



**Joint Strategic Needs Assessment
Supporting Strategic Planning
for
Health and Social Care Partnerships**

**Rapid Assessment:
Reducing Adverse Events in Children & Young People**

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Key points for decision makers

Home visiting programmes which are universal and have high fidelity (or low interprofessional variation) in terms of assessment and intervention are the basis of primary prevention for the adverse childhood events. These programmes should have a focus on home safety education associated with the provision of safety equipment. They must also deliver support to ensure safe sleeping position and a focus on interventions which minimise the impact of parent/carer smoking on the fetus and infant.

The secondary prevention of child maltreatment and neglect is not amenable to home visiting and there is limited evidence for supervision or for kinship care. Consistent thresholds for safeguarding, the promotion of early permanency and the use of unrelated foster care and treatment foster care have evidence for reducing secondary child maltreatment or neglect.

There is an association between poverty and child maltreatment. Upstream action on relative poverty is likely to be effective in reducing child maltreatment.

For pregnant women affected by addiction, programmes should be developed to deliver antenatal care and addictions care in an integrated manner since this improves outcomes for the child.

Executive Summary

This rapid assessment attempts to set out the key evidence required to reduce serious adverse events from taking place in childhood.

Given the limitations of time the overall approach adopted was that of a pragmatic, mixed-methods needs assessment which combined existing available data sources with a rapid assessment of published literature reviews addressing the identified priority areas. It includes data on admissions, preventable admissions, injuries, deaths and looked after children.

There were 10,434 admissions of children and young people to local hospitals. 62% of these admissions were for periods of less than 12 hours, reflecting good practice in observing children. Socioeconomic deprivation and young age of the child were the main drivers of admission rates.

41.4% of emergency conditions were amenable to management in primary or ambulatory care. Socioeconomic deprivation was a significant driver of these rates. The five most common groups of ACSC admissions were: ENT, dehydration or gastrointestinal conditions, asthma, constipation and dyspepsia.

Unintentional injuries were commoner in younger children with intentional injury being commoner in older groups. Socioeconomic deprivation was a significant driver of admission with injuries. Head injuries and burns were commoner at younger ages with poisoning being more likely in older groups

Mortality in children was fortunately uncommon and was falling across Ayrshire and Arran. Most deaths occur in the first year of life with congenital disorders and prematurity being the main causes.

There was some variation in LAC rates for young people over the age of 16 by local authority. There was variation in the rates of kinship care across the local authorities

Universal, high fidelity home visiting programmes and safety education combined with the provision of safety equipment were considered effective in primary prevention of maltreatment and injury. Unrelated foster care and treatment foster care were effective in secondary prevention of maltreatment. Consistent thresholds for safeguarding practice and early permanency were likely to be effective in secondary prevention. Integrated programmes for pregnant women affected by addictions can improve outcomes for children. Upstream action on relative poverty is also very likely to be effective in reducing child maltreatment rates.

Approaches which focus on education, enforcement and the safe design of the environment, including tackling poverty, are likely to be effective in reducing injuries.

Reducing child deaths requires universal change to improve the position of the child in society as well as targeted action to reduce harms such as exposure of the fetus and infant to parent and carer smoking. Programmes to encourage safe sleeping position in infants are also effective, but these need to be both universal and targeted to take account of the needs of those in poverty.

Well-designed, vertically integrated healthcare has the capacity to reduce common causes of childhood hospital attendance. The arrangements must take account of the inequalities faced by those caring for children as poverty is a major driver of both illness and attendance.

1 Introduction

Child health and wellbeing are important outcomes for Health and Social Care Partnerships. The current prominence afforded to this policy area stems from a clear recognition of the low levels of health and wellbeing experienced by UK children, with family relationships and position of children in society as the main causes of this¹. Further research into the UK's poor performance has suggested that socioeconomic inequality, time-poor parenting and an over-reliance on materialism to meet the needs of children are important contributory factors².

Improving health and wellbeing are huge undertakings and the policy framework set out in the Scottish Government's Early Years Framework succinctly sets out the key issues which society and public services need to address³. This rapid assessment attempts to tackle only a small proportion of this vast agenda through setting out the key evidence required to reduce serious adverse events from taking place in childhood. Preventing harm to children and young people is a key theme across the role of public services as set out in the Children and Young People (Scotland) Act of 2014⁴. In addition, an accompanying report to inform strategic planning has explored opportunities to reduce avoidable hospital admissions. Unnecessary hospitalisation is harmful for children and whilst the accompanying report deals mostly with this issue, the theme of preventing admissions in children and young people is also explored in some detail through this report.

2 Conceptual framework

Adverse events affecting children and young people are easily recognised but can be difficult to define. In this assessment, a variety of levels of avoidable adverse events were considered. These included deaths, injuries and illnesses resulting in hospital admission, as well as uncommon specific situations such as parental or carer neglect. Preventable admissions were also considered to be an adverse event for children.

In considering the world-view which should be taken to tackle complex issues such as neglect or child maltreatment, the model used was developed by MacMillan *et al* in 2009 in their systematic review of the evidence for prevention. This saw prevention before occurrence of harm/maltreatment as being divided into interventions which were either universally applied to all children, or those which were applied to a targeted group considered to be at higher risk. The forms of harm considered included physical, sexual and psychological abuse, as well as issues of neglect and the harms associated with child exposure to intimate-partner violence⁵. This framework also outlined the need for interventions to prevent recurrence of abuse (secondary prevention) or to reduce the impairment experienced by children as a result of the abuse (tertiary prevention).

3 Methods

Given the limitations of time imposed by the need to meet the timescales for the development of the Health and Social Care Partnerships' Strategic Plans, the overall approach adopted was that of a pragmatic, mixed-methods needs assessment which combined existing available data sources with a rapid assessment of published literature reviews addressing the identified priority areas.

3.1 Analysis of data

Scottish Morbidity Return One (SMR01) data were extracted from the Information Services Division's (ISD) Acute, Cancer Deaths and Mental Health (ACaDMe) data warehouse for continuous inpatient stays (CIS) beginning and ending during 2013/14 financial year for NHS Ayrshire & Arran residents coded as an emergency admission.

The primary analysis of avoidable emergency admissions to hospital focused on Ambulatory Care Sensitive Conditions (ACSC) as identified by Purdy *et al* (2009) based on ACSC coding used in NHS England and a review of international literature on ACSCs. This definition incorporates 36 categories of conditions¹ which could be prevented by interventions in primary care, either through condition management within primary care, access alternatives more suitable than acute admission, or preventative measures (whole population or risk groups). ACSC coding was based on the International Classification of Diseases (ICD-10) code in all diagnostic positions in SMR01. This approach was adopted because of the high proportion of relatively undifferentiated presentations in children. In addition, data was obtained from ISD for registered deaths between 2003 and 2012 in children and young people aged 0-19 who were resident within Ayrshire and Arran.

Rates were calculated either as age standardised to the European standard population or as age specific rates for five year age bands. This measure allows comparison between groups and/or over time whilst discounting any difference in the age structure of the populations being compared. These rates are different to crude rates and therefore can not be used to assess the absolute number of cases presenting to services. Confidence intervals for age standardised rates are presented at the 95% confidence level. As a general rule of thumb we can assume a significant difference between groups where intervals do not overlap. In cases where intervals do overlap we cannot assume a significant difference.

3.2 Literature review

A search of recent literature was undertaken to identify of evidence which might reduce: maltreatment, injury, mortality and avoidable admissions in children.. Abstracts were appraised to create a 'review of reviews'. In addition, PubMed, NIHR, the Cochrane Database and the Health Technology Assessment Database were searched for relevant systematic reviews. Where review articles were limited, some additional searches were developed to seek supporting evidence.

¹ 35 categories have been used in this analysis. Purdy *et al* used a non-ICD10 code for identifying self harm which does not appear to be used locally. Instead self harm is incorporate within the analysis of injury coding. (List of conditions available on request.)

4 Findings: data

Key messages

Hospital Admissions

- There were 10,434 admissions of children and young people to local hospitals
- 62% of these admissions were for periods of less than 12 hours, reflecting good practice in observing children
- Socioeconomic deprivation and young age of the child were the main drivers of admission rates

Ambulatory Care Sensitive Conditions (Preventable Admissions)

- 41.4% of emergency conditions were amenable to management in primary or ambulatory care
- Socioeconomic deprivation was significant driver of ACSC rates
- The five most common groups of ACSC admissions were: ENT, dehydration or gastrointestinal conditions, asthma, constipation and dyspepsia.

Injuries

- Unintentional injuries were commoner in younger children with intentional injury being commoner in older groups
- Socioeconomic deprivation was a significant driver of admission with injuries
- Head injuries and burns were commoner at younger ages with poisoning being more likely in older groups

Child Mortality

- Mortality in children is fortunately uncommon and is falling across Ayrshire and Arran
- Most deaths occur in the first year of life with congenital disorders and prematurity being the major causes

Looked After Children

- There was some variation in LAC rates for young people over the age of 16 by local authority
- There was variation in the rates of kinship care across the local authorities

4.1 Hospital Admissions

There were a total of 10,434 admissions of children under the age of 19 years to hospitals in NHS Ayrshire & Arran in the financial year 2013/14. This represented 7418 patients and 11,405 bed days.

All emergency admissions of resident children to NHS Ayrshire and Arran hospitals take place through the Emergency Departments (EDs). A large number of children who attend the ED are admitted to the Assessment Unit. The outcome of admission to the assessment unit can include discharge, admission to the inpatient unit at Crosshouse Hospital or transfer to the Royal Hospital for Sick Children in Glasgow. It should be noted that this practice has an impact on the coding of admissions for children such that short periods of observation in the assessment unit are coded as hospital admissions. 62% of child admissions recorded 0 bed days (the child was admitted and discharged within 12 hours) so the count of bed days does not necessarily reflect the totality of the load on the service.

