Impact of UK primary care policy reforms on short stay unplanned hospital admissions for children with primary care sensitive conditions: interrupted time series analysis

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Abstract

Purpose We aimed to assess the impact of primary care policy reforms - in April 2004, on potentially avoidable short stay unplanned hospital admissions for children with primary care sensitive conditions.

Methods We conducted an interrupted time series analysis of hospital admissions for all children aged less than 15 years in England between April 2000 and March 2012 using data from National Health Service (NHS) public hospitals in England. Main outcomes were annual short stay (<2 day) unplanned hospital admission rates for primary care sensitive infectious and chronic conditions.

Results There were 7.8 million unplanned admissions over the study period. Over a half (4,144,729/7,831,633) were short stay admissions for potentially avoidable infectious and chronic conditions. The primary care policy reforms in April 2004 were associated with an 8% increase in short stay admission rates for chronic conditions, equivalent to 8,500 additional admissions, above the 3% annual increasing trend. Policy reforms were not associated with an increase in short stay admission rates for infectious illness which were increasing by 5% annually before April 2004. The proportion of primary care referred admissions was falling prior to the reforms with further sharp falls in 2004.

Conclusion The introduction of primary care policy reforms coincided with an increase in short stay admission rates for children with primary care sensitive chronic conditions, and with more children are being admitted through emergency departments. Short stay admission rates for primary care sensitive infectious illness increased more steadily and could relate to lowered thresholds for admission to hospitals.
**Key Words:** Pay for performance, unplanned admissions, short stay admissions, children, out-of-hours health care, trends, primary care physicians

**Abbreviations:**

- **AHRQ**  Agency for Healthcare Research and Quality
- **CCS**  Clinical Classifications Software
- **CI**  Confidence interval
- **ED**  Emergency department
- **HES**  Hospital Episodes Statistics
- **LA**  (English) local authorities
- **NHS**  National Health Service
- **OR**  Odds ratio
- **PCS**  Primary care sensitive
- **RR**  Rate ratio
- **UK**  United Kingdom
Introduction
Pay for performance schemes have successfully driven improvements in care for chronic conditions in many countries. However, unintended consequences of these reforms may have diminished primary care quality for some groups such as children whose care is not incentivised. In 2004, the United Kingdom (UK) National Health Service (NHS) introduced major reforms to primary care policy which aimed to improve working conditions for primary care physicians and health outcomes for patients (Box 1). The scheme focused heavily on improving chronic disease management in adults with long conditions, but very few (<3%) of the health targets applied to children’s care. Additional revisions to primary care policy in 2004 allowing primary care physicians to opt out of providing acute primary care services during evenings and weekends have reduced access that has been associated with increased emergency department (ED) visits. Access to high-quality primary care is strongly associated with reduced numbers of unplanned hospital admissions for some conditions that are potentially avoidable or ‘primary care sensitive’ (PCS). These changes in primary care policy are thought to have contributed to a rise in unplanned hospital admissions in children over the past decade.

In England, all unplanned admissions in children increased between 1997 and 2006, driven by short stays (minor, self-limiting conditions of less than 2 days), which rose by 41%. Previous studies implicating primary care reforms as being responsible for rises in admissions had several design flaws. Firstly, none of these studies have taken into account secular trends in admission rates; linked the rises to the timing of the reforms or controlled for the falls in long stays. Also previous studies focusing on all short stay admissions did not compare changes in admission rates for PCS conditions against comparator conditions that should not have been affected by changes in primary care. For example injuries, which should be seen in hospital, may result in a short stay and should not be counted as being primary care sensitive. Pediatric quality indicators in the US and UK such as the Agency for Healthcare Research and Quality (AHRQ) have been used to measure PCS
admissions, but account for only a minority of highly frequent causes of admission in young children. We combined several criteria to develop a deliberately broader composite measure to capture the majority of potentially PCS childhood illnesses for which children would consult a primary care physician. Our hypothesis was that major restructuring in NHS primary care in England in 2004 impacted adversely on the availability of primary care to children and, as a result, increased PCS short stay unplanned hospital admissions for acute infectious and chronic conditions. We compared these trends with short stay admissions for injury as an index marker of background hospital admission trends and examined long stay admissions to explore an alternative hypothesis that the burden of illness has increased over time.

**Methods**

**Data and definitions**

We used Hospital Episodes Statistics (HES), the national administrative database for hospital activity in England. We examined all unplanned (emergency) admissions from 01/04/2000 to 31/03/2012 in children aged less than 15 years; an unplanned admission is an unexpected event which occurs when a child presents with an acute problem that is immediately referred for hospital treatment. Admission diagnoses are recorded in HES as the main reason for admission or ‘primary diagnosis’ using International Classification of Diseases, 10th revision (ICD10) codes that can be mapped to the AHRQ Clinical Classifications System (CCS). We developed broad composite indicators to identify admissions that were minor, self-limiting and potentially PCS. We defined our main outcome as short stay admissions with a length of stay of <2 days and no readmission for any cause within 28 days of the index admission for 2 broad groups of primary care sensitive conditions: acute infectious illness and chronic disease. We used clinical coding lists based on the AHRQ Clinical Classifications Software (CCS) drawn up by a clinician expert panel, for classification. Discrepancies were resolved by discussion and consultation with literature to achieve consensus (Appendix 1). Our comparator group was short stay admissions for injury. We also examined a secondary outcome measure of a
small subset of admissions for asthma, diabetes, urinary tract infection and intestinal infection that have been used to reflect the quality of care outside hospital for children aged less than 17 years and identify potentially avoidable hospitalizations among children at an area level by the AHRQ.\textsuperscript{9} We grouped admissions into 326 English local authority areas (LA), based on patients’ residential area, by sex, financial year of admission and by developmental age bands of <1, 1-4, 5-9 and 10-14 years. Annual denominator data were Office of National Statistics mid-year population estimates.\textsuperscript{14} We flagged each admission that was referred by a primary care physician.

To examine the effect of improved efficiency as an alternative explanation for the rise in short stay admission rates we examined trends in long stay admissions lasting 2+ days, which we considered to be ‘moderate’ or ‘serious’ and hence not PCS. We also examined same day discharges, a subset of short stay admissions as a secondary outcome of minor conditions presenting to hospitals. Age-sex specific short and long stay unplanned admission rates were directly standardised to the national population of children in 2011.

