

## 2) *Hospital case-fatality*

**2.1 Numerator:** The number of denominator continuous inpatient spells (*i.e.* spells excluding those with a diagnosis of cancer anywhere in the spell) where the patient dies in hospital or after discharge between 0-29 days (inclusive) of admission. Individual finished consultant episodes are linked within a financial year with other episodes where all are part of one continuous spell of care for a patient. A spell may contain HES data from another financial year only when one of its episodes spans years. Death registration data from the Office for National Statistics for deaths occurring during the financial year and up to end April of the following financial year are linked, so that deaths within 30 days of admission right up to the end of March during the financial year of analysis may be counted. The indicator includes deaths occurring after transfer to another Trust and also those that occur outside hospital following discharge but between 0-29 days of admission. There is variation in the completeness of hospital records and the quality of coding of diagnoses which may impact on the standardisation process. Also, there may be variation between Trusts in the way that the primary diagnosis is attributed. There may also be variation in the proportion of cases where the admission date is not coded, although this is quite small.

**2.2 Denominator:** The number of continuous inpatient spells (CIPS) which begin with a finished episode, excluding those with a diagnosis of cancer anywhere within a spell. Finished consultant episodes assumed to relate to the same patient are linked to form a CIPS, since the primary diagnosis and death can occur in separate episodes and even in separate hospitals after a transfer. Each CIPS must start with an admission episode, and finish with a discharge episode in the year of analysis. In some cases the admission episode may have commenced in a preceding HES year. CIPS with a diagnosis of cancer (other than benign or *in situ* cancers) *i.e.* ICD 10 codes C00 to C97 and D37 to D48, or mention of chemotherapy for cancer (ICD 10 code Z51.1) anywhere in the spell are excluded.

**2.3 Method of selecting diagnosis groups for use in case-fatality standardisation:** Case-fatality rates for individual diagnoses (at ICD 10 three digit level), adjusted by age and sex, were obtained separately for elective and non-elective admissions for the two financial years (2000-1 and 2001-2). Similarly, rates were obtained at the chapter and sub-chapter level. Within each year and admission type, a proposed listing of single and grouped diagnoses was produced on a hierarchical basis. An individual diagnosis was only included if its case fatality rate was significantly

different from its sub-chapter, and a sub-chapter if its rate was significantly different from its chapter. Diagnoses listed individually were excluded from the sub-chapter to avoid double counting. The list produced for ICD Chapter 1 for non-elective admissions is shown below as an example.

A00-B99 - Chapter 1 - Remainder of chapter

A00-A09 - Rest of Intestinal infectious diseases

A04 - Other bacterial intestinal infections

A20-A49 - Rest of Certain bacterial diseases

A39 - Meningococcal infection

B00-B09 - Viral infections characterized by skin & mucous membrane

For each admission type, the lists produced for the two financial years were compared. Individual diagnoses and sub-chapters were included in the final selection only if they appeared in both years and if the number of deaths in each year was greater than 50.

The resultant groups are shown in Table 2.1.

<b>Table 2.1: Diagnosis groupings used in the hospital case-fatality indicator standardisation</b>	
<b>Elective admissions</b>	
<b>Diagnosis Group and Description</b>	
1	A00-B99 - Chapter 1
2	D00-D48 - Chapter 2 pt - In situ & benign neoplasms and others of uncertain/unknown behaviour
3	D50-D89 - Chapter 3
4	E00-E90 - Chapter 4
5	F00-F99 - Chapter 5
6	G00-G99 - Chapter 6 - Remainder of chapter
7	G10-G13, G30-G32 - Rest of Other degenerative diseases (incl. Alzheimer's disease)
8	G12 - Spinal muscular atrophy and related syndromes
9	H00-H59 - Chapter 7
10	H60-H95 - Chapter 8
11	I00-I99 - Chapter 9 - Remainder of chapter
12	I00-I09 - Rheumatic heart disease
13	I21 - Acute myocardial infarction
14	I50 - Heart failure
15	I60-I69 - Rest of Cerebrovascular diseases
16	I64 - Stroke not specified as haemorrhage or infarction
17	I70-I79 - Rest of Diseases of arteries, arterioles & capillaries
18	I71 - Aortic aneurysm and dissection
19	I73 - Other peripheral vascular diseases
20	J00-J99 - Chapter 10 - Remainder of chapter
21	J10-J18 - Influenza & pneumonia
22	J20-J22 - Other acute lower respiratory infections
23	K00-K93 - Chapter 11 - Remainder of chapter
24	K20-K31 - Diseases of oesophagus, stomach & duodenum
25	K40-K46 - Hernia
26	K70-K77 - Diseases of liver
27	K80-K87 - Rest of Disorders of gallbladder, biliary tract & pancreas
28	K80 - Cholelithiasis