Of the 10,434 admissions, 6838 were emergency admissions. These figures exclude children who were resident in Ayrshire and Arran but who were transferred to Yorkhill Hospital in a planned transfer. If, after admission to an NHS Ayrshire & Arran hospital they were then transferred to Yorkhill only the stay in Ayrshire has been retained in the record.

Figure 1 shows that emergency admissions to hospital outstrip routine admissions in every local authority area. However, in South Ayrshire there was a higher ratio of routine to emergency admissions as a result of the smaller rate of emergency admissions.

Figure 1 Admissions of NHSAA resident children aged 0-19 to NHS Ayrshire and Aran Hospitals for the year 2013/14 (SMR01).

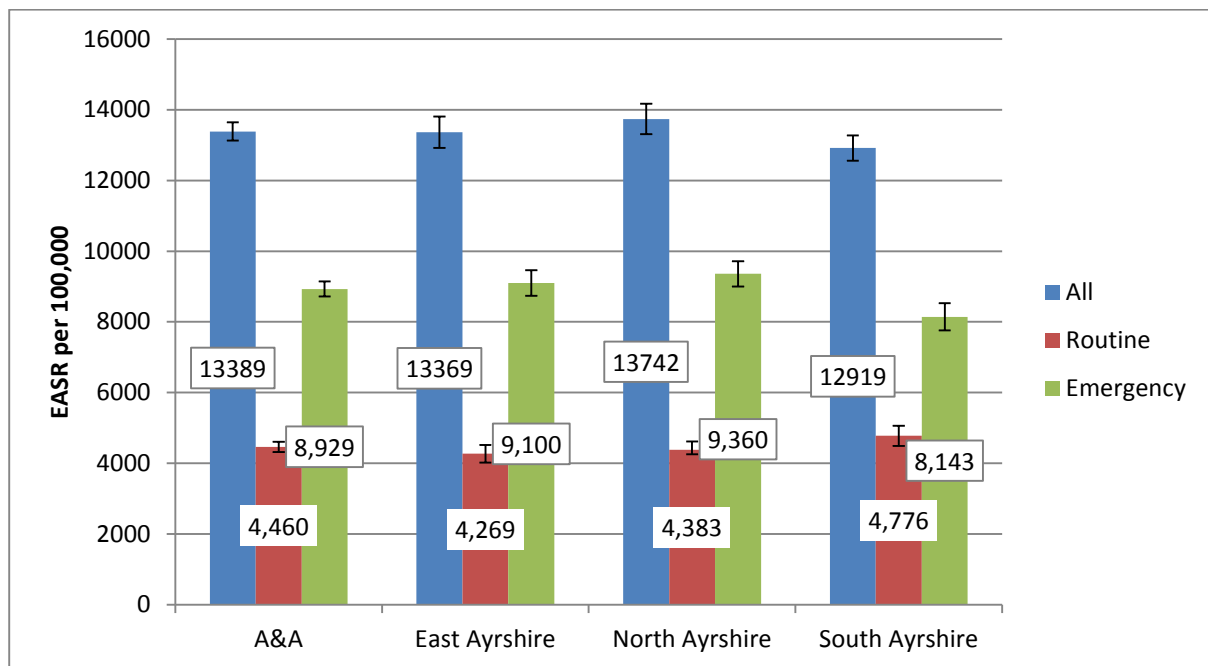


Figure 2 shows that children’s admissions to hospital follow a similar pattern to adults with children from Quintile 1 (most deprived) being more likely to be admitted than children from Quintile 5. However, this is largely driven by emergency admissions with routine admissions showing less variation (except for Quintile 5 - the most affluent group where there was a significant drop in the routine admission rate).

Figure 2 Age and gender standardised (EASR) child (0-19) admissions of Ayrshire and Arran residents to local hospitals by quintile of socioeconomic deprivation (SIMD12)

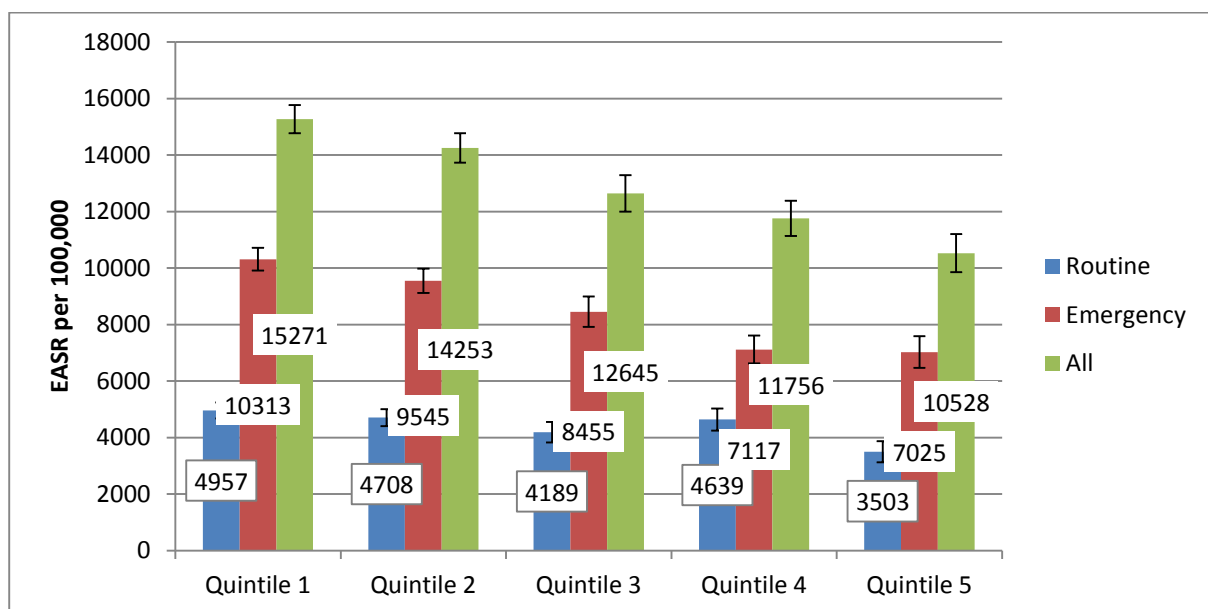
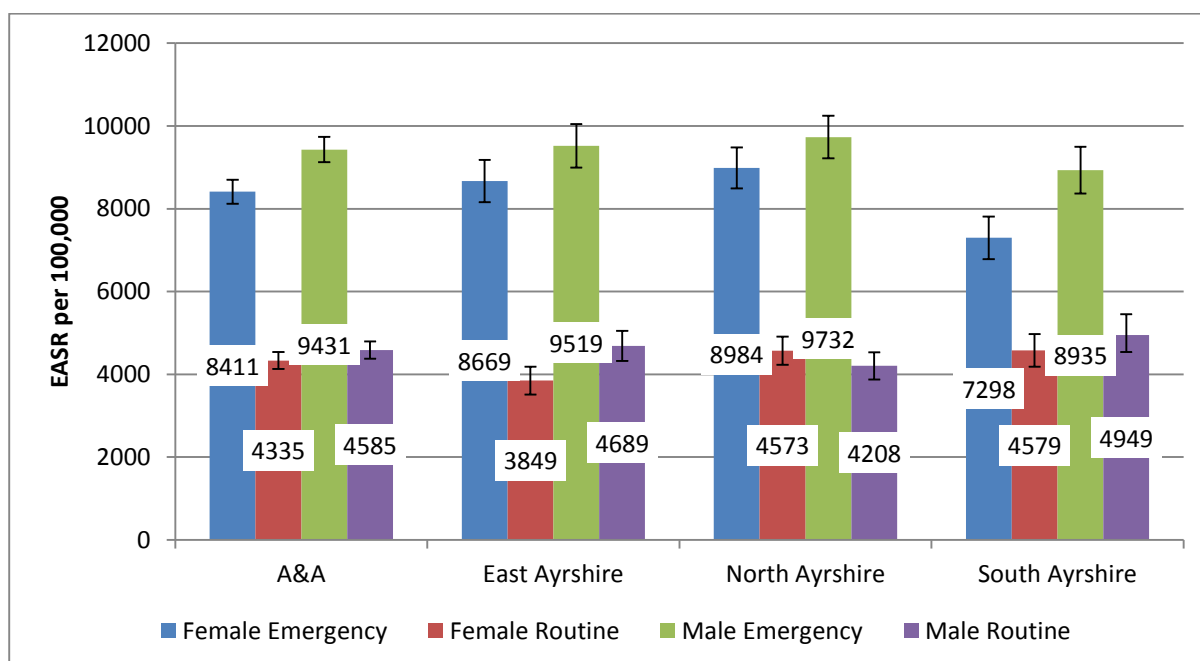


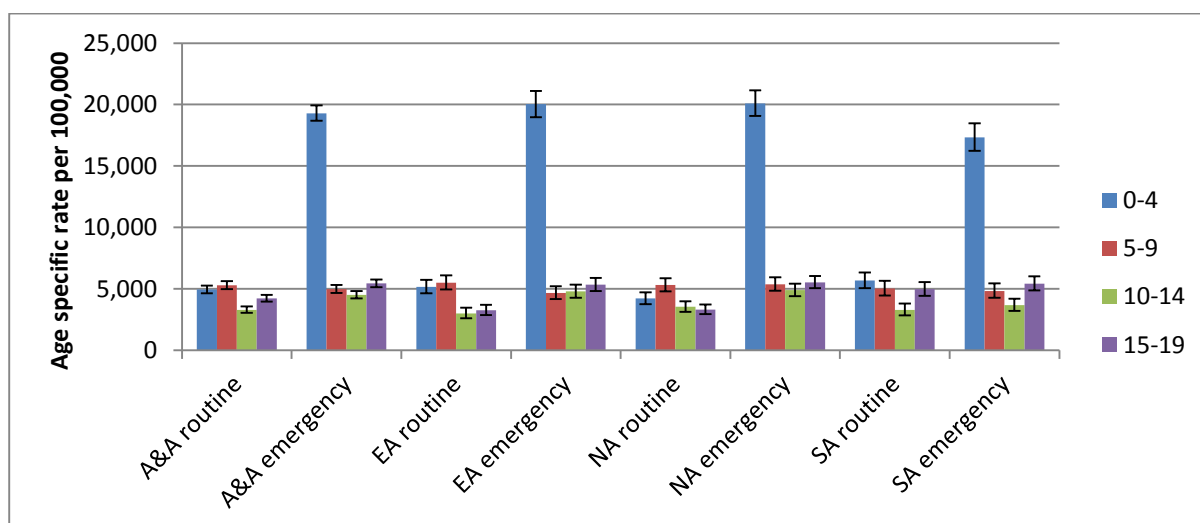
Figure 3 shows that boys tended to be admitted as emergency patients more than girls but there was little difference in terms of routine admissions. The relatively lower rate of emergency admissions observed in South Ayrshire was consistent for boys and girls.

