

Preventing emergency hospital admissions caused by injuries to children and young people in Lincolnshire: a strategic framework

2 October 2012, v1

Introduction

The purpose of this document is to present a strategic framework to prevent emergency hospital admissions caused by accidental and deliberate injuries to children and young people in Lincolnshire. This document highlights the public health issue in Lincolnshire through presenting a descriptive analysis of local data, and advocates for a multi-agency approach to commission cost-effective interventions.

The criteria used throughout this document to define the type of hospital admission and population of interest are those as previously used for National Indicator 70 (NI70) and Vital Sign C29 (VSC29). This specifically concerns the number of finished in-year emergency admissions per 10,000 population of children and young people aged 0-17 years. Causes of admission were matched to codes V01-Y98 for external causes of morbidity and mortality of the International Classification of Diseases revision 10 (ICD-10; codes X33-X39 and X52 are however excluded since these concern forces of nature). The following sub-sections are included within these codes (see: <http://apps.who.int/classifications/icd10/browse/2010/en>):

- V01-X59 = Accidents
- X60-X84 = Intentional self-harm
- X85-Y09 = Assault
- Y10-Y34 = Event of undetermined intent
- Y35-Y36 = Legal intervention and operations of war
- Y40-Y84 = Complications of medical and surgical care
- Y85-Y89 = Sequelae of external causes of morbidity and mortality
- Y90-Y98 = Supplementary factors related to causes of morbidity and mortality classified elsewhere

Indicator 2.7 of the recently published public health outcomes framework for England 2013-2016 (see: <http://www.dh.gov.uk/health/2012/01/public-health-outcomes>) extends the use of the previous NI70/VSC29 indicator and places a requirement on public services including Local Authorities (LAs), the NHS, and Public Health England to continue to monitor and report on this metric. The definition of this indicator is equivalent to that previously used for NI70/VSC29 although the denominator has now been specified as the Office for National Statistics (ONS) mid-year population estimate for children and young people aged 0-17 years. Indicator 2.7 will also report a breakdown of admission rates for children and young people aged 0-4 and 5-17 years.

The development of this strategic framework is being led by Lynne McNiven (Consultant and Assistant Director of Public Health, NHS Lincolnshire) and includes a significant contribution from Dr Charles Beck (Specialty Registrar in Public Health, NHS Lincolnshire). This document was developed on behalf of the NI70 Strategy Group, and will be submitted to senior decision-making Boards and Committees where organisational adoption will be requested. Since there is no current requirement for the collection and onward reporting of the indicator described above, for ease of reference this will be referred to throughout this document as NI70 although this should be recognised as outdated terminology.

Stakeholder analysis

The primary stakeholders in this strategic framework include those organisations with responsibilities to commission or provide services designed to prevent or treat childhood accidents. This includes: Lincolnshire County Council, NHS Lincolnshire (including the four transitional Clinical Commissioning Groups

[CCGs] in Lincolnshire), Lincolnshire Community Health Services NHS Trust, and United Lincolnshire Hospitals NHS Trust. Other stakeholders include the service users, acute hospitals outside of Lincolnshire which may treat Lincolnshire residents in an emergency, the seven Local Authority Districts and Borough Councils in Lincolnshire, and relevant third sector organisations, voluntary groups, and other community groups based in our locality. Key members of staff from each of the primary stakeholder organisations are engaged in the development of this strategic framework through active representation on the Lincolnshire NI70 Strategy Group (which is chaired by Public Health).

Strategic vision and values

The vision of the NI70 Strategy Group is for Lincolnshire to become a model area of how most effectively to achieve a sustainable reduction in the rate of emergency hospital admissions in children and young people due to accidental or deliberate harm. Whilst national data for 2008/09 shows that the admission rate in Lincolnshire was broadly comparable to the East Midlands and England (118.9 vs 113.9 vs 117.4 per 10,000 population) in past years the rate for Lincolnshire was markedly higher and reached 140 per 10,000 population in 2007/08. Key values of the strategic framework described here are:

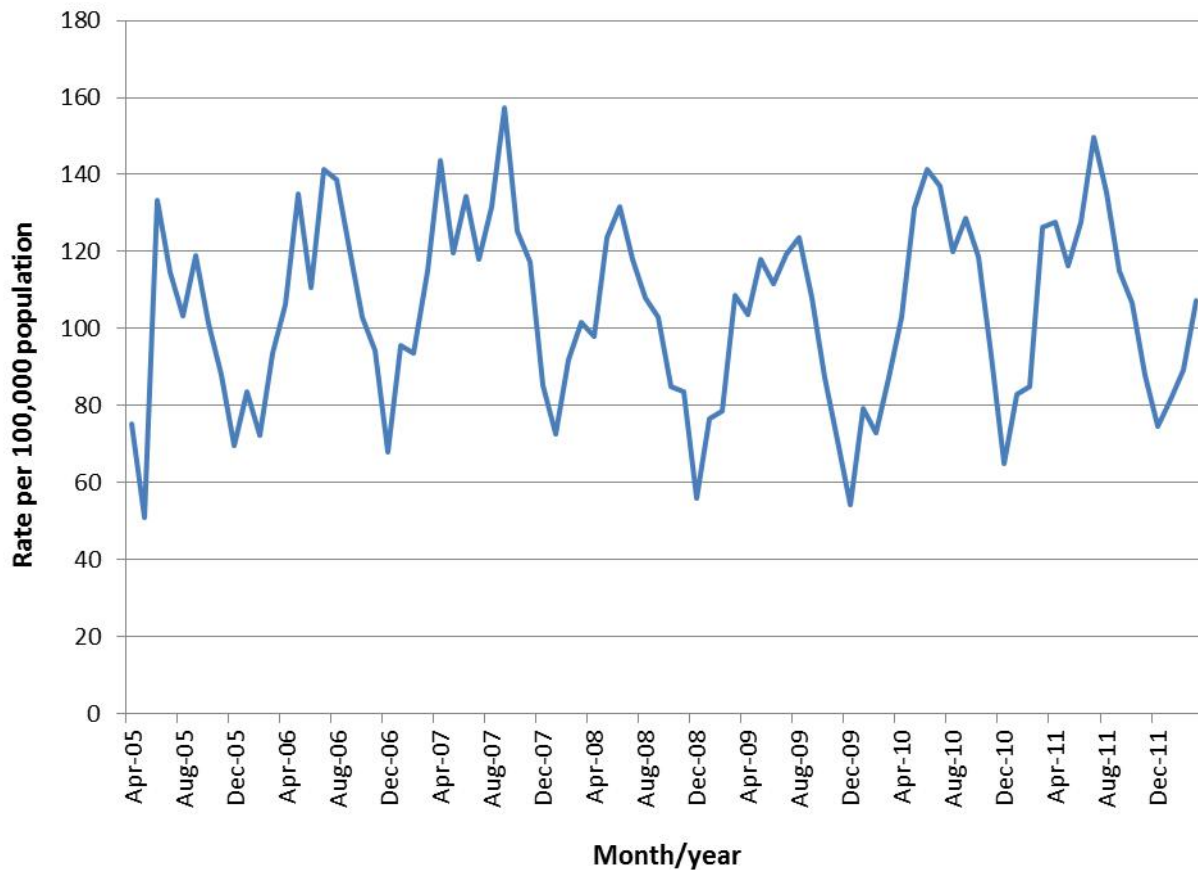
- To develop a shared understanding between multiagency partners that reducing preventable emergency hospital admissions in children across Lincolnshire due to accidental and deliberate injury is an issue of public health importance
- Recognition that the underlying causes of these hospital admissions are multifactorial, diverse, and interventions to reduce these may potentially be outside the scope of direct influence of any one multiagency partner
- The identification and subsequent prioritisation of interventions or activity to address health inequalities should be undertaken when developing action plans
- Through a co-ordinated approach to local collaboration and partnership working we may most effectively reduce the rate of these hospital admissions across Lincolnshire
- Championing this strategic framework within stakeholder organisations to raise the profile of the public health issue and the NI70 Strategy Group

Current position

The prevention of emergency hospital admissions due to accidental and deliberate harm in children and young people is not currently a defined strategic objective with resources allocated for public health intervention. However, initial meetings of the NI70 Strategy Group have demonstrated there are both scope and engagement opportunities to develop a successful multiagency collaboration across Lincolnshire to tackle this important issue of public health concern. In order to inform the strategic framework described herein and future work of the NI70 Strategy Group, an analysis of local data from 2005/06-2011/12 has been undertaken. It should be noted that no admissions coded to Y35-Y36 (legal intervention and operations of war) were recorded in the available data. Admission rates were calculated based on the denominator for children and young people aged 0-17 years using the most recent subnational population projections for LAs published by the ONS; linear interpolation based was assumed when calculating rates for young people aged 15-17 years. Unfortunately denominators for the four transitional CCGs were not available and therefore determination of rates has not been possible for these areas. Directly standardised rates are based on the European Standard population age structure, and 95% confidence intervals (95% CI) have been calculated where appropriate using standard formulae. Data analysis was conducted using Microsoft® Excel v14 (Microsoft Corporation, Redmond, USA) and Stata® v12 (StataCorp LP, Texas, USA).

Figure 1 shows the all cause crude monthly NI70 hospital admission rate over the analysis period of 2005/06-2011/12. These data show marked seasonality, with the lowest admission rates of approximately 60-80 per 100,000 population between November to January and the highest rates of approximately 120-160 per 100,000 population between April to August. The annual profile over the analysis timeframe appears largely regular, indicated by the similarity in the overall shape and configuration of the monthly admission rate over each 12 month period. Visual inspection of the figure suggests no overall reduction in the rate of admissions, although this has not been investigated statistically.

Figure 1. All cause crude monthly NI70 hospital admissions per 100,000 population (2005/06-2011/12)



Tables 1 and 2 show the crude number of NI70 hospital admissions by area and age band over 2005/06-2011/12. Whilst these data are a useful summary of service activity, it should be interpreted with caution since crude numbers do not account for demographic characteristics of the population. Variation in the number of admissions is shown for each area, where some areas have observed substantial changes either year on year or more generally over the analysis period. Table 1 suggests that a large number of admissions originate from the urban centres of Lincolnshire, although those more rural areas of the county may experience other factors of public health importance by virtue of their geographic isolation. Table 2 shows that the highest number of admissions was in children aged 0-4 years, followed closely by those aged 10-14 years. Variation again has been observed by area. It should be noted that the data presented in table 2 includes all admissions over 2005/06-2011/12 and not the annual number of admissions.

Table 1. Crude number of NI70 hospital admissions by LA and CCG (2005/06-2011/12)

Area	Year							
	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	Total
Local Authority								
Boston	129	160	153	173	192	224	217	1,248
East Lindsey	285	311	342	273	287	307	290	2,095
Lincoln	282	320	371	305	263	325	338	2,204
North Kesteven	237	294	286	234	244	283	289	1,867
South Holland	166	179	184	142	164	209	224	1,268
South Kesteven	254	302	343	304	267	312	330	2,112
West Lindsey	206	285	287	206	172	205	204	1,565
Clinical Commissioning Group								
Lincolnshire East	473	554	555	482	509	607	591	3,771
Lincolnshire West	534	682	735	599	542	663	644	4,399
NULL*	81	71	77	34	21	17	15	316
South Lincolnshire	240	261	260	263	263	308	329	1,924
South West Lincolnshire	231	283	339	259	254	270	313	1,949
Total (Lincolnshire)	1,559	1,851	1,966	1,637	1,589	1,865	1,892	12,359

* = admission of patient resident in Lincolnshire but not registered with a Lincolnshire GP

Table 2. Crude number of admissions by age band, LA and CCG (2005/06-2011/12)

