

## APPENDICES

### Appendix 1. hospital and patient characteristics of the total Dutch inpatient hospital population

(source: Dutch Hospital Data/Prismant) in 2004, 2008 and 2011/2012.

Hospital characteristics	Total hospital	Total hospital	Total hospital
	population	population	population
	2004*	2008*	2011/2012*
Inpatient admissions n	1.343.234	1.332.602	1.678.283
Hospital deaths n (% of total population)	42.329 (3.2)	35.721 (2.7)	37.249 (2.2)
Patient admissions n (% of total sample/ pop)			
- University hospitals	179.998 (13.4)	197.269 (14.8)	219.728 (13.1)
- Tertiary teaching	381.625 (28.4)	584.914 (43.9)	744.334 (44.4)
- General	781.611 (58.2)	550.419 (41.3)	714.221 (42.3)
Patient Characteristics	Total hospital	Total hospital	Total hospital
	population	population	population
	2004*	2008*	2011/2012*
Male sex %	48.7	49.9	49.8
Age y, mean (SD)	55.9 (21.7)	56.8 (21.8)	57.7 (21.6)
Length of hospital stay d, mean (SD/median)	7.3 (10.4/4)	6.3 (9.5/3)	5.4 (7,0/3)
Patients admitted urgently %	46.6	49.5	53.1
Hospital departments,			
- Surgery	24.4	23.8	23,0
- Cardiology	16.1	17.5	17,2
- Internal medicine	16.1	15.9	17,7
- Orthopaedics	8.7	8.2	8,4
- Neurology	6.3	6.5	7,5
- Lung diseases	6.5	7.7	8,5
- Ear, nose, throat	4.5	3.8	3,2
- Urology	5.0	5.0	5,1
- Other	13.1	11.6	9,3

\* Patient admissions of obstetrics, psychiatry, <1 year and <24 hours for non-deceased patients were excluded.

## Appendix 2: multilevel model preventable AE

	<b>Model AE OR (95% CI)</b>	<b>Model preventable AE OR (95% CI)</b>
inpatient death 2004	2.98 (2.37 to 3.75)	3.26 (2.36 to 4.52)
inpatient death 2008	4.05 (3.10 to 5.30)	4.90 (3.23 to 7.42)
inpatient deaths 2011/2012	3.06 (2.31 to 4.06)	4.80 (2.81 to 8.22)
academic hospital 2004	1.69 (1.05 to 2.73)	0.64 (0.36 to 1.14)
tertiary teaching hospital 2004	1.04 (0.68 to 1.59)	1.00 (0.63 to 1.59)
academic hospital 2008	0.83 (0.55 to 1.23)	0.65 (0.37 to 1.14)
tertiary teaching hospital 2008	0.95 (0.68 to 1.32)	0.93 (0.59 to 1.45)
academic hospital 2011/2012	1.29 (0.91 to 1.82)	0.60 (0.33 to 1.09)
tertiary teaching hospital 2011/2012	0.96 (0.72 to 1.29)	0.92 (0.61 to 1.40)
age 2004	1.01 (1.00 to 1.02)	1.01 (1.00 to 1.02)
age 2008	1.00 (1.00 to 1.01)	1.01 (1.00 to 1.01)
age 2011/2012	1.01 (1.00 to 1.01)	1.00 (0.99 to 1.01)
sex 2004	0.97 (0.82 to 1.15)	0.94 (0.73 to 1.19)
sex 2008	0.97 (0.79 to 1.19)	1.31 (0.96 to 1.79)
sex 2011/2012	1.03 (0.83 to 1.28)	1.37 (0.92 to 2.03)
urgent admission 2004	0.53 (0.43 to 0.65)	0.60 (0.44 to 0.81)
urgent admission 2008	0.63 (0.49 to 0.81)	0.73 (0.50 to 1.06)
urgent admission 2011/2012	0.50 (0.38 to 0.65)	0.54 (0.34 to 0.88)
admission to surgical unit 2004	1.70 (1.31 to 2.20)	1.96 (1.47 to 2.61)
admission to surgical unit 2008	2.83 (2.19 to 3.67)	3.69 (2.50 to 5.44)
admission to surgical unit 2011/2012	2.44 (1.86 to 3.21)	2.20 (1.42 to 3.41)
	<b>Model AE variance*</b>	<b>Model preventable AE variance*</b>
hospital level 2004	0.23	0.26***
department level 2004	0.39	0.29
hospital level 2008	0.18	0.16***
department level 2008	0.30	0.55
hospital level 2011/2012	0.09	X**
department level 2011/12	0.35	0.55
R-squared****	10.1%	12.8%

\*Variances are the sum of the variances and covariances of that year.

\*\*Variances and covariances could not be calculated and were estimated as zero by model

\*\*\*Covariances of 2011/2012 could not be calculated and were estimated as zero by model

\*\*\*\* McKelvey and Zavoina approximation for the explained proportion of variance for multilevel logistic regression (Snijders, TAB, Bosker, R.J. Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling, second edition. London etc.: Sage Publishers, 2012).