**Data analysis**

To estimate changes associated with primary care policy changes in 2004, we fitted a segmented regression model of our time series for all children in England. The model estimated 3 main parameters. The first parameter estimated the annual trend in our outcome associated with each year from 2000 before primary care policy reforms were introduced in April 2004, the second parameter estimated the immediate level change associated with policy change in 2004 and the third parameter estimated the trend change in our outcome associated with each year afterwards to 2011.\textsuperscript{15,16} For each outcome we applied a generalized estimating equation model clustering by LA-age-sex combination with robust standard errors and autoregressive correlation matrix.\textsuperscript{17,18} We report annual rate ratios (RR) calculated from the parameter estimations which represent population averaged rates. Sensitivity analyses investigated 1) an additional trend change in 2008 and 2) the confounding effect of long stay admissions trends on stay short stay admission rates. To
investigate referral by primary care physician as the outcome, adjusted annual odds ratios (OR) were calculated from a segmented trends analysis using logistic regression. The Health and Social Care Information Centre provided ethical approval to use HES data for our research. We performed all analysis using Stata11 (Stata Corp, Texas).

**Results**

Between 2000 and 2011 there were 7.8 million unplanned admissions in a population of 16 million children aged less than 15 years, of which 811,154 (10%) were readmissions within 28 days of discharge. Over half (4,144,729/7,831,633) of all unplanned admissions were potentially PCS short stay admissions, of which 32% (2,492,038) were for acute infectious illness and 21% (1,652,691) were for chronic conditions. The AHRQ pediatric care quality indicators accounted for less than 10% of unplanned admissions and did not change significantly across the study period. The proportion of all unplanned admissions that were for a short stay increased from 66% in 2000 to 75% in 2011 (Table 1), driven by same day discharges which increased from 31% to 46%.

Short stay admission rates were highest in infants and fell with age, ranging from 194 95%CI(193 - 195) per 1,000 children in aged <1 year in 2011 to 74 (73 - 74), 28 (27 - 28) and 23 (23 - 24) in children aged 1-4, 5-9 and 10-14 years respectively. Owing to the large numbers of admissions confidence intervals generated were narrow and are not presented in full from this point. Infectious illness was consistently the commonest reason for short stay admissions in children aged <5 years (Table 1 & Appendix 2). Infectious illness and chronic conditions accounted for similar proportions for children aged 5-9 years. Steep rises after 2004 meant that chronic conditions surpassed injury as the commonest reason for short stay admissions in children aged 10-14 years. There were steady increases in age-sex standardized short stay admission rates for infectious illness and injury over the study period, whereas rates for chronic conditions peaked in 2008 (Table 2). There were corresponding falls in long stay admission rates (Table 2 & Appendix 2).
Impact of 2004 policy reforms on PCS short & long stay admissions

Estimated trends for all cause short stay admission rates were increasing by 4% annually (RR 1.04 (1.04-1.04)) prior to 2004 but levelled to 3% per year afterwards. There was no immediate level change in 2004 (Table 3). Short stay admission rates for infectious illness were increasing by 5% annually before April 2004 (RR 1.05). Rates levelled in 2004 (RR 1.00)) and continued at 4% annually afterwards. The annual increase in short stay admissions for chronic conditions was 3% (RR 1.03) before 2004; an immediate level change in 2004 of 8% which is equivalent to 8,500 additional short stay admissions, gave a total annual increase of 11% in 2004; rates continued to rise at 4% (RR 1.04) per year afterwards. These estimated parameters measuring pre 2004 trend and 2004 level change were unaffected by modelling a 2008 trend change and adding long stay admission rates as an explanatory variable. Short stay admission rates for our comparator condition injury increased 1-2% annually throughout the study period.

Long stay admission rates fell annually by -4%, -4% and -2% prior to 2004 in infectious illness, chronic conditions and injury respectively. There was an interruption in the falling trend for chronic conditions in 2004 (RR 1.01) but not for the other disease categories.

Trends in admissions referred by primary care physician

More children were referred by primary care physicians for infectious illness 40% (1,122,656/2,797,011) than chronic conditions, 35% (549,800/1,578,757). Referrals for injury were lowest at 5% (54889/1,051,991). The proportion of unplanned admissions referred by primary care physicians for infectious illness and chronic conditions was decreasing annually by 8% (OR 0.92) and 7% (OR 0.93) before the policy reforms in April 2004, dropped by a further 5% and 6% level change, and levelled gradually afterwards (Table 4). The biggest falls of 8% occurred among children aged 4-9 years (OR 0.92).

Discussion
Main findings
Our findings confirm an association between the timing of major national primary care policy reform in the UK in 2004 and rises in short stay admission rates for primary care sensitive (PCS) chronic conditions in children. The 8% increase in 2004, above the increasing trend, was equivalent to 8,500 extra short stay admissions. These increases were accompanied by falls in admissions referred by a primary care physician. We did not find an immediate level change in short stay admission rates for infectious illness, which were increasing annually by 5% annually well before the reforms of 2004 against a steadily rising trend for injury admissions of 1-2% annually.

Strengths and weaknesses in relation to previous research
Our study is the first to use interrupted time series analysis to investigate the timing of primary care policy reforms on PCS admissions in children. Our study’s strengths include its size and national population coverage. National administrative admission data are a useful tool for exploring the impact of national policy change as they are not subject to bias due to regional variations of individual providers. Our definition of a PCS admission was deliberately broad and captured a wide spectrum of potentially avoidable admissions. Pediatric indicator sets adopted by previous studies accounted for only selected infectious and chronic conditions that taken together explained less than 30% of short stay admissions in children. By contrast in our study, the 10 most frequent causes for admission for potentially avoidable admissions for primary care sensitive infectious and chronic conditions account for over 70% of short stay admissions [Appendix 3]. Our broader composite indicators for acute and chronic PCS conditions in children may be useful for future research to monitor the impact of primary care on potentially avoidable admissions in children.