Area	Age band (years)				Total
	0 to 4	5 to 9	10 to 14	15 to 17	
Local Authority					
Boston	472	252	296	228	1,248
East Lindsey	568	420	605	502	2,095
Lincoln	762	402	505	535	2,204
North Kesteven	511	385	551	420	1,867
South Holland	410	274	347	237	1,268
South Kesteven	635	513	574	390	2,112
West Lindsey	412	307	433	413	1,565
Clinical Commissioning Group					
Lincolnshire East	1,158	751	1,033	829	3,771
Lincolnshire West	1,352	862	1,122	1,063	4,399
NULL*	95	51	94	76	316
South Lincolnshire	583	413	532	396	1,924
South West Lincolnshire	582	476	530	361	1,949
Total (Lincolnshire)	3,770	2,553	3,311	2,725	12,359

* = admission of patient resident in Lincolnshire but not registered with a Lincolnshire GP

The data presented in table 3 extends that in table 1 and shows the crude and adjusted rate of admissions per 10,000 population over each year of the analysis period. The adjusted rates are directly standardised to the European Standard population, which accounts for the underlying age structure of each area. The crude annual rate of admissions for Lincolnshire has varied between 110 and 140 per 10,000 which masks the seasonality shown in figure 1. After adjusting for age, Lincoln has a significantly higher admission rate than Lincolnshire across all years, similarly Boston demonstrates this for 2009/10-2011/12 (highlighted by

the adjusted 95% CI not overlapping with that for Lincolnshire). None of the areas have shown a sustained reduction in the crude or adjusted admission rate over the analysis period. The similarity observed between the crude and adjusted admission rates suggest that the number of admissions was not unduly influenced by the age structure of the given area.

Table 3. Rate of admissions per year by LA per 10,000 population (2005/06-2011/12)

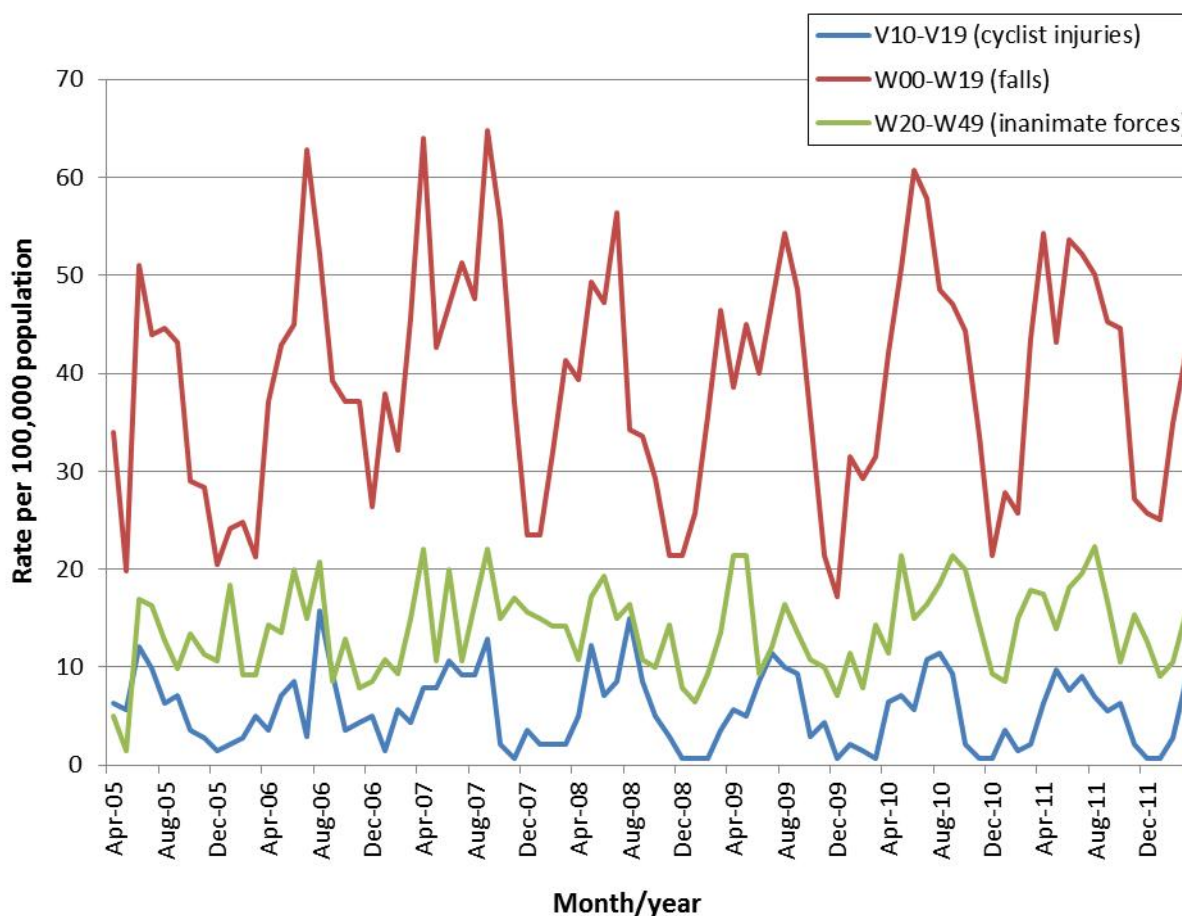
Year	Rate	Area							
		Boston	East Lindsey	Lincoln	Lincolnshire	North Kesteven	South Holland	South Kesteven	West Lindsey
05/06	Crude	107.0	109.5	130.7	110.4	109.8	102.1	90.3	111.5
	Adjusted (95% CI)	107.0 (88.6 to 125.3)	108.9 (96.3 to 121.5)	132.1 (116.7 to 147.5)	110.4 (105.0 to 115.9)	110.6 (96.6 to 124.6)	102.9 (87.3 to 118.5)	90.3 (79.3 to 101.4)	111.2 (96.1 to 126.3)
06/07	Crude	133.1	120.7	173.4	132.2	138.0	110.6	108.1	155.4
	Adjusted (95% CI)	131.9 (111.6 to 152.2)	120.7 (107.4 to 134.1)	171.0 (152.3 to 189.7)	132.2 (126.3 to 138.2)	138.8 (123.1 to 154.6)	110.8 (94.7 to 127.0)	108.0 (95.9 to 120.2)	155.7 (137.8 to 173.6)
07/08	Crude	126.7	133.6	204.1	139.9	132.9	112.6	122.1	155.5
	Adjusted (95% CI)	125.4 (105.6 to 145.1)	134.0 (119.9 to 148.1)	199.9 (179.7 to 220.2)	139.9 (133.7 to 146.0)	133.3 (117.9 to 148.6)	112.9 (96.7 to 129.1)	122.1 (109.3 to 135.0)	155.7 (137.8 to 173.5)
08/09	Crude	142.0	107.3	168.5	117.0	109.9	85.9	108.3	112.1
	Adjusted (95% CI)	140.4 (119.6 to 161.3)	107.0 (94.3 to 119.6)	164.9 (146.3 to 183.4)	117.0 (111.4 to 122.6)	110.4 (96.4 to 124.5)	85.7 (71.7 to 99.8)	108.4 (96.3 to 120.5)	112.9 (97.6 to 128.2)
09/10	Crude	158.4	113.8	142.9	113.6	114.3	98.9	95.8	93.6
	Adjusted (95% CI)	157.2 (135.1 to 179.3)	114.3 (101.1 to 127.4)	139.5 (122.6 to 156.5)	113.6 (108.0 to 119.1)	115.2 (100.8 to 129.5)	99.7 (84.5 to 114.9)	96.2 (84.7 to 107.7)	93.9 (79.9 to 107.8)
10/11	Crude	182.7	122.5	177.2	133.2	132.4	125.3	112.4	111.3
	Adjusted (95% CI)	178.1 (154.9 to 201.3)	122.9 (109.2 to 136.6)	175.0 (155.9 to 194.1)	133.2 (127.2 to 139.2)	133.5 (118.1 to 149.0)	125.8 (108.8 to 142.7)	112.6 (100.1 to 125.0)	112.1 (96.8 to 127.4)
11/12	Crude	177.0	115.5	185.5	131.9	135.6	133.5	119.1	110.2
	Adjusted (95% CI)	172.8 (150.0 to 195.7)	115.8 (102.5 to 129.0)	185.0 (165.1 to 204.8)	132.1 (126.2 to 138.0)	137.4 (121.7 to 153.2)	134.0 (116.6 to 151.4)	119.1 (106.3 to 131.9)	110.1 (95.1 to 125.1)