<b>Table 2.1: Diagnosis groupings used in the hospital case-fatality indicator standardisation</b>	
<b>Elective admissions</b>	
<b>Diagnosis Group and Description</b>	
29	L00-L99 - Chapter 12 - Remainder of chapter
30	M00-M99 - Chapter 13 - Remainder of chapter
31	M16 - Coxarthrosis [arthrosis of hip]
32	N00-N99 - Chapter 14 - Remainder of chapter
33	N17-N19 - Renal failure
34	N40-N51 - Diseases of male genital organs
35	N80-N98 – Non-inflammatory disorders of female genital tract
36	O00-O99 - Chapter 15
37	P00-P96 - Chapter 16
38	Q00-Q99 - Chapter 17
39	R00-R99 - Chapter 18 - Remainder of chapter
40	R10-R19 - Rest of Symptoms & signs inv. the digestive system & abdomen
41	R13 - Dysphagia
42	R30-R39 - Symptoms & signs involving the urinary system
43	R69-R69 - Unknown & unspecified causes of morbidity
44	S00-T98 - Chapter 19
45	Z00-Z99 - Chapter 21 - Remainder of chapter
46	Z00-Z13 - Rest of Persons encountering health services for examination
47	Z08 - Follow-up examination after treatment for malignant neoplasm
48	Z40-Z54 - Rest of Persons encountering health services for specific procedures and health care
49	Z46 - Fitting and adjustment of other devices
50	Z51 - Other medical care
51	Z70-Z76 - Persons encountering health services in other circumstances

<b>Table 2.1 (cont.): Diagnosis groupings used in the hospital case-fatality indicator standardisation</b>			
<b>Non-elective admissions</b>		<b>Non-elective admissions</b>	
<b>Diagnosis Group and Description</b>		<b>Diagnosis Group and Description</b>	
1	A00-B99 - Chapter 1 - Remainder of chapter	29	G45 - Transient cerebral ischaemic attacks and related syndromes
2	A00-A09 - Rest of Intestinal infectious diseases	30	G50-G73, G90-G99 - Rest of Other diseases & disorders of the nervous system
3	A04 - Other bacterial intestinal infections	31	G93 - Other disorders of brain
4	A20-A49 - Rest of Certain bacterial diseases	32	G80-G83 - Cerebral palsy & other paralytic syndromes
5	A39 - Meningococcal infection	33	H00-H59 - Chapter 7 -
6	B00-B09 - Viral infections characterized by skin & mucous membrane lesions	34	H60-H95 - Chapter 8 -
7	D00-D48 - Chapter 2 pt - In situ & benign neoplasms and others of uncertain/unknown behaviour	35	I00-I99 - Chapter 9 - Remainder of chapter
8	D50-D89 - Chapter 3 - Remainder of chapter	36	I10-I15 - Rest of Hypertensive diseases
9	D50 - Iron deficiency anaemia	37	I10 - Essential (primary) hypertension
10	D65-D89 - Diseases of the blood and blood-forming organs	38	I11 - Hypertensive heart disease
11	E00-E90 - Chapter 4 - Remainder of chapter	39	I12 - Hypertensive renal disease
12	E16 - Other disorders of pancreatic internal secretion	40	I20 - Angina pectoris
13	E86 - Volume depletion	41	I21 - Acute myocardial infarction
14	E87 - Other disorders of fluid electrolyte and acid-base balance	42	I22 - Subsequent myocardial infarction
15	F00-F99 - Chapter 5 - Remainder of chapter	43	I23 - Certain current complication follow acute myocardial infarction
16	F00-F03 - Dementia	44	I24 - Other acute ischaemic heart diseases
17	F20-F29 - Schizophrenia, schizotypal and delusional disorders	45	I25 - Chronic ischaemic heart disease
18	F30-F39 - Mood [affective] disorders	46	I26-I28 - Rest of Pulmonary heart disease & diseases of pulmonary circulation
19	F40-F69 - Neurotic behavioural & personality disorders	47	I27 - Other pulmonary heart diseases
20	G00-G99 - Chapter 6 - Remainder of chapter	48	I30-I52 - Rest of Other forms of heart disease
21	G00-G09 - Inflammatory diseases of the central nervous system	49	I31 - Other diseases of pericardium
22	G10-G13, G30-G32 - Rest of Other degenerative diseases (excl Alzheimer's disease)	50	I33 - Acute and subacute endocarditis
23	G12 - Spinal muscular atrophy and related syndromes	51	I42 - Cardiomyopathy
24	G30 - Alzheimer's disease	52	I44 - Atrioventricular and left bundle-branch block
25	G35-G37 - Demyelinating diseases (incl. Multiple Sclerosis) of the central nervous system	53	I45 - Other conduction disorders
26	G40-G47 - Rest of Epilepsy migraine & other episodic disorders	54	I46 - Cardiac arrest
27	G40 - Epilepsy	55	I47 - Paroxysmal tachycardia
28	G41 - Status epilepticus		

