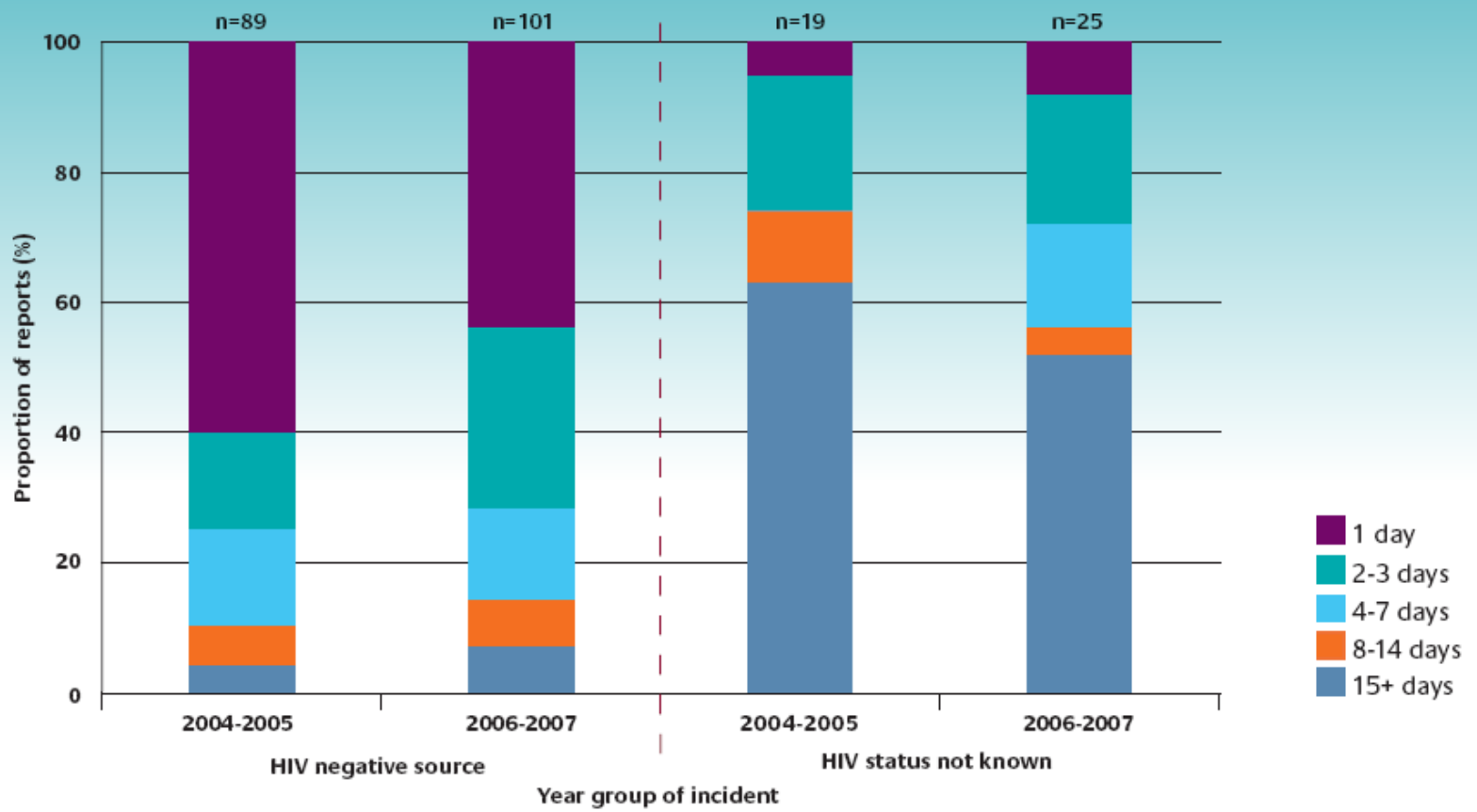


Proportion (%) = the number of reports received as a proportion of reports where the HCW has commenced HIV PEP for that year of incident and reported a time to HIV PEP.

[1] Date of incident up to 31st December 2007. The number may rise as further reports are received.