Figure 3 Standardised emergency and routine admission rates 0-19 year olds to local hospitals by gender and local authority of residence (EASR).



Whilst there is little variation between the age bands or the types of admissions from 5 years upwards, emergency admissions dominate the admissions for under 5 year olds and are about four to five times as great as comparable admissions in the other age bands. Children aged 10-14 were least likely to be admitted to hospital.

Figure 4 Standardised child emergency and routine admission rates to local hospitals by admission type, age-band and local authority of residence (EASR).



NB Please see appendix for data table

4.2 Ambulatory Care Sensitive Conditions

The Ambulatory Care Sensitive Conditions (ACSCs) definitions used in this analysis were those defined by Purdy et al but they include the diagnosis in any position (not just the primary position). This is because the primary diagnosis for many children frequently describes signs and symptoms and a more definite diagnosis is often only given in diagnostic position 2-6. Because children who are admitted to the Assessment Unit also count as admissions, and there is no explicit way of differentiating between those admitted to

the Assessment Unit and those admitted to the ward in the data, the analysis looked at admissions of children who had been admitted for at least one day (ie they had definitely been admitted to the ward). However, there was minimal difference in the ranking of ACSC conditions between the two analyses except that there was a marginally bigger percentage of children with UTIs who were admitted for more than a day. Because of this marginal difference and because the numbers of children admitted for one day plus were far fewer, all emergency admissions which included an ACSC condition were included in this analysis.

Table 1 shows that about 41% of children's emergency admissions were as a result of Ambulatory Care Sensitive Conditions (ACSC) and were potentially avoidable. In addition, about 15% of the emergency admissions were due to injuries. The number of bed days for each admission varied widely. 52% of all emergency admissions were for 0 bed days, 27% for one day and 9% for two days. The average length of stay (trimmed mean) was for 0.78 days but the range was from 0 to 455 (this child had been admitted in 2012/13). About a quarter (25%) of all emergency admissions are re-admissions with the number of re-admissions ranging from one to 18. 60% of re-admissions are for the under 5s and the following are the top five reason for re-admission: 34% Symptoms and Signs, 31% Respiratory, 23% Infections, 11% Gastro-Intestinal, 11% Injuries/Poisoning.

As Figure 5 shows, there were no significant differences in standardised admissions for ACSC in terms of gender or local authority. Figure 6 shows that there is a strong relationship between deprivation and admission rates with the most deprived children (Quintile 1) 50% more likely to be admitted with an ACSC than the least deprived children (Quintile 5).

Table 1 – All child emergency admissions, ACSC admissions and emergency admissions classed as injuries for NHS Ayrshire and Arran residents aged 0-19, attending local hospitals in 2013/14 (source SMR01).

	All emergency admissions	ACSC admissions	Emergency admissions (all) classed as injuries
No. admissions	6838	2834	1074
% emergency admissions	100%	41.4%	15%
Number of patients	5113	2236	961
Number of bed days	9487	3363	1435
% admissions with 0 bed days	51.6%	54%	46.5%

Figure 5 ACSC admissions by gender and local authority area (0-19 year olds presenting to local hospitals, based on SMR01).

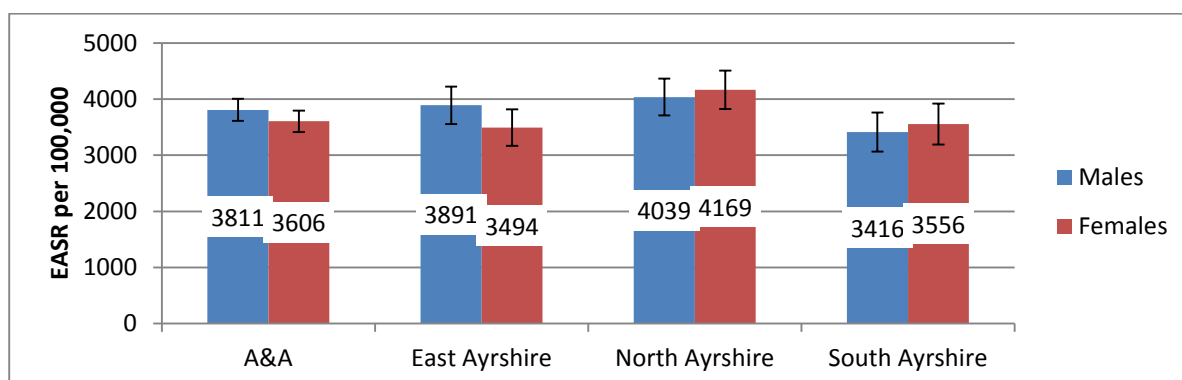
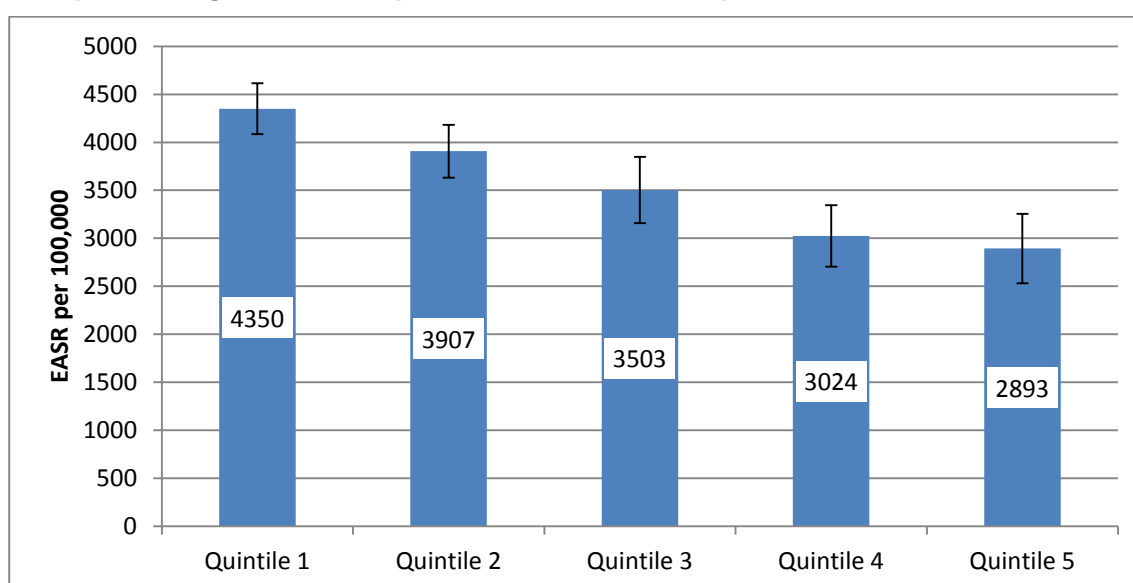


Figure 6 ACSC admissions by SIMD quintile of socioeconomic deprivation (0-19 year olds presenting to local hospitals, based on SMR01).



As can be seen in Table 2, children admitted for ear, nose and throat problems were the most common of the ACSC conditions. The second most common reason for admission was dehydration and gastro-intestinal conditions. This was followed by Asthma (6%) and then constipation and dyspepsia (each at 3%). The category 'dyspepsia and perforated ulcer' mostly comprises reflux and signs and symptoms around food intake.