Adjusted rates are directly standardised for age structure based on the European Standard population; bold highlight indicates a significantly higher adjusted rate compared to Lincolnshire; CI = confidence interval

The mean average index of multiple deprivation (IMD) 2007 score of children and young people admitted to hospital was 21.6 (standard deviation 14.6; 95% CI \pm 0.3) over the analysis period based on postcode of residence. Analysis of the mean average over each financial year showed only minor variation (range 20.9 to 22.2). However, the data appears to show a positive association between admissions and deprivation for three LAs (Boston, East Lindsey, and Lincoln) and Lincolnshire East CCG, whilst a negative association was found for two LAs (North and South Kesteven) and two CCGs (South and South West Lincolnshire). A greater proportion of males was admitted over the analysis period (57.2%; 95% CI 56.3-58.1%) and this trend was consistently shown over each financial year. Lincoln County Hospital admitted approximately half (46.8%; 95% CI 45.9-47.7%) whilst Pilgrim Hospital admitted around one quarter of all patients (27.3%; 95% CI 26.5-28.1%); the remaining admissions occurred in hospitals located outside of Lincolnshire. The majority of all admissions occurred following presentation to an A+E department (81.2%; 95% CI 80.5-81.8%).

Only a small proportion of all hospital admissions had a primary diagnosis ICD-10 code attributed within the eligible range for NI70, all of which were due to complications of medical and surgical care (3.8%; 95% CI 3.4-4.1%). A trend was observed in the proportion of these admissions by age band, where the greatest proportion originated from children 0-4 years (31.7%; 95% CI 27.6-36.0%) and the lowest proportion was from young people aged 15-17 years (20.5%; 95% CI 17.1-24.4%). All 12,359 admissions over the analysis period had a secondary diagnosis ICD-code attributed. Figure 2 shows the leading causes of admissions by month over the analysis period. Seasonality in the admission rate for falls and pedal cyclists injured in transport accidents may be the principal drivers of the overall seasonal variation in NI70 admissions shown above in figure 1. Admissions following exposure to inanimate mechanical forces may also contribute towards this, although possibly to a lesser extent. However, importantly, this factor is associated with a greater monthly admission rate than pedal cyclists injured in transport accidents.

Figure 2. Leading causes of admissions by month per 100,000 population (2005/06-2011/12)



V10-V19 = pedal cyclist injured in transport accident; W00-W19 = falls; W20-W49 = exposure to inanimate mechanical forces

Tables 4 and 5 present the crude annual rate including 95% CIs of secondary diagnoses per 100,000 population by age band and ICD-10 code range over the analysis period. Whilst these data are not adjusted for age, the rates of admission for many of the ICD-10 code ranges show either a positive or negative association with age. The major causes for admission across all age groups are those coded as accidents, although intentional self-harm is also an important reason for admission in young people aged 15-17 years. Sub-analysis of the admission codes for accidents (V01-X59) shows that falls and exposure to inanimate mechanical objects are leading causes of admission (as previously shown above in figure 2). Accidental poisoning by and exposure to noxious substances also accounts for a notable rate of admissions in children aged 0-4 years.