**Table 2.1 (cont.): Diagnosis groupings used in the hospital case-fatality indicator standardisation**

Non-elective admissions		Non-elective admissions	
Diagnosis Group and Description		Diagnosis Group and Description	
56	I48 - Atrial fibrillation and flutter	84	J40-J47 - Rest of Chronic lower respiratory diseases
57	I49 - Other cardiac arrhythmias	85	J43 - Emphysema
58	I50 - Heart failure	86	J44 - Other chronic obstructive pulmonary disease
59	I60-I69 - Rest of Cerebrovascular diseases	87	J45 - Asthma
60	I60 - Subarachnoid haemorrhage	88	J60-J70 - Lung diseases due to external agents
61	I61 - Intracerebral haemorrhage	89	J80-J99 - Rest of Other diseases of the respiratory system
62	I63 - Cerebral infarction	90	J81 - Pulmonary oedema
63	I64 - Stroke not specified as haemorrhage or infarction	91	J84 - Other interstitial pulmonary diseases
64	I67 - Other cerebrovascular diseases	92	J90 - Pleural effusion not elsewhere classified
65	I70-I79 - Rest of Diseases of arteries, arterioles & capillaries	93	J93 - Pneumothorax
66	I70 - Atherosclerosis	94	J96 - Respiratory failure not elsewhere classified
67	I71 - Aortic aneurysm and dissection	95	J98 - Other respiratory disorders
68	I72 - Other aneurysm	96	K00-K93 - Chapter 11 - Remainder of chapter
69	I73 - Other peripheral vascular diseases	97	K20-K31 - Rest of Diseases of oesophagus, stomach & duodenum
70	I74 - Arterial embolism and thrombosis	98	K21 - Gastro-oesophageal reflux disease
71	I77 - Other disorders of arteries and arterioles	99	K22 - Other diseases of oesophagus
72	I80-I89 - Rest of Diseases of veins & lymphatic system nec	100	K25 - Gastric ulcer
73	I80 - Phlebitis and thrombophlebitis	101	K26 - Duodenal ulcer
74	I85 - Oesophageal varices	102	K27 - Peptic ulcer site unspecified
75	I95-I99 - Rest of Other & unspecified disorders of the circulatory system	103	K29 - Gastritis and duodenitis
76	I95 - Hypotension	104	K35-K38 - Diseases of appendix
77	I99 - Other and unspecified disorders of circulatory system	105	K40-K46 - Rest of Hernia
78	J00-J99 - Chapter 10 - Remainder of chapter	106	K40 - Inguinal hernia
79	J00-J06 - Acute upper respiratory infections	107	K41 - Femoral hernia
80	J10-J18 - Rest of Influenza & pneumonia	108	K50-K52 - Non-infective enteritis & colitis
81	J13 - Pneumonia due to Streptococcus pneumoniae	109	K55-K63 - Rest of Other diseases of intestines
82	J15 - Bacterial pneumonia not elsewhere classified	110	K55 - Vascular disorders of intestine
83	J20-J22 - Other acute lower respiratory infections		