### Appendix 3: Type of preventable AEs per 10.000 patients for 2004, 2008 and 2011/12

	Type of harm	Preventable AE 2004	Preventable AE 2008	Preventable AE 2011/2012
<b>1</b>	<b>Cardiovascular system, total</b>	<b>41.6</b>	<b>32.3</b>	<b>29.6</b>
1.1	Cardiac arrest	0.0	2.5	0.0
1.2	Hypotension	3.8	2.5	4.9
1.3	Hypertension	0.0	2.5	0.0
1.4	Shock	3.8	0.0	2.5
1.5	Arrhythmias or conduction abnormality	5.0	0.0	0.0
1.6	Myocardial ischaemia	8.8	0.0	4.9
1.7	Heart failure	15.1	7.5	9.9
1.8	Aneurysm	0.0	0.0	2.5
1.9	Other cardiovascular event	5.0	17.4	4.9
<b>2</b>	<b>Respiratory system, total</b>	<b>39.1</b>	<b>62.1</b>	<b>19.8</b>
2.3	Pneumothorax	2.5	5.0	0.0
2.4	Atelectasis	1.3	0.0	0.0
2.5	Bronchospasm	0.0	0.0	2.5
2.6	Aspiration	7.6	12.4	4.9
2.7	Pulmonary embolus	15.1	24.9	4.9
2.9	Other respiratory event	12.6	19.9	7.4
<b>3</b>	<b>Renal or endocrine system, total</b>	<b>36.6</b>	<b>34.8</b>	<b>34.6</b>
3.1	Fluid overload	5.0	5.0	2.5
3.2	Dehydration or oliguria	2.5	5.0	0.0
3.5	Hyperglycaemia	2.5	2.5	2.5
3.6	Hypoglycaemia	2.5	5.0	7.4
3.7	Hyperkalaemia	3.8	2.5	9.9
3.8	Renal insufficiency	5.0	12.4	4.9
3.9	Other renal or endocrine event	15.1	2.5	7.4
<b>4</b>	<b>Haematologic system, total</b>	<b>22.7</b>	<b>37.3</b>	<b>9.9</b>
4.1	Haemorrhage	15.1	14.9	2.5
4.2	Thromboembolic venous event	3.8	7.5	2.5
4.3	Haematoma	0.0	7.5	2.5
4.4	Other haematologic event	3.8	7.5	2.5
<b>5</b>	<b>Gastrointestinal system, total</b>	<b>39.1</b>	<b>64.6</b>	<b>37.1</b>
5.1	Nausea or vomiting	0.0	2.5	2.5
5.2	Diarrhoea	0.0	0.0	0.0
5.5	Pancreatitis	0.0	0.0	2.5
5.6	Ileus	3.8	22.4	4.9
5.7	Intestinal tract bleeding	10.1	0.0	7.4
5.8	Perforation	10.1	12.4	14.8

5.9	Other gastrointestinal event	15.1	27.3	4.9
<b>6</b>	<b>Neurologic system, total</b>	<b>37.9</b>	<b>14.9</b>	<b>19.8</b>
6.2	Delirium or encephalopathy	3.8	5.0	2.5
6.3	Seizure	0.0	2.5	2.5
6.4	Stroke or intracerebral haemorrhage	15.1	2.5	4.9
6.5	Coma	0.0	0.0	7.4
6.6	Withdrawal symptoms	2.5	2.5	0.0
6.8	Other neurologic event	16.4	2.5	2.5
<b>7</b>	<b>Hospital acquired infection, total</b>	<b>36.6</b>	<b>87.0</b>	<b>46.9</b>
7.1	Catheter-related bloodstream infection	2.5	5.0	2.5
7.2	Sepsis or bacteraemia unrelated to catheter	15.1	54.7	24.7
7.3	Ventilator-associated pneumonia	1.3	0.0	0.0
7.4	Nosocomial pneumonia, not ventilator-related	3.8	9.9	4.9
7.5	Urinary tract infection	6.3	0.0	0.0
7.6	Surgical site infection	1.3	7.5	2.5
7.8	Clostridium difficile colitis	0.0	0.0	2.5
7.9	Phlebitis	0.0	0.0	2.5
7.10	Infected foreign material	2.5	5.0	2.5
7.11	Other hospital acquired infection	3.8	5.0	4.9
<b>8</b>	<b>Surgical event, total</b>	<b>94.6</b>	<b>121.8</b>	<b>49.9</b>
8.1	Postoperative haemorrhage	15.1	37.3	2.5
8.2	Postoperative haematoma	2.5	2.5	2.5
8.3	Postoperative abscess	2.5	2.5	2.5
8.4	Laceration or other organ injury	13.9	0.0	4.9
8.5	Unplanned removal of organ after intraoperative injury	0.0	9.9	0.0
8.6	Vascular injury	2.5	0.0	0.0
8.7	Nerve injury	3.8	0.0	0.0
8.9	Wound dehiscence	3.8	2.5	0.0
8.10	Anastomotic leakage	6.3	7.5	2.5
8.11	Postoperative fistula	2.5	0.0	0.0
8.12	Failed procedure	29.0	2.5	29.6
8.13	Unplanned return to surgery	0.0	9.9	0.0
8.14	Other event	12.6	47.2	4.9
<b>9</b>	<b>Other types of harm, total</b>	<b>94.6</b>	<b>121.8</b>	<b>49.4</b>
9.2	Pyrexia	0.0	5.0	2.5
9.4	Allergic reaction	0.0	0.0	0.0
9.5	Pressure ulcer	5.0	0.0	0.0
9.6	Rash	1.3	7.5	0.0
9.7	Catheter complication	0.0	0.0	0.0
9.8	Fracture	6.3	2.5	4.9

9.9	Other type of harm	36.6	42.3	22.2
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