HCW = healthcare worker PEP = post-exposure prophylaxis

Figure 8: Length of time on HIV PEP, source HIV negative or of unknown HIV status, 2004-2007[1]

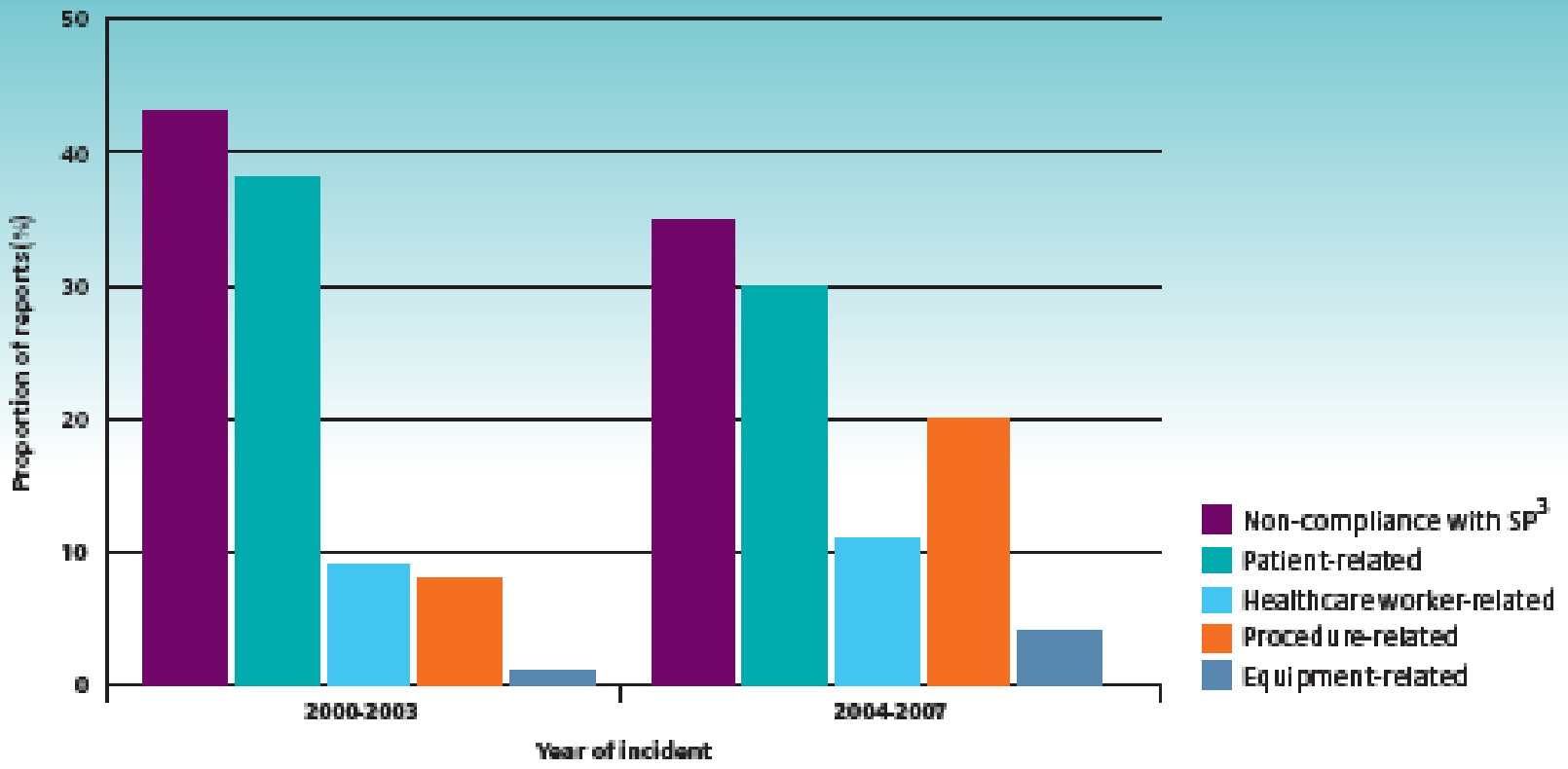


Proportion (%) = the number of reports received as a proportion of reports where the HCW had initiated HIV PEP, exposed to an HIV negative source/source of unknown HIV status and a time on PEP was provided.

[1] Date of incident up to 31st December 2007. The number may rise as further reports are received.