However, we acknowledge that our results are subject to a number of limitations. Inherent biases exist in the use of clinical codes and length of stay to derive a proxy for identifying primary care sensitive admissions. Changes in accuracy and completeness of clinical coding could affect diagnosis categorisation or referral information over the study period although the use of broadly defined diagnosis groups is less likely to be affected by variations in coding of individual conditions.
we present only 4 years of data prior to policy reform it is possible that a more important underlying trend could have been obscured, however our previous report of a 41% increase in short stay admissions over a 10 year period (between 1997 and 2006) is comparable to our findings of a pre-2004 rate of 4% per year. 6, 7

Our findings may be confounded by concurrent health policy and service changes in hospital care around 2004 (Box 1). UK government performance targets introduced in 2000 were tightened in 2004 whereby EDs incurred heavy penalties if patients waited longer than 4 hours. In response, many hospitals introduced short stay admission facilities for assessment and observation. This may explain increases in same day discharge rates but not differing trends across diagnosis categories. 8, 23. 24 Financial tariff schemes for hospital activities including admissions were introduced from 2003, but there was only limited evidence of ‘gaming’ by a small number of hospital trusts to increase payments. 21, 25 Shorter length of stay is associated with improved efficiency in hospitals when offset by a reduction in longer stay admissions of greater than 2 days; we adjusted for changes in long stay admission rates and found increased efficiency does not explain the increases in short stay admissions.

Implications and future research
Although we cannot infer causation our findings, with a magnitude of 11% increase in short stay admissions for chronic disease, lends weight to speculation from previous reports that short stay admissions may increase when primary care provision is withdrawn. 8 Our findings that short stay admission rates among children with chronic conditions suffered an immediate level change in 2004 and are now surpassing other causes of admission in older children are particularly concerning. This may indicate an adverse impact of financial incentive schemes focusing on chronic conditions in adults. 26 The success of the scheme on improving care quality and clinical outcomes has been called into question, 27, 28 and there has been concern it has widened inequalities as a result of unintended consequences for children and other groups. 29, 30 Continuity of care, important in building a parent
physician relationship and preventing the use of emergency health services also reportedly suffered with the introduction of pay for performance.\textsuperscript{31-33} Evidence of the impact of pay for performance in the UK on children’s access to primary care physicians is limited, but primary care consultation rates rose between 1995 and 2006 in all age groups except for children aged between 5 to 14 years.\textsuperscript{34}

We did not find a direct relationship between rising admissions for infectious illness in children, which predated the primary care policy reforms of 2004. Infectious illness is common in young children and particularly sensitive to the availability of out of hours care. Steep increases prior to 2004 may reflect gradual changes in out of hours primary care provision from 2000,\textsuperscript{35} by 2004 over 95\% of primary care physicians had opted out of out of hours health care provision at a national level. Certainly, the large increases in admissions with same day discharge may reflect a trend in EDs towards hospitalizing children for observation.\textsuperscript{8,36}

The expansion in primary care based activity as a result of reforms has meant that primary care physicians are struggling to maintain their existing workload,\textsuperscript{37} and existing healthcare provision in England is not sufficient to contain childhood illness in the community. Concerns about rising ED visits and short stay admissions have sparked calls for a reversal of policy reform suggesting UK primary care physicians should extend access to primary care outside of core hours and controversial pilot schemes for 24/7 care are now proposed in many areas.\textsuperscript{38} However such changes have huge implications for the primary care physician workforce and UK health system budgets. We recommend further research to model clinical and cost effectiveness and survey parental attitudes to weigh best options for avoiding hospital admissions in children.
Box 1: Major UK National Health Service Changes in 2004

| Primary care reforms |
|-----------------------|
| 1) Allowed primary care physicians greater flexibility to the services they provided for example opting out of responsibility for out-of-hours care. |
| 2) Financial incentive scheme for primary care physicians to deliver clinical and organisational care, assessed through performance target achievement - the Quality and Outcomes Framework. |

| Emergency care reforms |
|------------------------|
| Tightening of targets so that 98% of patients wait no more than 4 hours in an emergency department from arrival to hospital admission, transfer or discharge. |

| Hospital reforms |
|------------------|
| Introduction of ‘Payment by Results’ schemes changed the way a hospital was paid from block contract payment for service provision to one remunerating activity such as episodes of care. |
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References