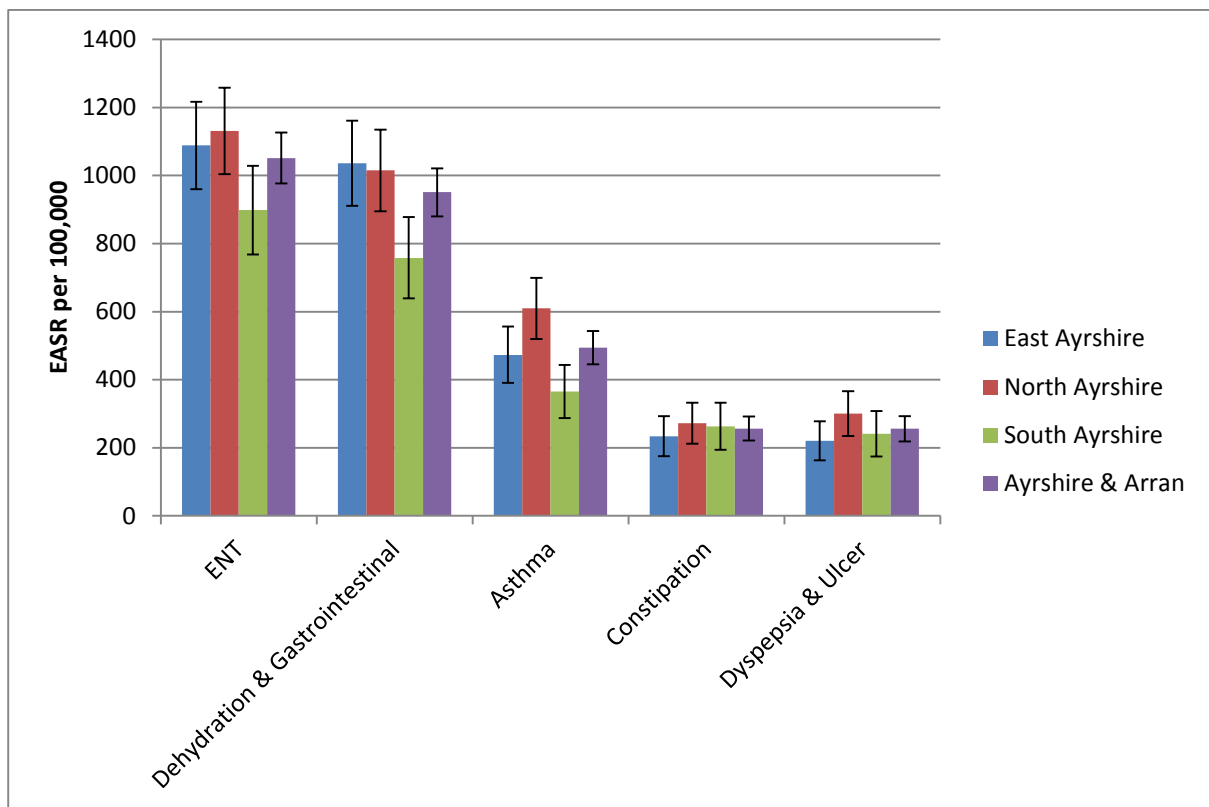
Table 2 – Most common ACSC diagnoses for Children and young people

	Number admissions with these diagnoses	% ACSC admissions	Number admissions with this in primary position	% of all emergency admissions
ENT	767	27	660	11
Dehydration and Gastrointestinal	699	25	575	10
Asthma	394	14	170	6
Constipation	198	7	123	3

Dyspepsia & perforated ulcer	187	7	120	3
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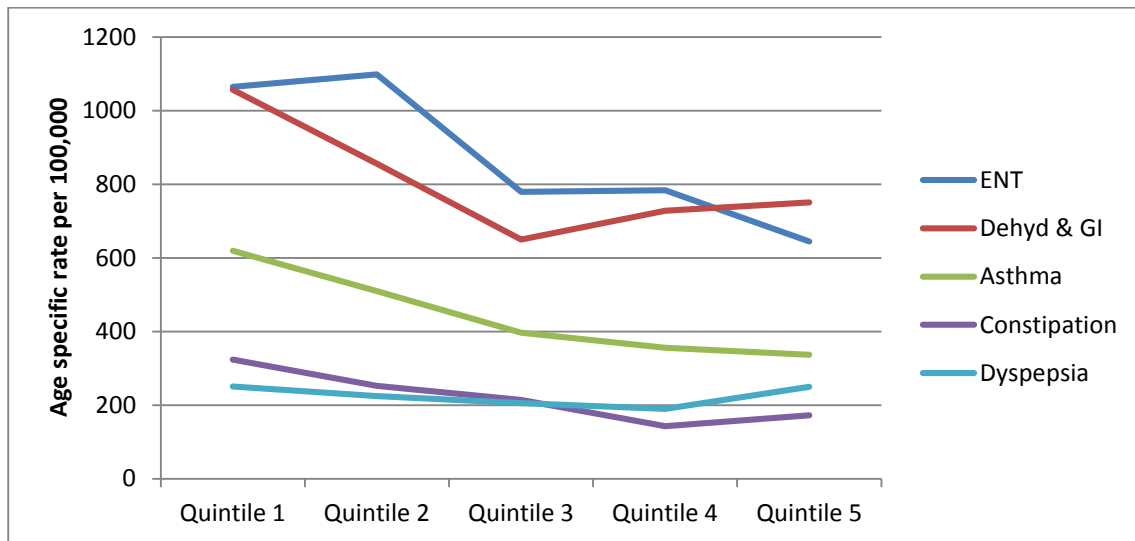
Figure 7 shows the five most common ACSC conditions by local authority area and Ayrshire & Arran as a whole. Given the wide confidence intervals, it cannot be concluded that there is a significant difference between the three local authority areas except possibly with regard to asthma where North Ayrshire has a statistically higher rate of admissions to South. Figure 8 shows the rates of the top 5 ACSC conditions by SIMD quintile. As can be seen admissions for most of these conditions decrease as deprivation decreases.

Figure 7 Most common ACSCs (standardised admission rates) by administrative area



NB Please see appendix for data tables

Figure 8 Most common ASCS (standardised admission rates) by SIMD quintile of socioeconomic deprivation

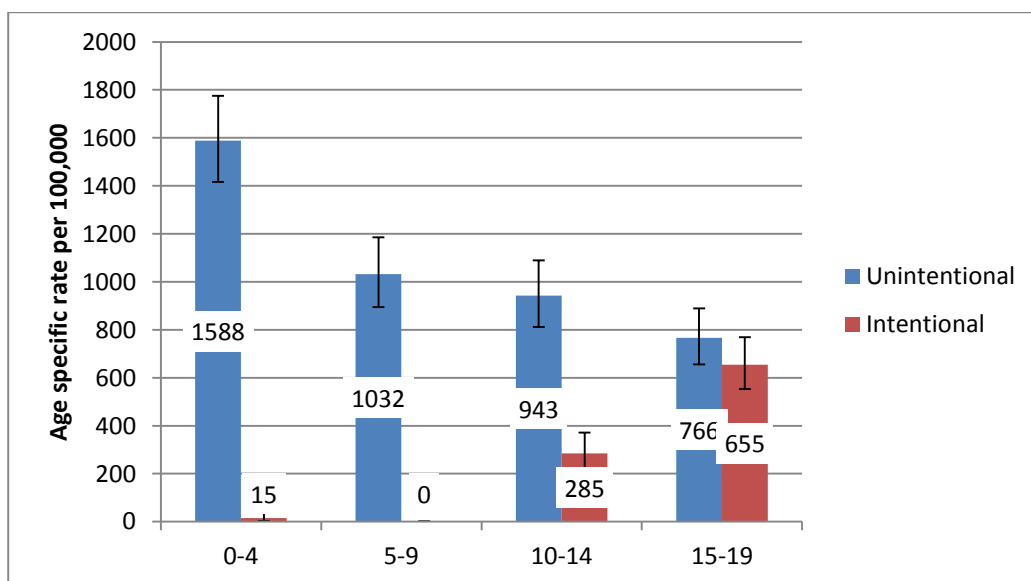


4.3 Injuries

There were 1487 diagnoses of injuries in the record, representing 1127 admissions as some children had more than one diagnosis of injuries in their record. Of these 1127 some 53 were due to adverse reactions to prescribed medication and so have not been included in this analysis. There were therefore some 1074 admissions due to injuries, representing 961 children.

Injuries can be classified as unintentional (previously referred to as accidents) or intentional (including assaults, abuse and self-harm). Age was a significant determinant of unintentional injury rates falling from 1588 per 100,000 0-4 year olds to 766 per 100,000 15 to 19 year olds. The opposite relationship between age and injury levels was found for intentional injury, with standardised injury rates rising to a high of 655 per 100,000 in 15-19 year olds.

Figure 9 Standardised intentional and unintentional injury rates by age band



There were differences between girls and boys with regard to intentional and unintentional injury. Boys were more likely to be admitted to hospital with unintentional injury with 1269 per 100,000 compared to 863 per 100,000 for girls but the reverse is true of intentional injuries with 327 per 100,000 girls being admitted to hospital for intentional injury compared

to 184 per 100,000 boys. The underlying cause for higher rates of intentional injuries in females remains unclear but may reflect self-harming behaviour and merits further exploration. Figure 10 shows the age adjusted rates of admission for injuries in children by Local Authority area. There were no significant differences between areas. Figure 11 shows the rates of injury by SIMD quintile. As deprivation decreases so does the likelihood of being hospitalised for either intentional or unintentional injury.