HCW = healthcare worker PEP = post-exposure prophylaxis

Figure 5: Factors[1] contributing to accidental exposures, 2000-2007[2]



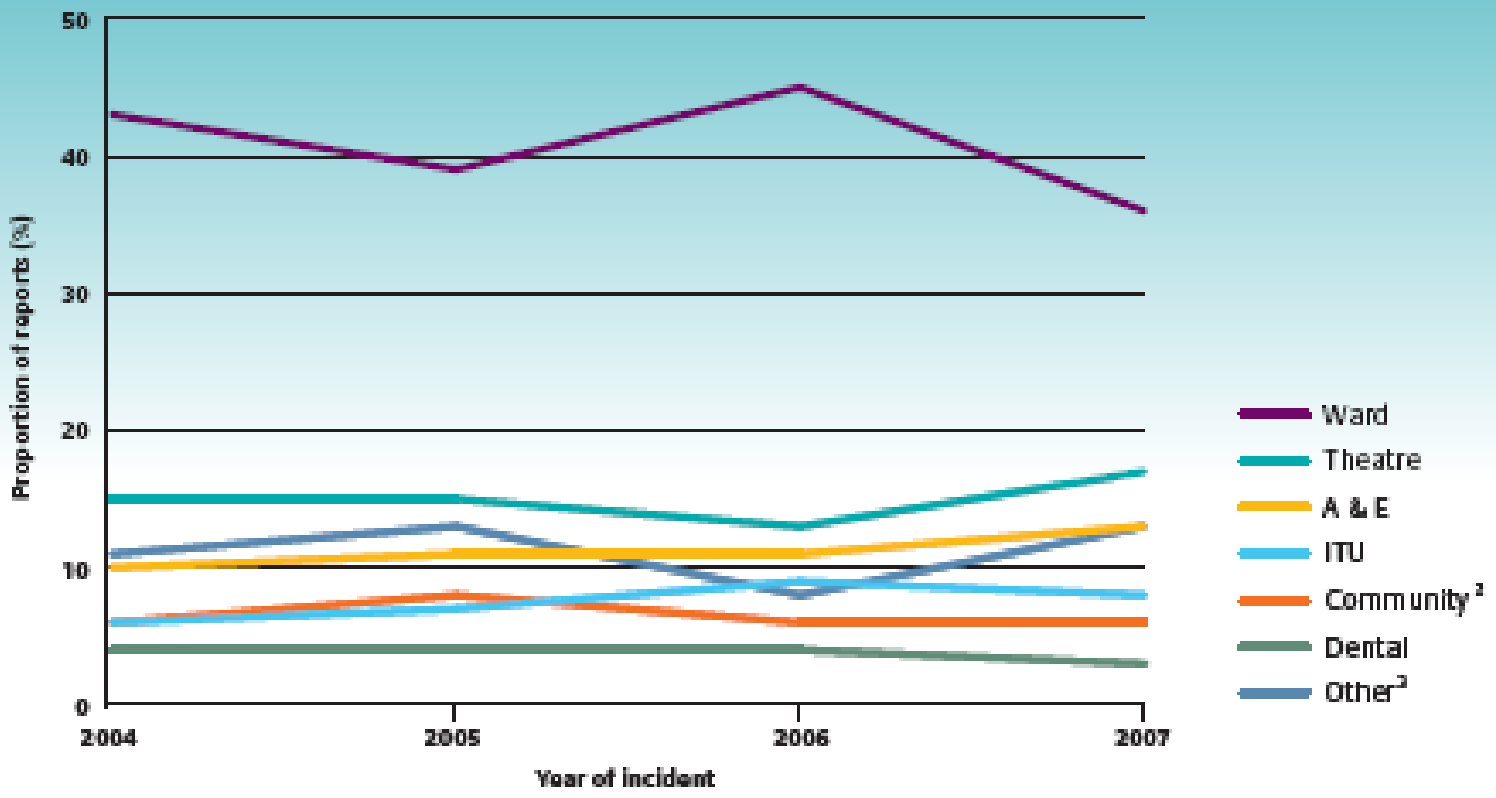
Proportion (%) = the number of reports received as a proportion of reports where a contributory factor was attributed for that year.

[1] The database allows up to two contributory factors to be listed per incident, and these second factors have been included in the denominator. Patient-related category has been broadened out to include all cases that did not record a patient-related contributory factor, where the specific subcategories for the timing of the exposure in relation to the procedure were 'patient moved, spat, and coughed, etc.' and 'restraining patient'.