1. Department of Health. Investing in General Practice: The New General Medical Services Contract. 2003 23 December 2003.
2. Roland M, Campbell S. Successes and Failures of Pay for Performance in the United Kingdom. N Engl J Med. 2014;370(20):1944-9.
3. Cowling TE, Cecil EV, Soljak MA, Lee JT, Millett C, Majeed A, et al. Access to primary care and visits to emergency departments in England: a cross-sectional, population-based study. PLoS One. 2013;8(6):e66699.
4. Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. Milbank Q. 2005;83(3):457-502.
5. Saxena S, Bottle A, Gilbert R, Sharland M. Increasing short-stay unplanned hospital admissions among children in England; time trends analysis '97-'06. PLoS One. 2009;4(10):e7484.
6. Huntley A, Lasserson D, Wye L, Morris R, Checkland K, England H, et al. Which features of primary care affect unscheduled secondary care use? A systematic review. BMJ open. 2014;4(5).
7. Saxena S, Francis N, Sharland M. Primary care of children: the unique role of GPs. Br J Gen Pract. 2012;62(600):340-1.
8. Gill PJ, Goldacre MJ, Mant D, Heneghan C, Thomson A, Seagroatt V, et al. Increase in emergency admissions to hospital for children aged under 15 in England, 1999–2010: national database analysis. Arch Dis Child. 2013; 98(5):328-34
9. AHRQ Pediatric Quality Indicators. Available from: http://www.qualityindicators.ahrq.gov/ (Accessed 02/03/2015).
10. Health and Social Care Information Centre: NHS Outcomes Framework Indicators. Available from: http://www.hscic.gov.uk/nhsfof (Accessed 02/03/2015).
11. Friedman B, Berdahl T, Simpson LA, McCormick MC, Owens PL, Andrews R, et al. Annual Report on Health Care for Children and Youth in the United States: Focus on Trends in Hospital Use and Quality. Acad Pediatr. 2011;11(4):263-79.
12. Health and Social Care Information Centre. Hospital Episode Statistics. Available from: http://www.hscic.gov.uk/hes (Accessed 02/03/2015).
13. AHRQ. Clinical Classifications Software. Available from: http://www.ahrq.gov/research/data/hcup/icd10usrgd.html (Accessed 02/03/2015).
14. Office for National Statistics. Available from: http://www.ons.gov.uk/ons/index.html (Accessed 02/03/2015).
15. Wagner AK, Soumerai SB, Zhang F, Ross-Degnan D. Segmented regression analysis of interrupted time series studies in medication use research. J Clin Pharm Ther. 2002;27(4):299-309.
16. Alshamsan R, Lee JT, Majeed A, Netuveli G, Millett C. Effect of a UK Pay-for-Performance Program on Ethnic Disparities in Diabetes Outcomes: Interrupted Time Series Analysis. Ann Fam Med. 2012;10(3):228-34.
17. Zeger SL, Liang KY. Longitudinal Data Analysis for Discrete and Continuous Outcomes. Biometrics. 1986;42:121-30.
18. Fretheim A, Soumerai SB, Zhang F, Oxman AD, Ross-Degnan D. Interrupted time-series analysis yielded an effect estimate concordant with the cluster-randomized controlled trial result. J Clin Epidemiol. 2013;66(8):883-7.
19. Goodacre S. Hospital admissions with head injury following publication of NICE guidance. Emerg Med J. 2008;25(9):556-7.
20. Torio CM, Elixhauser A, Andrews RM. Trends in Potentially Preventable Hospital Admissions among Adults and Children, 2005–2010: Statistical Brief #151 Rockville (MD): Agency for Health Care Policy and Research (US); 2013.
21. Audit Commission. Improving coding, costing and commissioning: Annual report on the Payment by Results data assurance programme 2010/11.
22. Dixon J, Sanderson C, Elliott P, Walls P, Jones J, Petticrew M. Assessment of the reproducibility of clinical coding in routinely collected hospital activity data: a study in two hospitals. J Public Health Med. 1998;20(1):63-9.
23. Department of Health. The NHS Plan: a plan for investment, a plan for reform. 2000.
24. Scribano PV, Wiley JF, 2nd, Platt K. Use of an observation unit by a pediatric emergency department for common pediatric illnesses. Pediatr Emerg Care. 2001;17(5):321-3.
25. Blunt I, Bardsley M, Dixon J. Trends in Emergency Admissions in England 2004–2009. Nuffield Trust, 2010.
26. Kyle RG, Kukanova M, Campbell M, Wolfe I, Powell P, Callery P. Childhood disadvantage and emergency admission rates for common presentations in London: an exploratory analysis. Arch Dis Child. 2011;96(3):221-6.
27. Heath I, Hippsley-Cox J, Smeeth L. Measuring performance and missing the point? British Medical Journal. 2007;335(7629):1075-6.
28. Gillam SJ, Siriwardena AN, Steel N. Pay-for-Performance in the United Kingdom: Impact of the Quality and Outcomes Framework—A Systematic Review. Ann Fam Med. 2012;10(5):461-8.
29. Campbell SM, Reeves D, Kontopantelis E, Sibbald B, Roland M. Effects of pay for performance on the quality of primary care in England. N Engl J Med. 2009 2009;361(4):368-78.
30. Chien AT, Dudley RA. Pay-for-performance in pediatrics: proceed with caution. Pediatrics. 2007;120(1):186-8.
31. Gill JM, Mainous III AG, Nsereko M. The Effect of Continuity of Care on Emergency Department Use. Arch Fam Med. 2000;9(4).
32. Campbell SM, Kontopantelis E, Reeves D, Valderas JM, Gaehl E, Small N, et al. Changes in patient experiences of primary care during health service reforms in England between 2003 and 2007. Ann Fam Med. 2010 8(6):499-506.
33. Mainous AG, Baker R, Love MM, Gray DP, Gill JM. Continuity of care and trust in one’s physician: evidence from primary care in the United States and the United Kingdom. Fam Med. 2001 2001;33(1):22-7.
34. Hippsley-Cox J, Fenty J, Heaps M. Trends in Consultation Rates in General Practice 1995 to 2006: Analysis of the QRESEARCH database. QRESEARCH research highlights Leeds: The Information Centre. 2007 2007;29.
35. Carson D. Raising Standards for Patients New Partnerships in Out-of-Hours Care. Department of Health; 2000.
36. Simmonds RL, Shaw A, Purdy S. Factors influencing professional decision making on unplanned hospital admission: a qualitative study. Br J Gen Pract. 2012 Nov;62(604):e750-6.
37. Gerada C, Riley B. The 2022 GP: our profession, our patients, our future. Br J Gen Pract. 2012;62(604):566-7.
38. Kingsland JP, & Swinyard, P. W. Should general practices open for longer. British Medical Journal. 2013;347.
### Table 1: Unplanned hospital admissions (%) for years 2000/1 and 2010/11 in children aged 0-14 years, in England

|                                | Aged <1 year | 1-4 years | 5-9 years | 10-14 years | Total        |
|--------------------------------|--------------|-----------|-----------|-------------|--------------|
|                                | 2000/1       | 2011/12   | 2000/1    | 2011/12     | 2000/1       | 2011/12     | 2000/1       | 2011/12     | 2000/1       | 2011/12     | 2000/1       | 2011/12     | 2000/1       | 2011/12     |
| Population                     | 575,000      | 679,100   | 2,405,900 | 2,649,600   | 3,176,900    | 2,990,100    | 3,197,800    | 3,067,400   | 9,355,600    | 9,386,200   |
| No. Children Admitted         | 115,132      | 159,486   | 163,508   | 207,573     | 94,857       | 96,232       | 95,601       | 91,354      | 469,098      | 554,645     |
| Total Unplanned Admissions     | 150,694      | 215,401   | 202,161   | 267,553     | 112,772      | 118,500      | 115,547      | 114,339     | 581,174      | 715,793     |
| Mean number of admissions per child | 1.31         | 1.35      | 1.24      | 1.29        | 1.19         | 1.23         | 1.21         | 1.25        | 1.24         | 1.29        |
| Mean length of stay (SD)       | 3.0 (27.0)   | 1.5 (4.5) | 2.1 (23.7) | 1.0 (2.8)   | 2.4 (25.0)   | 1.2 (3.2)    | 3.2 (31.5)   | 1.6 (4.8)   | 2.6 (26.5)   | 1.3 (4.0)   |
| N (%)                          | Boys         | 86,823     | 123,384   | 115,818     | 152,984      | 65,481       | 67,636       | 65,753       | 61,722       | 333,875     | 405,726     |
| Readmission†                   | 17,554       | 28,426     | 16,995    | 26,523      | 8,545        | 11,023       | 10,032       | 11,631      | 53,126       | 77,603      |
| Same day discharge†            | 45,595       | 97,531     | 71,376    | 134,516     | 33,424       | 52,827       | 27,167       | 43,562      | 177,562      | 328,436     |
| Overnight stay†                | 45,271       | 55,142     | 74,900    | 81,322      | 43,260       | 37,671       | 42,333       | 36,608      | 205,764      | 210,743     |
| 2+ days stay                   | 58,731       | 56,391     | 55,098    | 46,099      | 35,525       | 24,961       | 45,307       | 30,378      | 194,661      | 157,829     |
| Infection                      | 83,281       | 104,770    | 101,918   | 154,743     | 37,154       | 40,943       | 29,736       | 28,600      | 252,089      | 329,056     |
| Chronic                        | 40,693       | 63,226     | 57,253    | 63,301      | 35,613       | 39,839       | 34,142       | 39,366      | 167,701      | 205,732     |
| Injury                         | 5,980        | 9,156      | 26,454    | 34,840      | 28,323       | 28,236       | 31,255       | 29,862      | 92,012       | 102,094     |
| Other                          | 20,740       | 38,249     | 16,536    | 14,669      | 11,682       | 9,482        | 20,414       | 16,511      | 69,372       | 78,911      |
| AHRQ Pediatric Quality Indicators§ | 7,959        | 10,008     | 10,995    | 13,647      | 2,459        | 2,735        | 1,145        | 1,306       | 22,558       | 27,696      |
| Intestinal Infection§          | 3,023        | 5,088      | 2,686     | 3,570       | 1,624        | 1,992        | 943          | 1,162       | 8,276        | 11,812      |
| Urinary Tract Infection        | 936          | 166        | 13,267    | 9,796       | 6,607        | 7,233        | 4,128        | 4,171       | 24,938       | 21,337      |
| Diabetes                       | 21           | 21         | 680       | 737         | 1,310        | 1,286        | 2,614        | 2,775       | 4,625        | 4,819       |
| Referred by primary care physician | 65,466       | 64,338     | 69,675    | 68,542      | 34,156       | 25,370       | 32,191       | 21,557      | 201,488      | 179,807     |