Figure 10 Standardised injury rates by local authority area

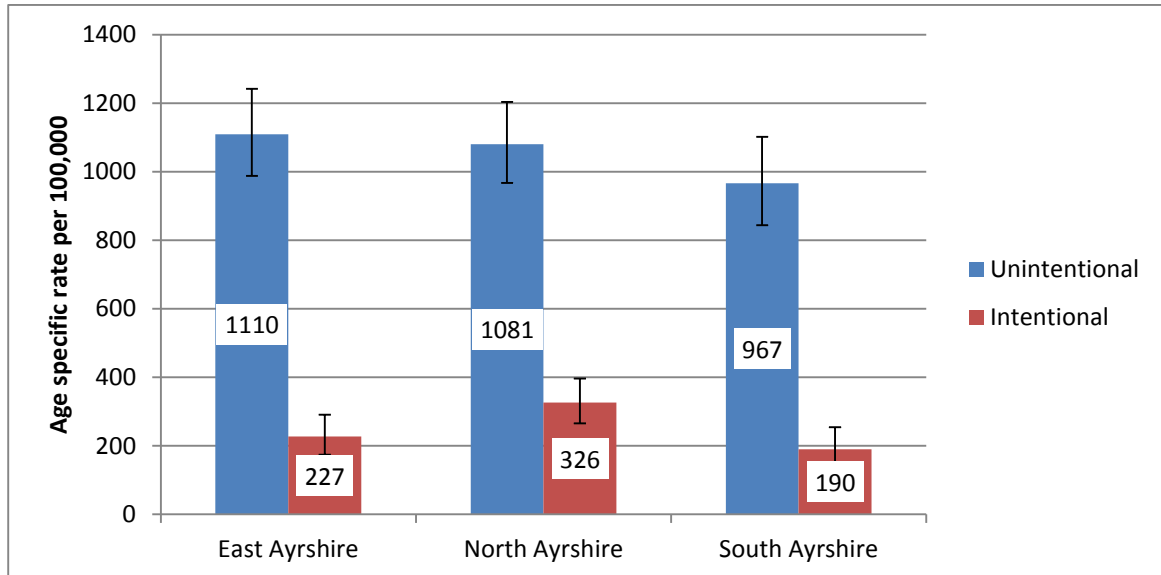


Figure 11 Standardised injury rates by quintile of socioeconomic deprivation (SIMD12)

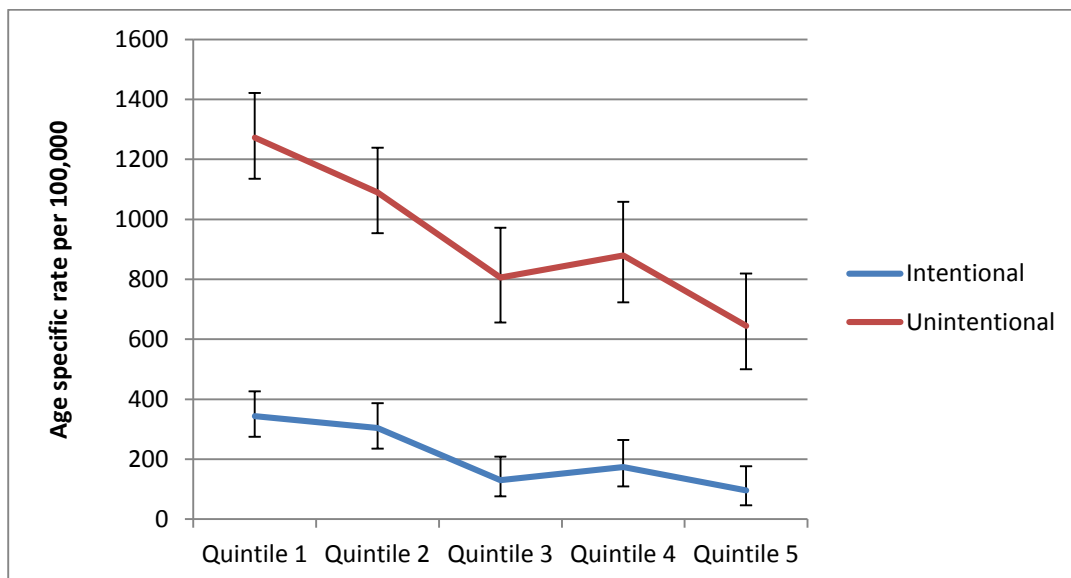
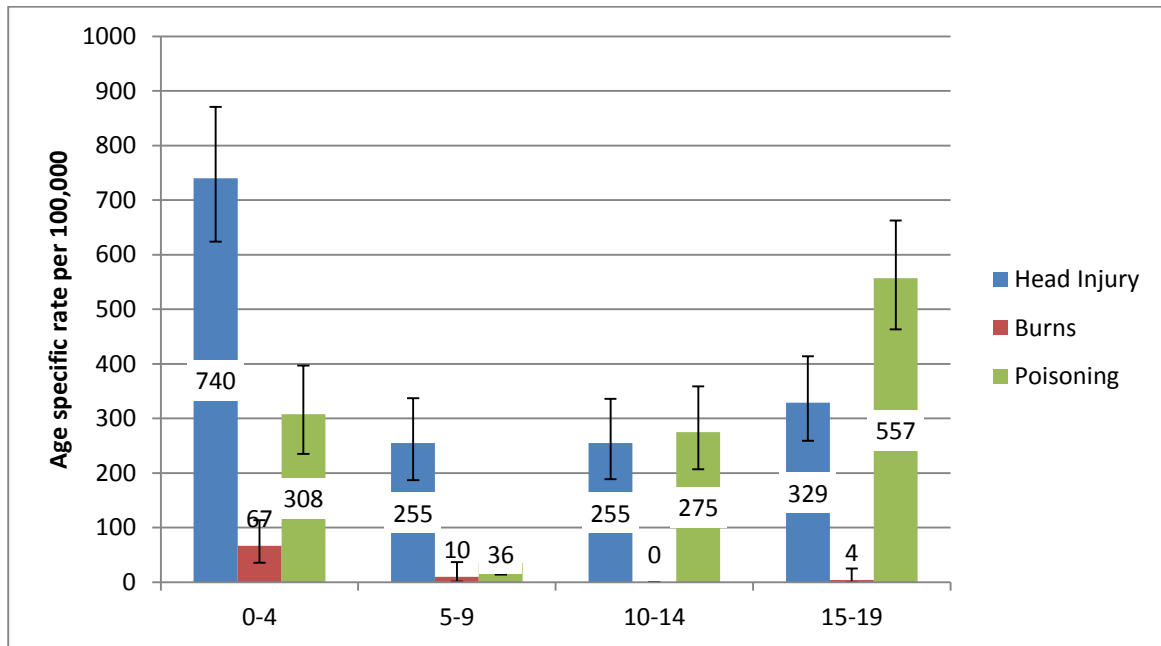


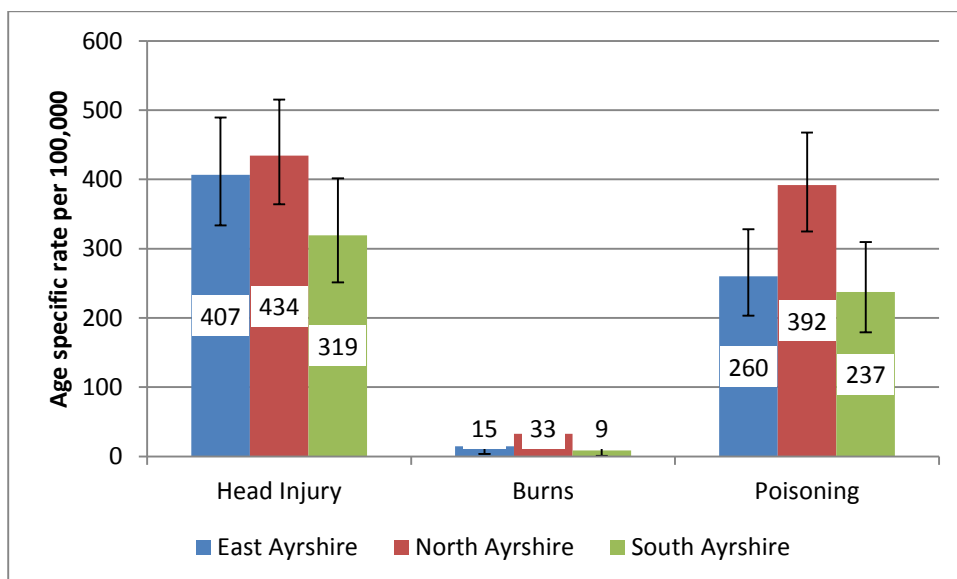
Figure 12 Standardised admission rates for subclasses of injuries by age band



Head injuries and burns were the main causes in 0-4 year olds with poisoning being the main cause in older young people. This is shown in Figure 12. Poisoning included either alcohol misuse or other substance misuse.

Figure 13 shows admissions for different types of injury by Local Authority area. There were no significant differences. In terms of gender differences, boys tend to suffer with head injuries more than girls (479 per 100,000 compared with 302 per 100,000) whilst girls tend to have been admitted for poisoning more than boys (405 per 100,000 as compared with 205 per 100,000). Both sexes were equally represented in the burns category (19 and 20 per 100,000).

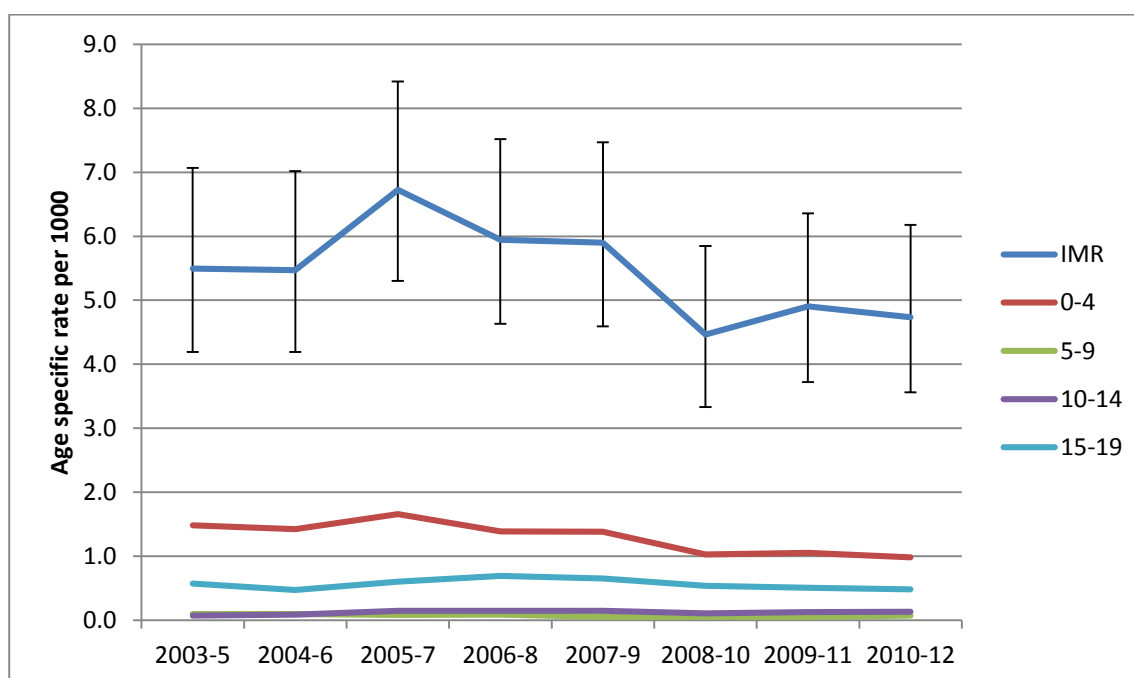
Figure 13 Classes of injury by local authority area