[2] Date of incident up to 31st December 2007. The number may rise as further reports are received.

[3] SP = standard (universal) infection control precautions.

Figure 3: Proportion of reports by location of incident, 2004-2007[1]



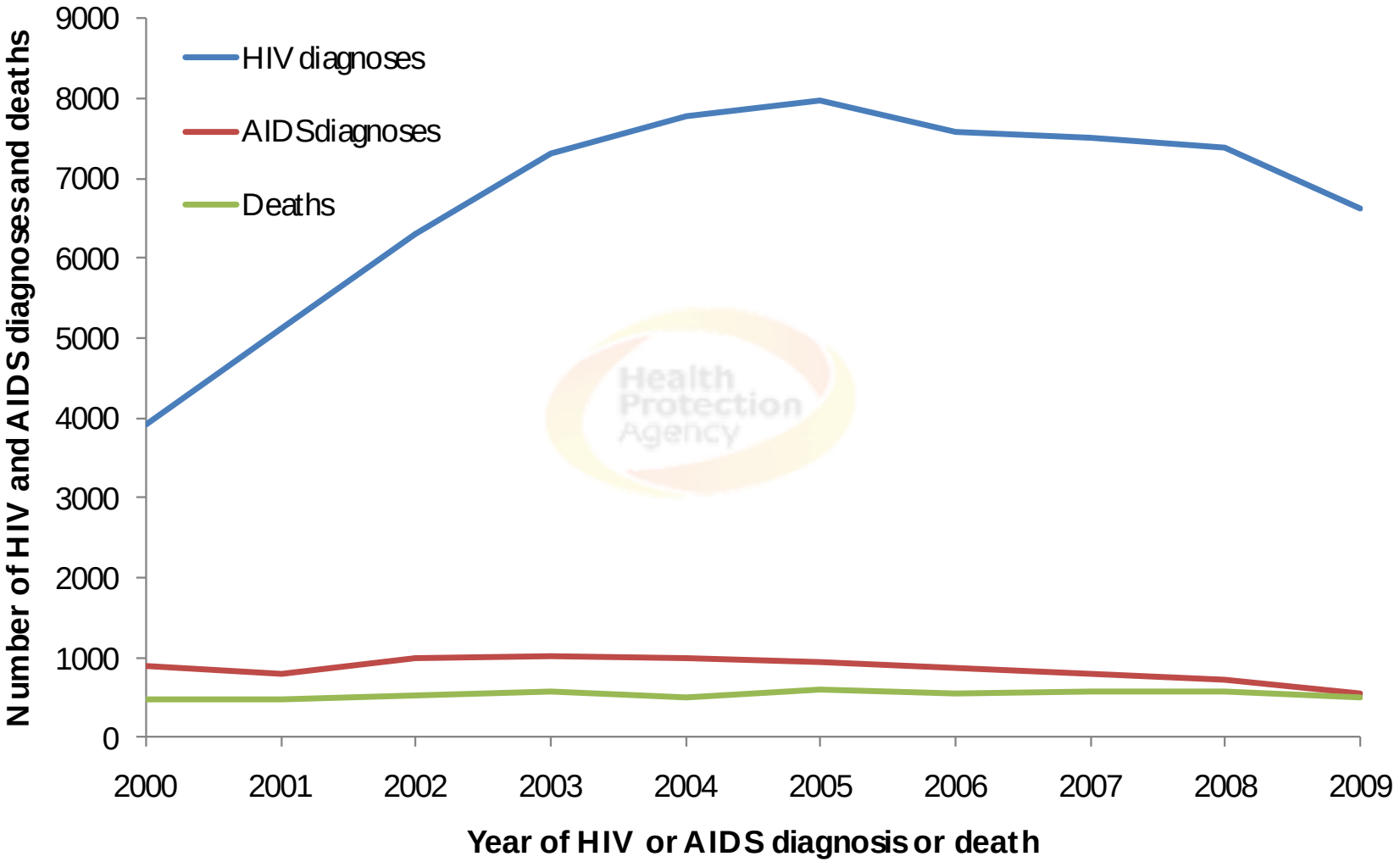
Proportion (%) = the number of reports received as a proportion of reports by location of incident for that year.