*Office of National Statistics England mid-year estimate population figures.
§Readmission within 28 days of an index admission
†Same day discharge and overnight stay combined make short stay admission numbers (admissions of less than 2 days).
‡Intestinal infection includes gastroenteritis
| Year | Infectious illness | Chronic conditions | Injury | All Cause |
|------|-------------------|--------------------|--------|-----------|
|      | Short stay | Long Stay | Short stay | Long Stay | Short stay | Long Stay | Short stay | Long Stay |
| 2000 | 17.3       | 8.8       | 10.8      | 5.4       | 7.2       | 2.2       | 39.3       | 19.1       |
| 2001 | 19.0       | 8.5       | 11.6      | 5.3       | 7.5       | 2.3       | 42.3       | 18.7       |
| 2002 | 18.6       | 7.7       | 12.0      | 5.0       | 7.4       | 2.2       | 42.1       | 17.3       |
| 2003 | 20.1       | 7.8       | 12.1      | 4.8       | 7.6       | 2.1       | 44.1       | 17.1       |
| 2004 | 19.9       | 7.3       | 13.4      | 4.8       | 7.6       | 1.9       | 45.4       | 16.4       |
| 2005 | 21.7       | 7.6       | 13.8      | 4.7       | 7.9       | 1.9       | 47.8       | 16.4       |
| 2006 | 21.4       | 6.9       | 14.7      | 4.6       | 8.1       | 1.8       | 48.3       | 15.3       |
| 2007 | 21.7       | 6.5       | 14.5      | 4.4       | 7.9       | 1.7       | 48.5       | 14.7       |
| 2008 | 22.6       | 6.6       | 15.4      | 4.4       | 7.9       | 1.5       | 50.6       | 14.7       |
| 2009 | 24.0       | 6.7       | 14.8      | 4.3       | 8.2       | 1.6       | 51.6       | 14.8       |
| 2010 | 25.1       | 7.1       | 14.5      | 4.2       | 8.4       | 1.5       | 53.0       | 15.0       |
| 2011 | 23.8       | 6.4       | 14.0      | 4.0       | 8.7       | 1.5       | 51.3       | 14.0       |

*Directly standardized unplanned admission rates are per 1,000 children aged 0-14 years with no readmission within 28 days
† Short stay admissions are unplanned admissions with a length of stay of less than 2 days
‡ Long stays are admissions with a length of stay of 2 days or more.
Confidence intervals for the standardized rates are very narrow and are not shown (maximum span 0.3)
Table 3: Annual rate ratios estimating trends before, and after 2004 primary care policy reforms in short and long stay rates for infectious illness, chronic conditions and injury, in children, in England.

|                      | Short Stay† |                           | Long Stay‡ |
|----------------------|-------------|----------------------------|------------|
|                      | % Annual    | RRᶛ                       | % Annual   | RRᶛ                       |
|                      | change      | 95% CI                     | change     | 95% CI                     |
| Infectious illness   |             |                            |            |
| Trend prior 2004     | 5           | 1.05 (1.05 - 1.05)         | -4         | 0.96 (0.96 - 0.96)         |
| Change 2003 to 2004  | 0           | 1.00 (1.00 - 1.00)         | -6         | 0.94 (0.94 - 0.95)         |
| Trend post 2004      | 3           | 1.03 (1.03 - 1.03)         | -1         | 0.99 (0.99 - 0.99)         |
| Chronic conditions   |             |                            |            |
| Trend prior 2004     | 3           | 1.03 (1.03 - 1.04)         | -4         | 0.96 (0.96 - 0.96)         |
| Change 2003 to 2004  | 11          | 1.11 (1.11 - 1.12)         | 1          | 1.01 (1.01 - 1.02)         |
| Trend post 2004      | 1           | 1.01 (1.01 - 1.01)         | -1         | 0.99 (0.98 - 0.99)         |
| Injury               |             |                            |            |
| Trend prior 2004     | 1           | 1.01 (1.01 - 1.02)         | -2         | 0.98 (0.98 - 0.99)         |
| Change 2003 to 2004  | 0           | 1.00 (0.99 - 1.01)         | -7         | 0.93 (0.91 - 0.95)         |
| Trend post 2004      | 2           | 1.02 (1.01 - 1.03)         | -4         | 0.96 (0.95 - 0.97)         |
| All Cause            |             |                            |            |
| Trend prior 2004     | 4           | 1.04 (1.04 - 1.04)         | -4         | 0.96 (0.96 - 0.97)         |
| Change 2003 to 2004  | 4           | 1.04 (1.03 - 1.04)         | -3         | 0.97 (0.97 - 0.97)         |
| Trend post 2004      | 2           | 1.02 (1.02 - 1.02)         | -2         | 0.98 (0.98 - 0.98)         |

† Short stays are unplanned admissions with a length of stay of less than 2 days
‡ Long stays are admissions with a length of stay of 2 days or more.
ᶛ RR = Annual rate ratio calculated from model parameter coefficients