4.4 Child Mortality

The Infant Mortality Rate (IMR) measures the number of children aged less than 1 year per 1000 live births that die. In Ayrshire & Arran, because the numbers are fortunately very small. To ensure reliability of the data, IMR has been analysed in three year blocks, calculating the rolling average for each three years block. The IMR in Ayrshire and Arran has reduced from 5.5 in 2003-2005 to 4.7 in 2010-2012. The figure for Scotland in 2012 was 3.7 infant deaths per 1000. Figure 14 shows the IMR for Ayrshire & Arran along with the child death rate in five year age bands. In contrast with the IMR which is measures per 1,000 live births, the death rates for other age bands is calculated as deaths per 1,000 resident children.

Figure 14 Average Infant Mortality Rate and mortality rates for other age bands for rolling 3 year periods for NHS Ayrshire and Arran residents

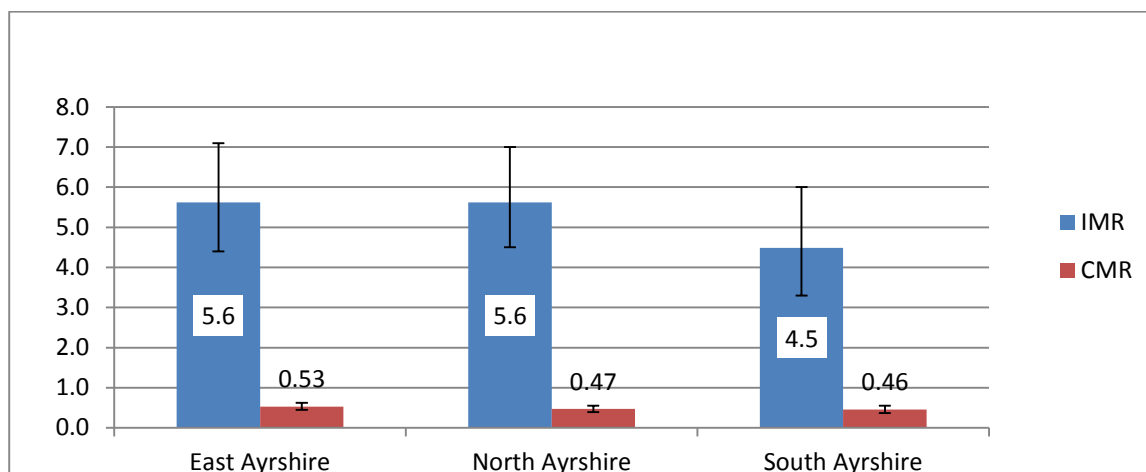


NB Please see appendix for data table

Children under the age of one were most likely to die, much of the mortality rate being driven by congenital and perinatal conditions. As children grow older the death rate falls considerably and mortality rates are much lower amongst the 5-9 year olds and the 10-14 year olds.

Figure 15 shows the Infant Mortality Rate and overall child mortality rate (for children between the ages of 0 and 19) by local authority area over a ten year period 2003 – 2012. There is little difference between the three areas.

Figure 15 Average IMR and 0-19 mortality rate for the period 2003-2012 by local authority area



4.5 Death, illness or serious injury in looked after children

Data on the epidemiology of looked after children is poorly developed. From Scottish Government Social Work Statistical Return, the numbers of crude rates of looked after on the 31st of July 2013 were obtained. These are shown in Table 3. These rates are higher than the overall Scottish rate of 1.5%.

Table 3 Numbers and crude rate of LAC by local authority as of 31 July 2013 (Source Social Work Statistics)

Local Authority	No. LAC children	LAC as a percentage residents 0-17
East Ayrshire	521	2.1
North Ayrshire	587	2.1
South Ayrshire	365	1.8

The statistical return also provides some detail on the demographics of LAC as well as their type of accommodation. Table 4 shows generally comparable proportions of LAC in the preschool age band and that overall, the proportion of LAC from minority groups is very low, reflecting the local population. South Ayrshire has a lower proportion of LAC aged 16 years or older (5% in comparison with 11% in the other areas and in Scotland as a whole). In addition, there were substantial differences in the proportion of LAC with additional support needs (previously referred to as the proportion with disabilities). This variation is likely to reflect differences in interpretation of this definition rather than a real difference.

East Ayrshire had a lower proportion of LAC at home or with foster carers, but a very high level being looked after by family or friends – i.e. kinship care. North Ayrshire had a greater proportion of LAC being looked after at home with lower levels of foster care. South Ayrshire also had a greater proportion of children being looked after at home, with foster care rates broadly comparable with Scotland, however they had a low level of kinship care (see Table 5).

Table 4 Demographics of LAC in 2013 by local authority, including all-Scotland for comparison

Local Authority	% under 5	% 16+	% minorities	% Additional Support Needs
East Ayrshire	23	11	1	5
North Ayrshire	24	11	2	12
South Ayrshire	24	5	*	25
Scotland	21	11	3	11

Table 5 LAC in 2013 by local authority and type of location

Local Authority	% at home with parents	% with friends/family	% foster care	% other community
East Ayrshire	28.4	37.1	32.9	1.6
North Ayrshire	41.3	31.4	25.2	1.9
South Ayrshire	42.9	16.7	37.9	2.3
Scotland	32.6	28.7	36.5	1.9

Very little information was known about the health status of looked after children. At present, there is no way of identifying Looked After Children (LAC) in NHS systems. Recent changes to local authority education systems combined with guidance from the information commissioner will make it possible to identify and analyse the health of this group in the future. This is a priority for ongoing work.

There was limited information on Significant or Immediate Case Reviews which should take place under the auspices of the local Child Protection Committees in circumstances where deaths or serious injury befalls looked after children. Scottish Government guidance has emphasised the need for more robust approaches to significant and immediate case review in the future, standardising practice across Scotland.

5 Findings: literature

Key messages

Reducing harm from neglect and maltreatment

- Universal, high fidelity home visiting programmes and safety education combined with the provision of safety equipment are effective in primary prevention of maltreatment and injury.
- Unrelated foster care and treatment foster care were effective in secondary prevention of maltreatment.
- Consistent thresholds for safeguarding practice and early permanency are likely to be effective in secondary prevention
- Integrated programmes for pregnant women affected by addictions improve outcomes for children

Reducing injuries

- Approaches which focus on education, enforcement and the safe design of the environment, including tackling poverty, are likely to be effective in reducing injuries

Reducing deaths

- Reducing child deaths requires universal change to improve the position of the child in society as well as targeted action to reduce harms such as exposure of the fetus and infant to parent and carer smoking.
- Programmes to encourage safe sleeping position in infants are also effective, but these need to be both universal and targeted to take account of the needs of those in poverty

Reducing common attendances

- Well-designed, vertically integrated healthcare has the capacity to reduce common causes of childhood hospital attendance. The arrangements must take account of the inequalities faced by those caring for children as poverty is a major driver of both illness and attendance.

5.1 Caveats for Decision Makers

A systematic review is an approach taken where all the peer-reviewed studies on a given topic are reviewed against an agreed set of criteria, including, robustness of study design and errors in the analysis and interpretation of the findings. Studies judged to contain such errors are excluded from a systematic review. By carefully weighing the evidence from good quality studies together, a systematic review should come to an overall conclusion about the likelihood that an intervention or treatment is effective. This report about interventions to reduce adverse childhood events relied in the main on a series of systematic reviews.

There are some limitations to this approach. The main one is that studies to evaluate new interventions or services are often very different in their design. This is often because the services themselves are very different from each other. Because the services and the studies to evaluate them are so variable, it can be difficult to draw very firm conclusions about their impact. The second limitation is that many models or interventions are made up of many different elements. There may, for

example, be involvements from a range of healthcare professionals. There may also be involvement from different sectors like; the health service, social services and the voluntary sectors. This means that it is difficult to identify which elements of the overall model which are effective in a given context, or those elements which may be acting as a barrier to effectiveness.

The third caveat is about studies that are rejected from the reviews. A systematic review may start by considering a large number of studies but will reject many because of concerns about quality. This means that there is a risk that some interventions for reducing avoidable admissions that might actually work in Ayrshire and Arran were discounted from the review.

Another challenge is that the authors of original studies may define the interventions differently. So, for example, a systematic review about 'case management' may include studies where this is defined solely as direct clinical care for patients in a clinical setting whereas in other studies case management can also include telecare, home visits and regular scheduled visits to a patients GP. This could result in contradictory findings between reviews where one review reports an intervention is effective whilst a different review may report the opposite.

Finally, it should be remembered that the interventions were evaluated only for their effect on reducing adverse childhood events. However, the interventions included may have resulted in improvements in other outcomes, as well as reductions in costs, or improvements in patient or staff experiences.