Table 4. Crude annual rate of secondary diagnoses by age band per 100,000 population (2005/06-2011/12)

ICD-10 code	Age band (years)				Total
	0 to 4	5 to 9	10 to 14	15 to 17	
V01-X59 (accidents)	1,330.5 (1213.6 to 1455.7)	900.6 (805.4 to 1003.8)	896.0 (808.0 to 990.9)	837.1 (730.8 to 954.5)	1002.1 (950.4 to 1056.0)
X60-X84 (self-harm)	2.8 (0.1 to 15.6)	2.8 (0.1 to 15.4)	115.8 (85.7 to 153.2)	412.9 (339.4 to 497.7)	115.0 (98.0 to 134.2)
X85-Y09 (assault)	8.4 (1.7 to 24.6)	5.5 (0.7 to 20.0)	16.6 (6.7 to 34.1)	90.1 (57.7 to 134.1)	25.0 (17.4 to 34.8)
Y10-Y34 (undetermined intent)	8.4 (1.7 to 24.6)	2.8 (0.1 to 15.4)	7.1 (1.5 to 20.7)	11.3 (2.3 to 32.9)	6.4 (2.9 to 12.2)
Y40-Y84 (complications of healthcare)	154.1 (116.1 to 200.5)	93.9 (65.0 to 131.3)	80.4 (55.7 to 112.3)	105.1 (69.8 to 151.9)	107.9 (91.3 to 126.5)
Y85-Y89 (sequelae of external causes)	5.6 (0.7 to 20.2)	5.5 (0.7 to 20.0)	4.7 (0.6 to 17.1)	3.8 (0.1 to 20.9)	4.3 (1.6 to 9.3)
Y90-Y98 (supplementary factors)	0.0 (0.0 to 10.3)	0.0 (0.0 to 10.2)	0.0 (0.0 to 8.7)	0.0 (0.0 to 13.9)	0.7 (0.0 to 4.0)
Total	1509.8 (1385.0 to 1642.3)	1008.3 (907.5 to 1117.2)	1118.2 (1019.7 to 1223.7)	1460.2 (1318.7 to 1612.8)	1261.4 (1203.3 to 1321.7)

Values in parentheses are exact Poisson 95% confidence intervals; data include only admissions with eligible ICD-10 codes (see NI70 definition); V01-X59 = accidents; X60-X84 = intentional self-harm; X85-Y09 = assault; Y10-Y34 = event of undetermined intent; Y40-Y84 = complications of medical and surgical care; Y85-Y89 = sequelae of external causes of morbidity and mortality; Y90-Y98 = supplementary factors related to causes of morbidity and mortality classified elsewhere

Table 5. Crude annual rate of secondary diagnoses by age band for admissions coded as an accident per 100,000 population (2005/06-2011/12)

ICD-10 code	Age band (years)				Total
	0 to 4	5 to 9	10 to 14	15 to 17	
V01-V09 (pedestrian injuries)	11.2 (3.1 to 28.7)	19.3 (7.8 to 39.8)	28.4 (14.7 to 49.6)	18.8 (6.1 to 43.8)	20.0 (13.3 to 28.9)
V10-V19 (cyclist injuries)	14.0 (4.6 to 32.7)	71.8 (46.9 to 105.2)	115.8 (85.7 to 153.2)	52.6 (28.7 to 88.2)	67.1 (54.3 to 82.2)
V20-V29 (motorcycle injuries)	2.8 (0.1 to 15.6)	2.8 (0.1 to 15.4)	16.6 (6.7 to 34.1)	93.8 (60.7 to 138.5)	24.3 (16.8 to 33.9)
V40-V49 (car injuries)	8.4 (1.7 to 24.6)	13.8 (4.5 to 32.2)	18.9 (8.2 to 37.3)	86.3 (54.7 to 129.6)	27.1 (19.2 to 37.3)
V80-V89 (other transport injuries)	2.8 (0.1 to 15.6)	19.3 (7.8 to 39.8)	35.5 (19.9 to 58.5)	33.8 (15.5 to 64.1)	23.6 (16.2 to 33.1)
W00-W19 (falls)	669.5 (587.3 to 759.9)	494.5 (424.7 to 572.5)	420.8 (361.3 to 487.4)	251.5 (194.9 to 319.4)	472.9 (437.5 to 510.3)
W20-W49 (inanimate forces)	249.3 (200.2 to 306.8)	154.7 (116.9 to 200.9)	122.9 (91.8 to 161.2)	138.9 (97.8 to 191.4)	166.4 (145.7 to 189.2)
W50-W64 (animate forces)	42.0 (23.5 to 69.3)	58.0 (35.9 to 88.7)	68.6 (45.9 to 98.5)	56.3 (31.5 to 92.9)	57.9 (46.0 to 71.9)
W75-W84 (other threats to breathing)	11.2 (3.1 to 28.7)	0.0 (0.0 to 10.2)	0.0 (0.0 to 8.7)	0.0 (0.0 to 13.9)	3.6 (1.2 to 8.3)
X00-X09 (smoke, fire and flames)	5.6 (0.7 to 20.2)	5.5 (0.1 to 20.0)	2.4 (0.1 to 13.2)	3.8 (0.1 to 20.9)	4.3 (1.6 to 9.3)
X10-X19 (heat and hot substances)	50.4 (29.9 to 79.7)	5.5 (0.1 to 20.0)	2.4 (0.1 to 13.2)	3.8 (0.1 to 20.9)	15.0 (9.3 to 22.9)
X40-X49 (poisoning)	176.5 (135.6 to 225.8)	19.3 (7.8 to 39.8)	21.3 (9.7 to 40.4)	41.3 (20.6 to 73.9)	63.6 (51.1 to 78.2)
X50-X57 (overexertion, travel, privation)	5.6 (0.7 to 20.2)	5.5 (0.1 to 20.0)	18.9 (8.2 to 37.3)	22.5 (8.3 to 49.0)	13.6 (8.2 to 21.2)
X58-X59 (other factors)	70.03 (45.3 to 103.4)	27.6 (13.3 to 50.8)	18.9 (8.2 to 37.3)	22.5 (8.3 to 49.0)	35.0 (25.9 to 46.3)
Total	1330.5 (1213.6 to 1455.7)	900.6 (805.4 to 1003.8)	896.0 (808.0 to 990.9)	837.1 (730.8 to 954.5)	1002.1 (950.4 to 1056.0)