Segmented regression models were individually constructed for short and long stays in 3 diagnosis categories
Data are for 326 local authority areas over 12 years (2000/1-2011/12) in children aged less than 15 years
Table 4: Annual odds ratios† estimating trends in primary care practitioner referred admissions before, and after 2004 primary care policy reforms for infectious illness, chronic conditions and injury, in children, in England

|                             | % Annual change | OR†   | 95% CI     |
|-----------------------------|----------------|-------|------------|
| **Infectious illness**      |                |       |            |
| Trend prior 2004            | -8             | 0.92  | (0.92 to 0.92) |
| Change 2003 to 2004         | -12            | 0.88  | (0.86 to 0.89) |
| Trend post 2004             | -2             | 0.98  | (0.98 to 0.99) |
| **Chronic conditions**      |                |       |            |
| Trend prior 2004            | -7             | 0.93  | (0.93 to 0.93) |
| Change 2003 to 2004         | -13            | 0.87  | (0.86 to 0.89) |
| Trend post 2004             | -3             | 0.97  | (0.96 to 0.98) |
| **Injury**                  |                |       |            |
| Trend prior 2004            |                | 0.95  | (0.94 to 0.96) |
| Change 2003 to 2004         | -10            | 0.90  | (0.85 to 0.95) |
| Trend post 2004             | -1             | 0.99  | (0.96 to 1.02) |

† OR Annual odds Ratios are estimated from the model parameter coefficients which are adjusted for age and sex.

Data are for 12 years (2000/1-2011/12) in children aged less than 15 year
Appendix 1

AHRQ Clinical Classifications Software (CCS) clinical codes used to define outcomes of primary care sensitive infectious illness and chronic conditions in children