5.2 Reducing maltreatment

The literature identified parenting support programmes, safety education programmes which included the provision of safety equipment and some home visiting programmes as being effective in the primary prevention of child maltreatment and injury. Given the association between child maltreatment, upstream actions designed to tackle poverty are likely to be effective. Home visiting programmes need to be universal in reach but of a high fidelity if they are to be effective. In terms of secondary prevention there was robust evidence for unrelated foster care and for multidimensional treatment foster care. The evidence for prevention associated with kinship care was weak and conflicting. Programmes designed to ensure early permanency showed very significant reductions in subsequent child maltreatment. The literature favoured robust assessment processes based on the Framework for the Assessment of Children in Need and their Families (FACNF). This framework is in place in a number of developed countries and opinion suggests it has the potential to improve outcomes through child-centred practice, but outcome evidence is still awaited. There was also evidence suggesting the adoption of consistent thresholds for decision-making in relation to child protection processes held promise in reducing secondary abuse. For pregnant women affected by addictions, there was evidence that integrated programmes which deliver both addictions care with antenatal care, resulted in better outcomes for children. The findings are set out in greater detail in Tables 5.2.1 to 5.2.7 in the appendix.

5.3 Reducing injury

The compelling message from the literature was that injuries are predictable and injury type tends to be dependent upon the age and stage of the child and therefore they are amenable to prevention strategies. There was a wealth of research on various prevention approaches and this is captured in 'The Three Es of Injury Prevention': Education, Enforcement and Engineering the Environment. Educational interventions should be aimed at a variety of

groups – children, parents, carers, professionals, politicians. Enforcement legislation requires to be enforced for it to be meaningful. It was recognised that this is labour intensive and requires input from statutory services such as the police. Examples included seatbelt legislation and traffic speed limits. Finally technological advances, home design and building, road design, and consumer product safety all had a part to play. A crucial environmental issue was poverty as the risk of unintentional injury in childhood increases very substantially with increasing socio-economic deprivation. Systematic reviews indicate that that whilst education can result in behaviour change, this will not be successful on its own. The most effective interventions require a combination of all three approaches. The detail underpinning this section of the literature can be found in Table 5.3.1 in the appendix.

5.4 Reducing mortality

Many of the causes and determinants of childhood deaths are potentially preventable. Reducing health inequalities in infant mortality requires a combination of health interventions and actions on the wider social determinants of health by the NHS, local authorities and voluntary organisations, charities and social enterprises. These interventions must start before birth. Giving every child the best start in life through interventions to reduce health inequalities in infant mortality is central to reducing health inequalities across the life course. Infant Mortality can be reduced. Universal and targeted solutions are needed: universal to ensure our society is more child-centred, and targeted, to ensure that effective interventions are designed to reduce fetal and infant exposure to parent/carer smoking, and promote safe sleeping position. The prevention of suicide in young people is complex and is often related to longer term difficulties. Therefore the prevention agenda requires multiple strategies. This has only been touched on for the purpose of this literature review. The literature table can be found in Table 5.4.1 in the appendix.

5.5 Reducing the most common causes for attendance

5.5.1 ENT admissions

Interventions with evidence of effectiveness included pneumococcal immunisation. In addition, senior medical specialist review in the emergency room as well as the use of short stay observation arrangements were of value. Conditions such as otitis media were associated with socioeconomic deprivation, with the likely cause being related to exposure to environmental tobacco smoke. More detail is contained in Table 5.5.1 in the appendix.

5.5.2 Dehydration and gastrointestinal admissions

A total of 47 abstracts were returned for dehydration and gastroenteritis, 30 were excluded on the basis of; inconclusive findings, small sample size, not sufficiently focussed on reducing hospital admissions, focussed on developing world countries and diarrheal disease.

Abstracts relating to Rotavirus vaccine indicated the significant reduction in the incidence of rotavirus gastroenteritis and the significant reduction in emergency hospital admissions. (This was introduced as a national immunisation programme for all babies in Scotland born after 1st May 2013). Breastfeeding was shown to significantly reduce hospital admissions from gastrointestinal and respiratory infections in infants aged under one year. Antiemetics are useful in the emergency department to reduce vomiting, allow oral rehydration as opposed to intravenous rehydration and reduce avoidable admissions. There is no evidence that education programs or primary care follow-up soon after emergency department visits for gastroenteritis are associated with a lower rate of subsequent visits.

More detail can be found in Table 5.5.2 of the appendix.

5.5.3 Asthma

Well-designed asthma education programmes that foster continuity, target socio-economically deprived parents and children and enhance self-management and the management of an exacerbation may have some effect on hospital utilisation. Continuity of care, smoke free homes and cars, early identification of allergies and not being overweight are all important in reducing avoidable admissions in children with asthma. More detail is found in Table 5.5.3 in the appendix.

5.5.4 Constipation & Dyspepsia

A total of 235 abstracts were returned for constipation and dyspepsia, very few focussed on reducing hospital admissions and those that did were either not robust or were inconclusive. The focus of many were on the underlying causes of the conditions, comparisons of treatments (various preparations) and some of the psychosocial issues that emerge for children (particularly school absences) and families. Audits of pathways and some services for constipation claimed a reduction in hospital admissions.

Key findings that may be useful to note were the explanations that hospital use was avoidable if primary care interventions were early and thereafter maintained. There were a number of abstracts that referred to dietary interventions, laxative therapy, cow's-milk-free diet, probiotic yogurt, water intake, lifestyle modifications, not being overweight and increased physical activity all of which increased the likelihood of constipation being managed in the community. In relation to dyspepsia, (there were far fewer abstracts) several studies found that the identification and eradication of *H pylori* in children presenting with nonulcer dyspepsia demonstrated long term improvements.

The data can be found in Table 5.5.1 of the appendix.

6 Conclusion and Recommendations

This report clearly sets out that socioeconomic deprivation is a major driver of adverse events in childhood. Poverty is associated with higher levels of illness as well as increased mortality. There is also a strong association between poverty and children being looked after. Action to tackle poverty is likely to be effective in reducing child maltreatment and levels of LAC.

There are interventions which can reduce adverse events for children and young people. For primary prevention of maltreatment or parental neglect, these include: investment in universal, high-fidelity home visiting programmes which have a focus on consistent assessment and which deliver safety education in association with safety equipment. The programmes should also focus on safe sleeping position for infants and on strategies to minimise risk to the fetus and infant from parent/carer smoking.





For children already affected by maltreatment or neglect, the focus should be on interventions with effectiveness. These should include consistent thresholds for intervention, programmes which promote earlier permanency, and where foster arrangements are required, practitioners should bear in mind that the evidence supports unrelated foster care or treatment foster care, whilst kinship care lacks a robust evidence base. In addition, supervision alone is unlikely to prevent secondary abuse or neglect. For pregnant women affected by addictions, integrated delivery of antenatal and addictions care improves children's outcomes.

Reducing attendances in children requires a focus on vertically integrated pathways which are flexible enough to take account of the impact of socioeconomic inequalities.

Appendix – data and literature

Table 5.2.1 Summary of literature for models of care for the primary prevention of physical abuse, injury and hospitalisation

Key:  = reduces  = no effect  = increases

Intervention	Detail	Impact
Home visiting programmes	Different programmes have different effectiveness. Cost per family visited \$1800 to \$30k. Cost per abuse prevented \$22k to \$1m # Paraprofessional programmes not effective.	 
Parenting programmes	Triple P, but based on single trial with small sample size.	 weak
Abusive head trauma education programmes	Single study (cohort with historical control)	 weak
Enhanced paediatric skills for those at risk of abuse and neglect	Enhancing physician skills to identify and help families reduce risk factors for child maltreatment.	Not statistically significant

MacMillan et al, 2009

Dalziel and Segal, 2012

Table 5.2.2 Summary rating from the literature of effective models of care/interventions to prevent sexual abuse

Key:  = reduces  = no effect  = increases


Intervention	Detail	Impact
Education programmes to reduce risk of sexual abuse	Universal	 Increased awareness

Table 5.2.3 Summary rating from the literature of effective models of care/interventions to prevent psychological abuse

Key:  = reduces  = no effect  = increases



Intervention	Detail	Impact
Therapeutic counselling	Attachment-based interventions may improve parenting quality and reduce infant insecurity, but there is no evidence they prevent abuse.	

Table 5.2.4 Summary rating from the literature of effective models of care/interventions to prevent exposure to intimate partner violence

Key:  = reduces  = no effect  = increases






Intervention	Detail	Impact

Programmes to reduce risk of exposure to intimate partner violence	Two systematic reviews failed to identify effective interventions	
--------------------------------------------------------------------	-------------------------------------------------------------------	-------------------------------------------------------------------------------------

MacMillan et al, 2009

Table 5.2.5 Summary rating from the literature of effective models of secondary prevention or to improve child outcomes in cases of child abuse

Key:  = reduces  = no effect  = increase

Intervention	Details	Impact
Physical abuse and neglect <ul style="list-style-type: none"> • Parenting programmes • Home visiting programmes • Neglect programmes 	Webster Stratton some evidence No effect	  
Sexual abuse	CBT improves mental health for abused children but conflicting evidence on child behavioural problems	 weak
Emotional abuse	Limited evidence. Group based CBT may be effective with some parents	 weak








Intimate partner violence	<p>Limited evidence</p> <p>Restraining orders may prevent recurrence. Offender treatment has limited evidence.</p> <p>Mother-child therapy may have some benefit where there are behavioural problems</p>	 weak
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Table 5.2.6 Summary rating from the literature of effective models of secondary prevention or to improve child outcomes in cases of child abuse: global interventions

Key:  = reduces  = no effect  = increase

Intervention	Details	Impact
Foster care	<p>Foster care without family reunion has benefits for children.</p> <p>Enhanced foster care results in better mental health for children than traditional foster care.</p>	 
Family preservation programmes	No evidence of improved outcomes	
Kinship care	Conflicting evidence in comparison with traditional or enhanced foster care	Conflicting evidence of effectiveness compared with unrelated fostering


Multidimensional treatment foster care	Reduced behavioural problems and fewer failed placements	
Multidisciplinary Infant Mental Health (Early Permanency)#	Intervention doubled the rates of terminating parental rights, and halved levels of abuse.	
Mentoring and skills training	Some evidence of improved mental health outcomes	 weak





MacMillan et al, 2009

#Zeanah et al, 2001.