Values in parentheses are exact Poisson 95% confidence intervals; data presented by ICD-10 codes where the crude number of admissions are greater than or equal to 30 for at least one age band; * = includes other eligible causes of admissions within the ICD-10 code range of V01-X59; V01-V09 = pedestrian injured in transport accident; V10-V19 = pedal cyclist injured in transport accident; V20-V29 = motorcycle rider injured in transport accident; V40-V49 = car occupant injured in transport accident; V80-V89 = other land transport accidents; W00-W19 = falls; W20-W49 = exposure to inanimate mechanical forces; W50-W64 = exposure to animate mechanical forces; W75-W84 = other accidental threats to breathing; X00-X09 = exposure to smoke, fire and flames; X10-X19 = contact with heat and hot substances; X40-X49 = accidental poisoning by and exposure to noxious substances; X50-X57 = overexertion, travel and privation; X58-X59 = accidental exposure to other and unspecified factors

In addition to analysing hospital admission data, a descriptive summary of A+E attendances during 2011/12 has been undertaken to further inform the strategic framework presented here. Data pertaining to all such attendances from children and young people aged 0-17 years registered with a Lincolnshire GP and unregistered patients who were resident in Lincolnshire were identified. However, it should be noted that A+E attendances are coded based on the NHS data dictionary (see: <http://www.datadictionary.nhs.uk>) and

not ICD-10 until admission to hospital. Attendances coded with descriptors which most closely matched those pertaining to accidental or deliberate injury were extracted, but the resultant descriptive analysis should be interpreted with caution.

Table 6 shows the number and rate of A+E attendances by age band for each LA and CCG in Lincolnshire. The greatest number of attendances arises from children and young people resident in the LAs of East Lindsey and South Kesteven and Lincolnshire East CCG. After accounting for the denominator population sizes and adjusting for the underlying age structure it has been observed that the LAs of East Lindsey and South Holland have a significantly higher rate of A+E attendances compared to Lincolnshire. The attendance rate for West Lindsey was also elevated and approached significance.

Table 6. Number and rate of A+E attendances by age band, LA and CCG per 10,000 population (2011/12)

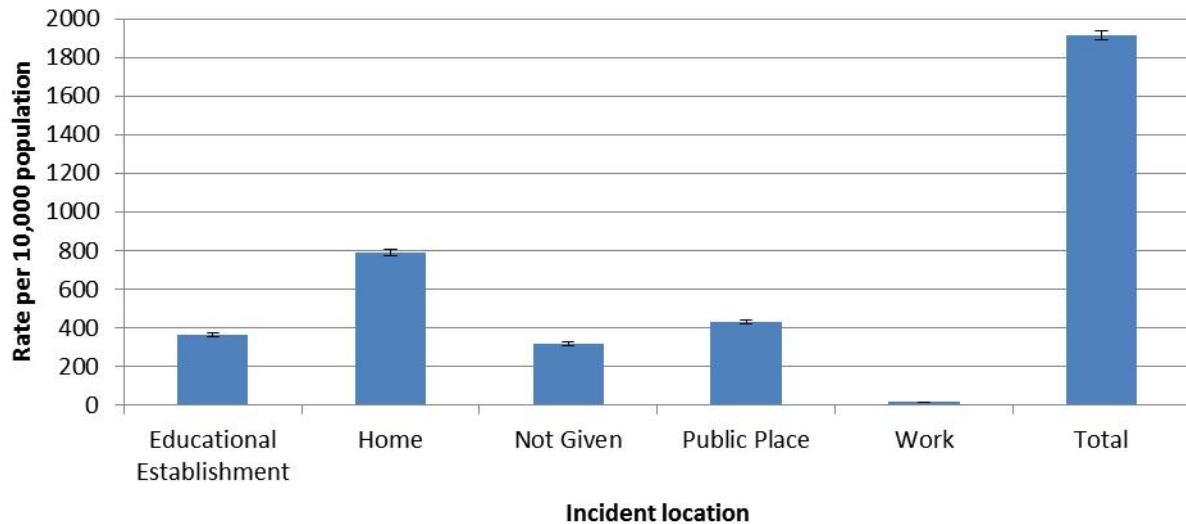
Area	Age band (years)				Total	Rate per 10,000 population	
	0 to 4	5 to 9	10 to 14	15 to 17		Crude	Adjusted (95% CI)
Local Authority							
Boston	533	493	808	458	2,292	1869.5	1900.7 (1830.9 to 1970.4)
East Lindsey	1242	1016	2042	1367	5,667	2257.8	2247.7 (2196.5 to 2298.9)
Lincoln	893	676	1015	618	3,202	1757.4	1809.3 (1752.2 to 1866.5)
North Kesteven	619	625	1162	643	3,049	1430.1	1433.0 (1386.1 to 1479.9)
Out of County	231	241	417	253	1,142	-	-
South Holland	757	717	1468	798	3,740	2228.8	2246.6 (2184.0 to 2309.3)
South Kesteven	1018	947	1779	919	4,663	1683.4	1694.9 (1650.8 to 1738.9)
West Lindsey	793	767	1351	765	3,676	1984.9	1983.7 (1926.5 to 2040.8)
Clinical Commissioning Group							
Lincolnshire East	1,984	1673	3,283	2086	9,026	-	-
Lincolnshire West	1,984	1724	2,795	1630	8,133	-	-
NULL*	80	60	93	48	281	-	-
South Lincolnshire	1139	1189	2323	1191	5,842	-	-
South West Lincolnshire	899	836	1548	866	4,149	-	-
Total (Lincolnshire)	6,086	5,482	10,042	5,821	27,431	1911.6	1906.5 (1886.3 to 1926.8)

Adjusted rates are directly standardised for age structure based on the European Standard population; * = attendance of patient resident outside of Lincolnshire; ** = attendance of patient resident in Lincolnshire but not registered with a Lincolnshire GP