| Broad Category          | CCS Category                                                      |
|-------------------------|-------------------------------------------------------------------|
| Chronic disease         | Acquired foot deformities                                         |
| Chronic disease         | Acute and unspecified renal failure                               |
| Chronic disease         | Acute cerebrovascular disease                                     |
| Chronic disease         | Acute posthemorrhagic anemia                                      |
| Chronic disease         | Anal and rectal conditions                                        |
| Chronic disease         | Aortic and peripheral arterial embolism or thrombosis            |
| Chronic disease         | Aortic; peripheral; and visceral artery aneurysms                 |
| Chronic disease         | Aspiration pneumonitis; food/vomitus                              |
| Chronic disease         | Asthma                                                            |
| Chronic disease         | Biliary tract disease                                              |
| Chronic disease         | Blindness and vision defects                                       |
| Chronic disease         | Calculus of urinary tract                                         |
| Chronic disease         | Cardiac and circulatory congenital anomalies                      |
| Chronic disease         | Cardiac arrest and ventricular fibrillation                       |
| Chronic disease         | Cardiac dysrhythmias                                              |
| Chronic disease         | Cataract                                                          |
| Chronic disease         | Chronic obstructive pulmonary disease and bronchiectasis         |
| Chronic disease         | Chronic renal failure                                             |
| Chronic disease         | Chronic ulcer of skin                                             |
| Chronic disease         | Coagulation and hemorrhagic disorders                             |
| Chronic disease         | Coma; stupor; and brain damage                                    |
| Chronic disease         | Conditions associated with dizziness or vertigo                   |
| Chronic disease         | Conduction disorders                                              |
| Chronic disease         | Congestive heart failure; nonhypertensive                         |
| Chronic disease         | Coronary atherosclerosis and Other heart disease                  |
| Chronic disease         | Cystic fibrosis                                                   |
| Chronic disease         | Deficiency and Other anemia                                       |
| Chronic disease         | Diabetes mellitus with complications                              |
| Chronic disease         | Diabetes mellitus without complication                            |
| Chronic disease         | Digestive congenital anomalies                                    |
| Chronic disease         | Diseases of mouth; excluding dental                               |
| Chronic disease         | Diseases of white blood cells                                     |
| Chronic disease         | Disorders of lipid metabolism                                     |
| Chronic disease         | Diverticulosis and diverticulitis                                 |
| Chronic disease         | Endometriosis                                                     |
| Chronic disease         | Esophageal disorders                                              |
| Chronic disease         | Essential hypertension                                            |
| Chronic disease         | Fluid and electrolyte disorders                                   |
| Chronic disease                                                      | Condition                                              |
|----------------------------------------------------------------------|--------------------------------------------------------|
| Chronic disease                                                      | Gastritis and duodenitis                               |
| Chronic disease                                                      | Gastroduodenal ulcer (except hemorrhage)               |
| Chronic disease                                                      | Gastrointestinal hemorrhage                            |
| Chronic disease                                                      | Genitourinary congenital anomalies                     |
| Chronic disease                                                      | Genitourinary symptoms and ill-defined conditions     |
| Chronic disease                                                      | Glaucoma                                               |
| Chronic disease                                                      | Gout and Other crystal arthropathies                   |
| Chronic disease                                                      | Headache; including migraine                           |
| Chronic disease                                                      | Heart valve disorders                                  |
| Chronic disease                                                      | Hemolytic jaundice and perinatal jaundice              |
| Chronic disease                                                      | Hemorrhoids                                            |
| Chronic disease                                                      | Hyperplasia of prostate                                |
| Chronic disease                                                      | Hypertension with complications and secondary hypertension |
| Chronic disease                                                      | Immunity disorders                                     |
| Chronic disease                                                      | Inflammation; Infection of eye (except *)              |
| Chronic disease                                                      | Inflammatory conditions of male genital organs         |
| Chronic disease                                                      | Inflammatory diseases of female pelvic organs          |
| Chronic disease                                                      | Late effects of cerebrovascular disease                |
| Chronic disease                                                      | Lung disease due-external agents                       |
| Chronic disease                                                      | Malaise and fatigue                                    |
| Chronic disease                                                      | Menstrual disorders                                    |
| Chronic disease                                                      | Multiple sclerosis                                     |
| Chronic disease                                                      | Nephritis; nephrosis; renal sclerosis                  |
| Chronic disease                                                      | Nervous system congenital anomalies                    |
| Chronic disease                                                      | Non-infectious gastroenteritis                         |
| Chronic disease                                                      | Nonmalignant breast conditions                         |
| Chronic disease                                                      | Nonspecific chest pain                                 |
| Chronic disease                                                      | Nutritional deficiencies                               |
| Chronic disease                                                      | Occlusion or stenosis of precerebral arteries          |
| Chronic disease                                                      | Osteoarthritis                                         |
| Chronic disease                                                      | Osteoporosis                                           |
| Chronic disease                                                      | Other acquired deformities                             |
| Chronic disease                                                      | Other and ill-defined cerebrovascular disease          |
| Chronic disease                                                      | Other and ill-defined heart disease                    |
| Chronic disease                                                      | Other bone disease and musculoskeletal deformities     |
| Chronic disease                                                      | Other circulatory disease                              |
| Chronic disease                                                      | Other congenital anomalies                             |
| Chronic disease                                                      | Other connective tissue disease                        |
| Chronic disease                                                      | Other diseases of bladder and urethra                  |
| Chronic disease                                                      | Other diseases of kidney and ureters                   |
| Chronic disease                                                      | Other diseases of veins and lymphatics                 |
| Chronic disease                                                      | Other disorders of stomach and duodenum                |
| Chronic disease                                                      | Other ear and sense organ disorders                    |
| Chronic disease                                                      | Other endocrine disorders                              |
| Chronic disease                                                      | Other eye disorders                                    |
| Chronic disease                                                      | Other female genital disorders                         |
| Chronic disease                                                      | Other gastrointestinal disorders                       |
| Chronic disease | Other hematologic conditions |
|-----------------|-----------------------------|
| Chronic disease | Other hereditary and degenerative nervous system conditions |
| Chronic disease | Other inflammatory condition of skin |
| Chronic disease | Other liver diseases |
| Chronic disease | Other lower respiratory disease |
| Chronic disease | Other male genital disorders |
| Chronic disease | Other nervous system disorders |
| Chronic disease | Other non-traumatic joint disorders |
| Chronic disease | Other nutritional; endocrine; and metabolic disorders |
| Chronic disease | Other skin disorders |
| Chronic disease | Ovarian cyst |
| Chronic disease | Pancreatic disorders (not diabetes) |
| Chronic disease | Paralysis |
| Chronic disease | Peri-; endo-; and myocarditis; cardiomyopathy (except *) |
| Chronic disease | Peripheral and visceral atherosclerosis |
| Chronic disease | Peritonitis and intestinal abscess |
| Chronic disease | Phlebitis; thrombophlebitis and thromboembolism |
| Chronic disease | Pleurisy; pneumothorax; pulmonary collapse |
| Chronic disease | Prolapse of female genital organs |
| Chronic disease | Pulmonary heart disease |
| Chronic disease | Regional enteritis and ulcerative colitis |
| Chronic disease | Respiratory distress syndrome |
| Chronic disease | Respiratory failure; insufficiency; arrest (adult) |
| Chronic disease | Retinal detachments; defects; vascular occlusion; and retinopathy |
| Chronic disease | Rheumatoid arthritis and related disease |
| Chronic disease | Sickle cell anemia |
| Chronic disease | Spondylosis; intervertebral disc disorders; Other back problems |
| Chronic disease | Systemic lupus erythematosus and connective tissue disorders |
| Chronic disease | Thyroid disorders |
| Chronic disease | Transient cerebral ischemia |
| Chronic disease | Varicose veins of lower extremity |
| Chronic & Infection** | Epilepsy; convulsions |
| Chronic & Infection** | Other upper respiratory disease |
| Infection | Abdominal pain |
| Infection | Acute and chronic tonsillitis |
| Infection | Acute bronchitis |
| Infection | Bacterial Infection; unspecified site |
| Infection | Encephalitis (except *) |
| Infection | Fever of unknown origin |
| Infection | Gangrene |
| Infection | Hepatitis |
| Infection | HIV Infection |
| Infection | Immunizations and screening for infectious disease |
| Infection | Infective arthritis and osteomyelitis (except*) |
| Infection | Influenza |
| Infection | Intestinal Infection |
| Infection | Lymphadenitis |
| Broad Category          | CCS Category                          | ICD10* code | ICD10 Description                  | Conditions       |
|------------------------|----------------------------------------|-------------|------------------------------------|------------------|
| Chronic disease        | Epilepsy; convulsions                  | G40         | Epilepsy                           |                  |
| Chronic disease        | Epilepsy; convulsions                  | G41         | Status epilepticus                 |                  |
| Infection              | Epilepsy; convulsions                  | R560        | Febrile convulsions                |                  |
| Chronic disease        | Epilepsy; convulsions                  | R568        | Other and unspecified convulsions  |                  |
| Chronic disease        | Other upper respiratory disease         | J30         | Vasomotor and allergic rhinitis    |                  |
| Chronic disease        | Other upper respiratory disease         | J31         | Chronic rhinitis, nasopharyngitis  |                  |
| Chronic disease        | Other upper respiratory disease         | J33         | Nasal polyp                        |                  |
| Chronic disease        | Other upper respiratory disease         | J34         | Other disorders of nose and nasel sinuses |                  |
| Chronic disease        | Other upper respiratory disease         | J37         | Chronic laryngitis and laryngotracehitis |                  |
| Chronic disease        | Other upper respiratory disease         | J38         | Disease of vocal cords and larynx, not elsewhere classified |                  |
| Chronic disease        | Other upper respiratory disease         | J39         | Other disease of upper respiratory tract |                  |
| Chronic disease        | Other upper respiratory disease         | J98         | Other respiratory disorders        |                  |
| Chronic disease        | Other upper respiratory disease         | R04         | Hemorrhage from respiratory passages |                  |
| Chronic disease        | Other upper respiratory disease         | R060        | Dyspnoea                           |                  |
| Infection              | Other upper respiratory disease         | R062        | Wheezing                           | if aged <1 yrs   |
| Chronic disease        | Other upper respiratory disease         | R062        | Wheezing                           | if aged 1+ yrs   |
| Chronic disease        | Other upper respiratory disease         | R063        | Periodic breathing                 |                  |
| Chronic disease        | Other upper respiratory disease         | R064        | Hyperventilation                   |                  |

* (except that caused by tuberculosis or sexually transmitted disease)

**Chronic & Infection are where the ICD10 codes within the CCS group have been separately categorised.

International classification of disease version 10 (ICD10) codes used to define outcomes of primary care sensitive infectious illness and chronic conditions in children where direct AHRQ Clinical Classifications Software group categorisation was not possible.
| Chronic disease | Other upper respiratory disease | R065 | Mouth breathing |
| Chronic disease | Other upper respiratory disease | R067 | Sneezing |
| Chronic disease | Other upper respiratory disease | R068 | Other and unspecified abnormalities of breathing |
| Chronic disease | Other upper respiratory disease | R07  | Pain in throat |
| Chronic disease | Other upper respiratory disease | R49  | Voice disturbances |