**Table 2.1 (cont.): Diagnosis groupings used in the hospital case-fatality indicator standardisation**

Non-elective admissions		Non-elective admissions	
Diagnosis Group and Description		Diagnosis Group and Description	
111	K56 - Paralytic ileus and intestinal obstruction without hernia	139	M06 - Other rheumatoid arthritis
112	K57 - Diverticular disease of intestine	140	M30-M36 - Systemic connective tissue disorders
113	K59 - Other functional intestinal disorders	141	M60-M79 - Soft tissue disorders
114	K62 - Other diseases of anus and rectum	142	M80-M94 - Rest of Osteopathies and chondropathies
115	K63 - Other diseases of intestine	143	M80 - Osteoporosis with pathological fracture
116	K65-K67 - Rest of Diseases of peritoneum	144	N00-N99 - Chapter 14 - Remainder of chapter
117	K65 - Peritonitis	145	N17 - Acute renal failure
118	K66 - Other disorders of peritoneum	146	N18 - Chronic renal failure
119	K70-K77 - Rest of Diseases of liver	147	N19 - Unspecified renal failure
120	K70 - Alcoholic liver disease	148	N30-N39 - Other diseases of the urinary system
121	K72 - Hepatic failure not elsewhere classified	149	N40-N51 - Diseases of male genital organs
122	K74 - Fibrosis and cirrhosis of liver	150	N80-N98 - Non-inflammatory disorders of female genital tract
123	K76 - Other diseases of liver	151	O00-O99 - Chapter 15 -
124	K80-K87 - Rest of Disorders of gallbladder, biliary tract & pancreas	152	P00-P96 - Chapter 16 - Remainder of chapter
125	K80 - Cholelithiasis	153	P07 - Disorders related to short gestation and low birth weight
126	K81 - Cholecystitis	154	Q00-Q99 - Chapter 17 -
127	K83 - Other diseases of biliary tract	155	R00-R99 - Chapter 18 - Remainder of chapter
128	K85 - Acute pancreatitis	156	R00-R09 - Rest of Symptoms & signs inv. the circulatory/respiratory system
129	K86 - Other diseases of pancreas	157	R00 - Abnormalities of heart beat
130	K90-K93 - Rest of Other diseases of the digestive system	158	R02 - Gangrene not elsewhere classified
131	K91 - Postprocedural disorders of digestive system NEC	159	R04 - Haemorrhage from respiratory passages
132	L00-L99 - Chapter 12 - Remainder of chapter	160	R05 - Cough
133	L02 - Cutaneous abscess furuncle and carbuncle	161	R06 - Abnormalities of breathing
134	L03 - Cellulitis	162	R07 - Pain in throat and chest
135	L89 - Decubitus ulcer	163	R09 - Other symptoms and signs involving the circulatory, and respiratory systems
136	L97 - Ulcer of lower limb not elsewhere classified	164	R10-R19 - Rest of Symptoms & signs involving the digestive system & abdomen
137	M00-M99 - Chapter 13 - Remainder of chapter	165	R10 - Abdominal and pelvic pain
138	M00 - Pyogenic arthritis		