The mean average IMD 2007 score of children and young people who attended A+E was 21.2 (standard deviation 13.7; 95% CI \pm 0.2) over the analysis period based on postcode of residence. Similar to the NI70 admission data, there was a positive association between A+E attendances and deprivation for three LAs (Boston, East Lindsey, and Lincoln) and Lincolnshire East CCG, whilst a negative association was found for two LAs (North and South Kesteven) and two CCGs (South and South West Lincolnshire). A greater proportion of males attended A+E in 2011/12 (56.2%; 95% CI 55.6-56.8%). Most patients attended the A+E department at Lincoln County Hospital (24.0%; 95% CI 23.5-24.5%) whilst the next most frequently attended A+E department was at Pilgrim Hospital (15.2%; 95% CI 14.7-15.6%). The majority of patients attended following a self-referral (79.7%; 95% CI 79.3-80.2%) whilst only a small proportion attended following referral or transportation by emergency services (5.8%; 5.5-6.1%), and first attendances were most frequently observed rather than planned or unplanned follow-up visits (93.6%; 95% CI 93.3-93.9%).

Figure 3 shows the crude rate of A+E attendance by incident location over 2011/12. This displays that most occurred in the home environment, although a large proportion of incidents occurred in public places and the educational setting.

Figure 3. Crude rate of A+E attendance by incident location per 10,000 population (2011/12)



Error bars are exact Poisson 95% confidence intervals

Tables 7 and 8 show the crude rates of primary investigations, diagnoses, and treatment by age band. Due to the volume of data, rates were calculated where more than 500 attendances (equivalent to 35 per 10,000 population) were attributed to each investigation, diagnosis or treatment. Perhaps most notably, these data show a large proportion of attendances where no investigations were conducted and treatment consisted of guidance or advice only. The greatest rate of attendance was shown in children aged 10-14 years and there is evidence of both positive and negative associations with certain investigations, diagnoses, and treatments with age.

Table 7. Crude rate of primary investigations and diagnoses by age band following attendance at A+E per 10,000 population (2011/12)

Description	Age band (years)				Total
	0 to 4	5 to 9	10 to 14	15 to 17	
Primary Investigation					
X-ray plain film	338.7 (320.4 to 357.8)	646.1 (620.2 to 672.9)	1317.2 (1283.4 to 1351.8)	1123.4 (1083.1 to 1164.8)	855.6 (840.5 to 870.9)
None	1055.2 (1022.6 to 1088.5)	718.5 (691.2 to 746.7)	808.0 (781.6 to 835.2)	857.9 (822.7 to 894.1)	859.4 (844.3 to 874.7)
Total	1614.3 (1574.0 to 1655.4)	1514.4 (1474.5 to 1555.0)	2308.5 (2263.6 to 2354.1)	2230.3 (2173.3 to 2288.3)	1911.6 (1889.0 to 1934.3)
Primary Diagnosis					
Foreign body	113.8 (103.3 to 125.1)	61.9 (54.0 to 70.5)	32.4 (27.3 to 38.2)	47.1 (39.2 to 56.2)	63.9 (59.8 to 68.2)
Burns and scalds	161.8 (149.2 to 175.2)	64.6 (56.6 to 73.4)	40.2 (34.5 to 46.7)	46.7 (38.8 to 55.8)	79.5 (75.0 to 84.3)
Head injury	248.5 (232.9 to 265.0)	108.6 (98.1 to 119.8)	65.3 (57.9 to 73.3)	67.4 (57.8 to 78.2)	124.7 (119.0 to 130.7)
Contusion / abrasion	189.9 (176.3 to 204.4)	181.8 (168.1 to 196.2)	271.5 (256.2 to 287.4)	249.0 (230.3 to 268.9)	223.3 (215.7 to 231.2)
Laceration	329.2 (311.1 to 348.0)	250.3 (234.2 to 267.1)	172.6 (160.5 to 185.4)	234.9 (216.6 to 254.2)	244.7 (236.6 to 252.9)
Sprain/ligament injury	75.6 (67.1 to 84.9)	209.4 (194.7 to 224.8)	495.9 (475.2 to 517.2)	465.1 (439.3 to 492.1)	307.6 (298.6 to 316.8)
Dislocation / fracture / joint injury / amputation	166.8 (154.1 to 180.4)	274.3 (257.5 to 291.9)	480.7 (460.3 to 501.7)	353.3 (330.8 to 376.8)	323.0 (313.8 to 332.4)
Soft tissue inflammation	228.6 (213.6 to 244.4)	313.0 (295.0 to 331.8)	654.7 (630.9 to 679.2)	615.7 (586.0 to 646.6)	449.5 (438.6 to 460.6)
Total	1614.3 (1574.0 to 1655.4)	1514.4 (1474.5 to 1555.0)	2308.5 (2263.6 to 2354.1)	2230.3 (2173.3 to 2288.3)	1911.6 (1889.0 to 1934.3)

Values in parentheses are exact Poisson 95% confidence intervals

Table 8. Crude rate of primary treatment by age band following attendance at A+E per 10,000 population (2011/12)