*International classification of disease version 10*
Appendix 2

Figure 1: Age specific annual short stay admission rates per 1,000 children aged 0-14 years for infectious illness, chronic conditions and injury, from 2000-2011, in England.
Figure 2: Age specific annual long stay admission rates per 1,000 children aged 0-14 years for infectious illness, chronic conditions and injury, from 2000-2011, in England.
### Appendix 3:
Top 10 most frequent age group specific CCS groups for stay admissions by diagnosis category in children aged less 15 years, in financial year 2011/12, in England.

| Children aged <1 | Children aged 1-4 | Children aged 5-9 | Children aged 10-14 |
|------------------|-------------------|-------------------|---------------------|
| **Infectious illness** | | | |
| Acute bronchitis | Viral infection | Abdominal pain | Abdominal pain |
| Other upper respiratory infections | Other upper respiratory infections | Viral infection | Viral infection |
| Viral infection | Acute and chronic tonsillitis | Other upper respiratory infections | Acute and chronic tonsillitis |
| Intestinal infection | Intestinal infection | Acute and chronic tonsillitis | Other upper respiratory infections |
| Nausea and vomiting | Acute bronchitis | Intestinal infection | Intestinal infection |
| Fever of unknown origin | Epilepsy; convulsions | Acute bronchitis | Skin and subcutaneous tissue infections |
| Intestinal infection | Fever of unknown origin | Urinary tract infections | Lymphadenitis |
| Urinary tract infections | Pneumonia (except that caused by tuberculosis or sexually transmitted disease) | Fever of unknown origin | Urinary tract infections |
| Skin and subcutaneous tissue infections | Nausea and vomiting | Nausea and vomiting | Nausea and vomiting |
| Epilepsy; convulsions | Urinary tract infections | Lymphadenitis | Acute bronchitis |

| Chronic conditions | | | |
|--------------------|-----------------|-----------------|-----------------|
| Hemolytic jaundice and perinatal jaundice | Asthma | Asthma | Asthma |
| Noninfectious gastroenteritis | Noninfectious gastroenteritis | Epilepsy; convulsions | Epilepsy; convulsions |
| Esophageal disorders | Epilepsy; convulsions | Other gastrointestinal disorders | Headache; including migraine |
| Other upper respiratory disease | Other skin disorders | Noninfectious gastroenteritis | Other male genital disorders |
| Other skin disorders | Other gastrointestinal disorders | Coagulation and hemorrhagic disorders | Other gastrointestinal disorders |
| Other nutritional; endocrine; and metabolic disorders | Otitis media and related conditions | Other skin disorders | Noninfectious gastroenteritis |
| Other gastrointestinal disorders | Other upper respiratory disease | Other non-traumatic joint disorders | Nonspecific chest pain |
| Other lower respiratory disease | Other lower respiratory disease | Headache; including migraine | Other non-traumatic joint disorders |
| Epilepsy; convulsions | Coagulation and hemorrhagic disorders | Other male genital disorders | Diabetes mellitus without complication |
| Other congenital anomalies | Other non-traumatic joint disorders | Other connective tissue disease | Other skin disorders |
| Injury                                                                 | Superficial injury; contusion | Fracture of upper limb | Fracture of upper limb | Fracture of upper limb | Fracture of lower limb | Syncope | Crushing injury or internal injury | Poisoning by psychotropic agents | Other injuries and conditions due to external causes |
|-----------------------------------------------------------------------|-------------------------------|------------------------|------------------------|------------------------|------------------------|---------|-----------------------------------|---------------------------------|----------------------------------|
| Superficial injury; contusion                                         | Superficial injury; contusion | Fracture of upper limb | Fracture of upper limb | Fracture of upper limb | Fracture of lower limb | Syncope | Crushing injury or internal injury | Poisoning by psychotropic agents | Other injuries and conditions due to external causes |
| Allergic reactions                                                    | Open wounds of head; neck; and trunk | Superficial injury; contusion | Superficial injury; contusion | Superficial injury; contusion | Superficial injury; contusion | Syncope | Crushing injury or internal injury | Poisoning by psychotropic agents | Other injuries and conditions due to external causes |
| Burns                                                                 | Fracture of upper limb        | Open wounds of head; neck; and trunk | Open wounds of extremities | Open wounds of extremities | Open wounds of head; neck; and trunk | Syncope | Crushing injury or internal injury | Poisoning by psychotropic agents | Other injuries and conditions due to external causes |
| Other injuries and conditions due to external causes                  | Open wounds of extremities    | Open wounds of extremities | Open wounds of extremities | Open wounds of extremities | Open wounds of head; neck; and trunk | Syncope | Crushing injury or internal injury | Poisoning by psychotropic agents | Other injuries and conditions due to external causes |
| Open wounds of head; neck; and trunk                                 | Other injuries and conditions due to external causes | Other injuries and conditions due to external causes | Fracture of lower limb | Fracture of lower limb | Fracture of lower limb | Syncope | Crushing injury or internal injury | Poisoning by psychotropic agents | Other injuries and conditions due to external causes |
| Skull and face fractures                                              | Burns                         | Allergic reactions      | Syncope                | Crushing injury or internal injury | Crushing injury or internal injury | Syncope | Crushing injury or internal injury | Poisoning by psychotropic agents | Other injuries and conditions due to external causes |
| Fracture of lower limb                                                | Allergic reactions            | Crushing injury or internal injury | Crushing injury or internal injury | Crushing injury or internal injury | Crushing injury or internal injury | Syncope | Crushing injury or internal injury | Poisoning by psychotropic agents | Other injuries and conditions due to external causes |
| Fracture of upper limb                                                | Fracture of lower limb        | Fracture of lower limb   | Fracture of lower limb | Fracture of lower limb | Fracture of lower limb | Syncope | Crushing injury or internal injury | Poisoning by psychotropic agents | Other injuries and conditions due to external causes |
| Syncope                                                               | Crushing injury or internal injury | Syncope                | Syncope                | Syncope                | Syncope                | Syncope | Crushing injury or internal injury | Poisoning by psychotropic agents | Other injuries and conditions due to external causes |
| Crushing injury or internal injury                                    | Poisoning by psychotropic agents | Burns                  | Burns                  | Burns                  | Burns                  | Syncope | Crushing injury or internal injury | Poisoning by psychotropic agents | Other injuries and conditions due to external causes |