<b>Table 2.1 (cont.): Diagnosis groupings used in the hospital case-fatality indicator standardisation</b>			
<b>Non-elective admissions</b>		<b>Non-elective admissions</b>	
<b>Diagnosis Group and Description</b>		<b>Diagnosis Group and Description</b>	
166	R13 - Dysphagia	194	S20-S29 - Rest of Injuries to the thorax
167	R17 - Unspecified jaundice	195	S27 - Injury of other and unspecified intrathoracic organs
168	R18 - Ascites	196	S30-S39 - Rest of Injuries to the abdomen. lower back, lumbar spine & pelvis
169	R19 - Other symptoms & signs involving digestive system and abdomen.	197	S36 - Injury of intra-abdominal organs
170	R20-R23 - Symptoms & signs inv. the skin & subcutaneous tissue	198	S40-S49 - Injuries to the shoulder & upper arm
171	R25-R29 - Symptoms & signs inv. the nervous& musculoskeletal system	199	S50-S59 - Injuries to the elbow & forearm
172	R30-R39 - Symptoms & signs involving the urinary system	200	S70-S79 - Rest of Injuries to the hip & thigh
173	R40-R46 - Rest of Symptoms & signs inv. Cognition, perception etc.	201	S79 - Other and specified injuries of hip and thigh
174	R40 – Somnolence, stupor and coma	202	S80-S89 - Injuries to the knee & lower leg
175	R41 – Other symptoms & signs involve. cognitive function and awareness	203	T08-T14 - Injuries to unspecified part of trunk limb or body region
176	R42 - Dizziness and giddiness	204	T20-T32 - Burns and corrosions
177	R50-R68 - Rest of General symptoms & signs	205	T36-T50 - Rest of Poisonings by drugs medicaments & biological substances
178	R51 - Headache	206	T40 - Poisoning by narcotics and psychodysleptics [hallucinogens]
179	R53 - Malaise and fatigue	207	T51-T65 - Toxic effects of substances chiefly non-medicinal as to source
180	R55 - Syncope and collapse	208	T66-T78 - Rest of Other and unspecified effects of external causes
181	R56 - Convulsions not elsewhere classified	209	T68 - Hypothermia
182	R57 - Shock not elsewhere classified	210	T80-T88 - Rest of Complications of surgical & medical care nec.
183	R63 - Symptoms and signs concerning food and fluid intake	211	T82 - Comps of cardiac & vasc. prosthetic devices, implants & grafts
184	R68 - Other general symptoms and signs	212	T83 - Comps of genitourinary prosthetic devices, implants & grafts
185	R69-R69 - Unknown & unspecified causes of morbidity	213	T84 - Comps of internal orthopaedic prosthetic devices implants & grafts
186	S00-T98 - Chapter 19 - Remainder of chapter	214	T85 - Comps other internal prosthetic devices implants &grafts
187	S00-S09 - Rest of Injuries to the head	215	Z00-Z99 - Chapter 21 - Remainder of chapter
188	S00 - Superficial injury of head	216	Z00-Z13 - Rest of Persons encountering health services for exam.
189	S01 - Open wound of head	217	Z03 - Med observ and evaluation for suspected diseases and conditions
190	S02 - Fracture of skull and facial bones	218	Z51 - Other medical care
191	S06 - Intracranial injury	219	Z70-Z76 - Persons encountering health services in other circumstances
192	S09 - Other and unspecified injuries of head		
193	S10-S19 – Injuries to the neck		





**Table 2.2: Deaths within 30 days of admission to hospital, per 100,000 patients by age and sex**

(standardised for method of admission and diagnosis at chapter/sub-chapter/3 digit ICD10 code), including deaths in hospital and after discharge, excluding spells with cancer coded anywhere. (Standardised to 2001-2)

<i>England</i>										
Female	0	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44
1998-9	592.7	127.3	66.0	84.5	69.9	35.6	37.7	59.6	105.0	225.2
1999-2000	549.6	124.1	63.7	101.4	53.9	41.4	41.2	53.7	104.4	234.2
2000-1	498.6	102.7	70.1	83.3	60.3	37.5	40.0	59.5	106.6	206.4
2001-2	514.6	80.5	76.3	67.0	55.5	36.3	33.7	50.2	106.7	222.2
2002-3	480.4	104.2	43.6	76.8	52.2	38.4	40.6	54.2	103.5	216.4
Female	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+	All
1998-9	389.1	515.4	758.2	1224.6	1936.4	3092.9	4559.6	6593.5	11298.9	1792.7
1999-2000	380.5	482.3	707.6	1162.9	1820.5	2908.7	4412.2	6465.6	11076.7	1737.1
2000-1	365.5	472.2	672.8	1084.4	1710.5	2706.0	4175.6	6184.2	10626.4	1652.7
2001-2	349.2	473.5	685.2	1062.5	1633.4	2571.4	4062.6	6044.8	10862.5	1638.9
2002-3	359.4	468.4	649.0	1009.1	1574.6	2520.3	3974.7	5961.3	10879.2	1620.8