Description	Age band (years)				Total
	0 to 4	5 to 9	10 to 14	15 to 17	
<i>Primary Treatment</i>					
Incision & drainage	54.4 (47.2 to 62.4)	38.1 (32.0 to 45.0)	39.1 (33.4 to 45.4)	51.7 (43.4 to 61.2)	45.2 (41.7 to 48.8)
Wound cleaning	68.2 (60.1 to 77.0)	54.7 (47.34 to 62.9)	35.9 (30.5 to 42.0)	44.8 (37.1 to 53.7)	50.7 (47.1 to 54.6)
Bandage/support	13.3 (9.8 to 17.5)	43.1 (36.6 to 50.4)	97.9 (88.9 to 107.7)	78.9 (68.5 to 90.5)	58.4 (54.5 to 62.5)
Plaster of Paris	34.0 (28.3 to 40.4)	64.6 (56.6 to 73.4)	89.7 (81.0 to 99.0)	53.6 (45.1 to 62.3)	62.2 (58.1 to 66.4)
Dressing	63.1 (55.4 to 71.7)	56.4 (48.9 to 64.6)	64.6 (57.3 to 72.6)	69.7 (60.0 to 80.6)	63.1 (59.0 to 67.3)
Wound closure (excluding sutures)	95.5 (85.9 to 105.9)	78.7 (69.9 to 88.4)	35.9 (30.5 to 42.0)	46.0 (38.1 to 55.0)	64.2 (60.1 to 68.5)
Splint	3.4 (1.8 to 5.9)	36.5 (30.5 to 43.2)	129.2 (118.7 to 140.3)	97.7 (86.1 to 110.5)	67.0 (62.9 to 71.4)
Medication administered	46.9 (40.3 to 54.4)	64.1 (56.1 to 72.9)	107.8 (98.3 to 118.0)	72.4 (62.5 to 83.5)	74.4 (70.0 to 79.0)
Prescription / medicine	71.1 (62.8 to 80.1)	65.5 (57.4 to 74.4)	88.5 (79.9 to 97.8)	121.8 (108.8 to 136.0)	84.2 (79.5 to 89.1)
None (consider guidance / advice option)	94.4 (84.9 to 104.8)	80.9 (71.9 to 90.8)	101.6 (92.4 to 111.5)	117.6 (104.8 to 131.5)	97.4 (92.4 to 102.7)
Guidance / advice only	874.3 (844.7 to 904.6)	797.0 (768.1 to 826.6)	1345.5 (1311.3 to 1380.4)	1234.9 (1192.6 to 1278.3)	1063.2 (1046.4 to 1080.2)
Total	1614.3 (1574.0 to 1655.4)	1514.4 (1474.5 to 1555.0)	2308.5 (2263.6 to 2354.1)	2230.3 (2173.3 to 2288.3)	1911.6 (1889.0 to 1934.3)

Values in parentheses are exact Poisson 95% confidence intervals

Taken together, analysis of the current situation suggests the following:

- No overall reduction in the crude or adjusted rate of emergency hospital admissions due to accidental or deliberate harm in children and young people has been observed over the period of 2005/06 to 2011/12
- There is a marked and regular seasonal variation in the rate of admissions which peak in the spring to summer months
- Certain areas of Lincolnshire and population sub-groups have been identified which experience the greatest burden of admissions across the county, such as:
 - Children aged 0-4 years
 - Children and young people resident in Boston and Lincoln
 - Socioeconomically deprived areas of Boston, Lincoln, East Lindsey and Lincolnshire East CCG
 - Admissions due to falls, exposure to inanimate forces, pedal cyclist injuries, poisonings, and contact with heat and hot substances
- Socioeconomically affluent areas of North and South Kesteven and South and South West Lincolnshire CCGs showed higher rates of admission than deprived areas; this was an unexpected finding and requires further analysis to investigate potential sources of bias in the data
- Local discussion between multiagency partners should be held to identify whether opportunities exist to reduce the number of unnecessary attendances to A+E departments and further streamline the availability of emergency healthcare resources
- Children and young people are a vulnerable population, for whom Local Authorities and the NHS carry a duty of care to prevent accidental and deliberate harm occurring
- The NI70 Strategy group should develop business case(s) and action plan(s) to commission cost-effective public health interventions to prevent accidental and deliberate harm following a robust review of the research and policy evidence base

Strategic objectives and priorities for strategic change

The strategic objectives of this document are to:

- Achieve a sustainable reduction in the rate of emergency hospital admission in children and young people due to accidental and deliberate harm from 2011/12 levels
- Narrow inequalities in the rate of emergency hospital admission by age bands, geographic area of Lincolnshire (based on Local Authority and CCG boundaries), and socioeconomic deprivation
- Develop a pan-Lincolnshire action plan to introduce and, where appropriate, target specific evidence based public health interventions to reduce the rate of emergency hospital admission
- Benchmark local annualised data reported as indicator 2.7 of the public health outcomes framework from 2013/14 with rates for England, the East Midlands, and other localities within the East Midlands and socio-demographically comparable areas outside of the region
- Raise the strategic profile of the NI70 Strategy Group and more actively involve stakeholders to adopt a co-ordinated approach to preventing accidental and deliberate harm in children and young people in Lincolnshire
- Advocate that the prevention of childhood accidents and deliberate harm should be embedded within strategies held by each of the primary stakeholder organisations identified above

The priorities for strategic change include:

- Developing closer and more integrated partnership working between the stakeholder Local Authority and NHS commissioning and provider organisations
- Achieving organisational adoption of this strategic framework to allocate resources
- Encouraging organisational contacts engaged with the NI70 Strategy Group to champion this strategic framework and promote the agenda of preventing childhood accidents and deliberate harm where appropriate

Workforce issues

A number of workforce issues are envisaged through implementing this strategic framework. Ongoing specialist public health advice, analytical support, and sustained engagement with multiagency partners will be required for the NI70 Strategy Group to continue providing an effective leadership role. Successful dissemination and organisational adoption of this strategic framework will require staff embedded within these organisations to advocate on behalf of the NI70 Strategy Group. Colleagues representing various stakeholders on the NI70 Strategy Group may be required to form sub-groups or work individually to undertake defined projects and champion this strategic framework within their host organisation.

Evaluation, learning and review

The strategic objectives described above will be evaluated and reviewed at regular intervals by the NI70 Strategy Group. Where evaluation shows that an overall reduction in the rate of emergency hospital admissions is not being achieved, corrective action will be taken as appropriate by multiagency partners. Due to resource availability, evaluation may typically be limited to an assessment of the annual rate of emergency hospital admissions per 10,000 population reported for indicator 2.7 of the public health outcomes framework unless the NI70 Strategy Group requests a detailed analytical report. This strategic framework may also be revised in due course to take account of local developments, service needs, or commissioning arrangements.

Communication plan

The NI70 Strategy Group proposes to present this strategic framework to senior decision-making Boards and Committees of the primary stakeholders for organisational adoption. Once approved, the NI70 Strategy Group will convene to discuss and agree next steps to co-ordinate action to meet the strategic objectives described herein.

Contact information

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