[1] Date of incident up to 31st December 2007. The number may rise as further reports are received.

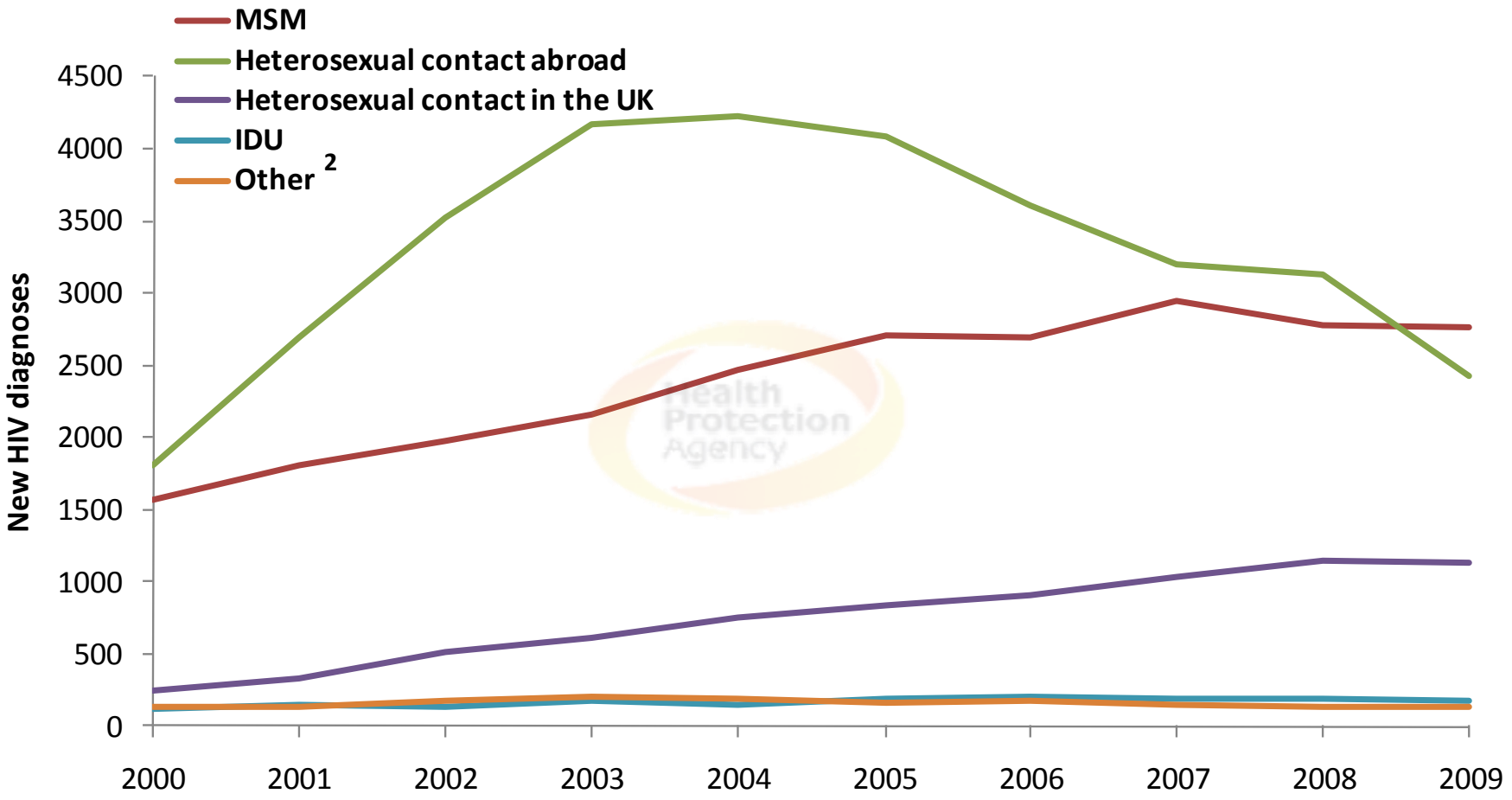
[2] Community includes: GP surgery; prison; ambulance and other community settings.

[3] Other includes: laboratory; mortuary; other hospital departments; OUM; outpatient department; liver unit; minor treatment centre; incidents occurring in other parts of the hospital, such as the grounds, toilet, car park and post room; non-hospital based clinical settings, and two incidents that occurred in another country but were reported in the UK, etc.

New HIV and AIDS diagnoses in the UK, and deaths among HIV infected individuals: 2000 – 2009

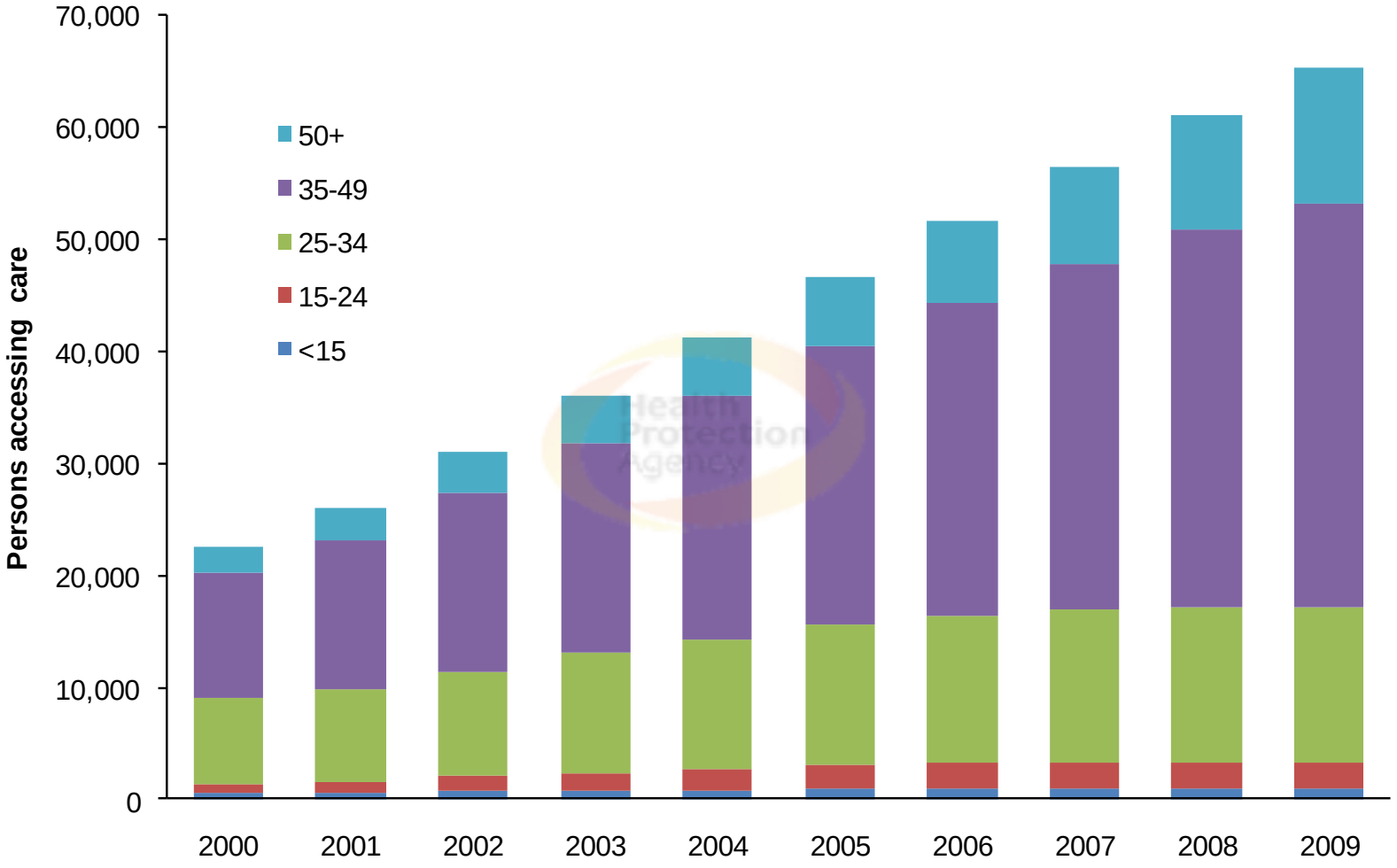


Number of new HIV diagnoses[1] by prevention group, UK: 2000-2009



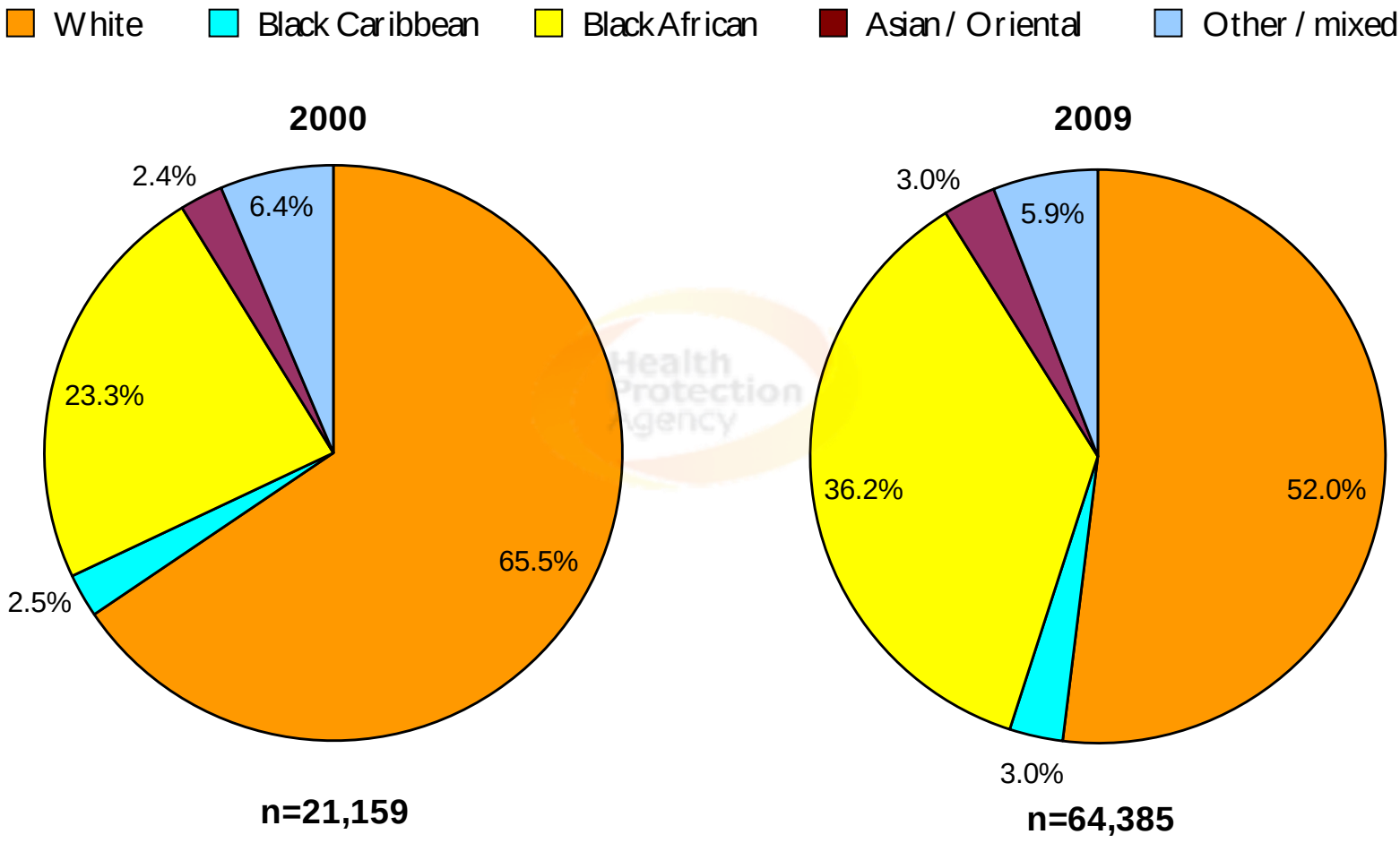
[1] Data are adjusted for missing route of infection
[2] Includes Mother to child transmission and blood product recipient

Diagnosed HIV-infected individuals seen for care by age group, UK: 2000-2009



Annual survey of HIV-infected persons accessing care

Diagnosed HIV-infected individuals seen for care by ethnicity*, UK: 2000 and 2009, UK



* *Excludes individuals with ethnicity not reported: 1,416 in 2000 and 934 in 2009*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oakleys


KEEP
CALM
AND YOU
WON'T GET
HUNG FOR THIS
(HANGED, YES)