Table 5.2.7 Further evidence for general approaches to secondary prevention of maltreatment

Key:  = reduces  = no effect  = increase

Intervention	Details	Impact
Supervision	Weak and limited evidence for social work supervision in terms of reducing child abuse and maltreatment (Carpenter et al 2013)	

Family preservation programmes	No evidence of improved outcomes	
Assessment	Clear evidence of assessment methods and risk factors which can raise likelihood of child abuse and maltreatment, but limited clarity on when and how to intervene (Daniel et al 2010)	
Thresholds and consistent decision-making	Evidence that personal characteristics of decision-makers had a marked impact on outcomes of child protection in this study (Jent et al 2011)	
Framework for the Assessment of Children in Need and their Families (FACNF)	Facilitated by training can result in more child-centred practice, but negative consequences of substantial impact on workload.	Promising
Integrated treatment programmes for substance abuse in pregnant women	Evidence that integrated programmes, providing antenatal care, parenting and addictions support and treatment together are more effective than independent programmes in terms of children's outcomes. (Niccols et al, 2012)	

5.3.1 Summary of Effectiveness of models of care to prevent injuries in children and young people

Symbols: reduce (↓); increase (↑) and no effect (↔).

Cause of Injury	Intervention	Impact	High risk groups	Key Message
Poisoning	Promote use of child resistant packaging.	↓ (when done together)	Toddlers	Studies suggest that the most vulnerable time is when the poisons are in use and that safe packaging alone cannot compensate for unsafe storage or use.

	Promote safe storage of medicine			
	Parental education to increase knowledge regarding risk factors.	↓↔	Toddlers	Educational activities may assist in increasing parental knowledge.
Fires	Home risk assessments, safety checks and escape plans. Properly installed and maintained smoke alarms/sprinklers.	↓	Toddlers and school aged children	Permanent safety equipment should be installed and maintained in social and rented housing, and accompanied by home assessments, information and education. Target deprived groups: in particular children in privately rented and temporary accommodation and households where people smoke.
	Fire safety skills training for children and parents.	↔		No studies identified directly linking training to injury reduction.
Scalds	Regulation of hot water temperature.	↓	Toddlers	Studies show that legislation regarding a safe pre-set temperature for all water heaters has proven a more effective method of reducing scalds than parental education to turn down water heaters.
Road Traffic Injuries	Safer road design. Promote traffic speed reduction and 20mph in areas of high pedestrian activity. Correct use of child seats/seat belts.	↓	All children	Studies indicate that in the United Kingdom, introduction of the 20 mph speed limit zones has resulted in 70% reduction in fatal child pedestrian accidents.
	Community based education/advocacy measures to protect pedestrians.	↓↔	All children	Mixed reviews within the literature: the most effective programs include educational, social and environmental strategies.

Bicycle/Scooter Injuries	Wearing bicycle helmets.	↓	School aged children	Studies have suggested that correctly fitted bicycle helmets can reduce the risk of head and brain injury by 63-88%.
Falls	Home safety checks by professionals. Installation and use of home safety equipment. Installation and use of stair gates at tops of stairs.	↓↔ (combination of all is most effective)	Infants and toddlers	The provision and instalment of free equipment is more likely to increase use, particularly in lower income settings.
	Playground standards and community programmes that help to create safe living and playing environments.	↔ (arms and legs) ↓ (head injury)	School aged children	Standards are most effective when implemented in tangent with educational activities. Surfacing standards address risk of head injury, but not injuries to the arms and legs.
Drowning	Removing or covering water hazards. Fencing around swimming pools. Vigilant adult supervision.	↓	Toddlers and school aged children	Parents should be strongly encouraged to continue close supervision of their children around water; no protection system can replace parent supervision.
Self harm	School based prevention programmes	↔↓ (weak)	Adolescents	Promising interventions that need further research include school-based prevention programs with a skills training component, individual CBT interventions, interpersonal psychotherapy, and attachment-based family therapy. Gaps in the research exist in evaluations of interventions for Self harm in young people with identifiable psychopathology, particularly substance use disorder, and research that classifies participants on the basis of their suicidal intent.
Generic	Intervention	Impact	High risk groups	Key Message

Support to families of young children	Home based social support, such as home visiting programmes. Discourage use of baby walkers.	↓	Infants and Toddlers	Supportive home visits are most effective when the information provided is age appropriate and visits are combined with provision of free safety equipment and broader promotional campaigns. Studies highlight the potential to significantly reduce rates of child injury through home visiting.
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5.4.1 Summary of Effectiveness of models of care/interventions to prevent childhood deaths

Symbols: reduce (↓); increase (↑) and no effect (↔).

Potentially modifiable risk factors for infant mortality	Intervention	Impact	Key message
Smoking during pregnancy	Smoking cessation during pregnancy	↓	Smoking cessation programmes in pregnancy are effective in reducing the number of women who smoke in late pregnancy and in reducing low birth weight and preterm birth. Pharmacological treatments appear to have a higher success rate than behavioural intervention; however effects are mixed and generally modest.
	Telephone interventions	↔ (may support relapse prevention)	Telephone interventions in isolation were not effective in improving smoking cessation. However proactive telephone support may assist in preventing smoking

			relapse.
Smoking in the postpartum period (birth to one year)	Smoking cessation	↔ ↓	Some evidence of a modest impact on patterns of smoking relapse. Successful postpartum relapse interventions should involve the woman's social network and her partner. (Presence of a partner who smokes is a strong determinant of postpartum relapse). Stress has been identified as a determinant of relapse and any interventions should include stress management techniques.
Sudden infant death syndrome/sudden unexpected death (SIDS/SUDI)	Avoid prone (stomach) sleeping 'Back to sleep'	↓	Clear evidence that advice to avoid prone sleeping is beneficial.
	Avoid bed sharing	↔↓ (protective factors)	Research has not concluded that babies should not be brought into the parents' bed for comfort and feeding, it advises that babies should not sleep in their parents' bed. Smoking, alcohol and drug use are already recognised risk factors for SIDS and greatly increase the risk associated with bed-sharing.
	Breastfeeding	↔↓ (protective factors)	Findings are based on observational studies and whilst do not identify a direct cause and effect relationship between breastfeeding and SIDS prevention, it is suggested within the literature that breastfeeding provides a protective effect against SIDS.

5.4.2 Generic interventions which have an impact on mortality.

Generic Interventions	Impact	High risk groups	Key Message

Injury Prevention	Injuries are a leading cause of childhood mortality and interventions to reduce these are highlighted in table 3.3		
Intentional Injury Review	Difficult to state clearly as dependent upon a multitude of individual factors.	Infants and young children	Mortality is higher in children who experience non-accidental trauma, therefore it is critically important to intervene and follow up a child's initial episode to prevent a future catastrophic event.
Child Death Reviews	Difficult to state clearly as dependent upon a multitude of individual factors.	Infants and children	Enhanced child death reviews provide an opportunity to highlight risk factors to help steer prevention efforts. To operate effectively this process needs to be analysed, measured, supported and improved.
Immunisation programmes	↓		Evidence indicates that immunisation programmes with high coverage offer one of the most cost effective health interventions, compared to other methods of preventing illness.
Antenatal Care	↓ (when accessed)	Pregnancy	Improving access to antenatal care is insufficient; it needs to be accompanied with a focus on continuous, effective, assessment of health and social need in order to identify any prevention and early intervention actions needed <i>before</i> babies are born <i>and</i> in the early days of their lives Women under 20 and women from areas of deprivation tend to 'book' for antenatal care later than other women. Booking late for antenatal care is a significant factor in maternal and infant mortality and morbidity.
Promotion of a balanced nutritious diet for all pregnant women	↓ (prevention of low birthweight)	Pregnancy (older and younger mothers)	Inadequate nutrition can drive low birthweights. Increasing use of foodbanks is an urgent and growing concern.
Modification of maternal lifestyle	↔↓	Teenagers; Mothers	Lifestyle behaviours such as alcohol use, smoking, drug misuse, risky sexual behaviour, poor nutritional intake and physical activity have

		living in socio-economically deprived areas	complex interlocking relationships with social inequalities and cultural norms and practices. The provision of health improvement advice and information is not effective in promoting behavioural change on its own.
Preventing suicide in young people	Note	At risk young people (12-25) who had presented with a recent history of suicidal ideation.	Limited evidence suggested that individual cognitive behavioural therapy based interventions showed promise; further research required.
	↓	Adults and adolescents	Education of doctors and restricting access to lethal means were found to prevent suicide. (1 systematic review)
	Note	Young people	School based programmes to prevent suicide improve knowledge, attitudes and help-seeking behaviours. Gaps in the evidence as to whether these reduce suicide rates.

5.5.1 ENT – reducing avoidable admissions in children

A total of 63 abstracts were returned for ENT, 47 were excluded on the basis of; too small a sample, not sufficiently focussed on reducing hospital admissions, being too focussed on testing the effectiveness of different drugs or the way in which drugs were administered and testing a locally specific guideline.

Symbols: reduce AHA (↓); increase AHA (↑) and no effect on AHA (↔).

Findings from the research literature	Impact on AHA
<p>A significant reduction in hospitalisations for acute otitis media following widespread uptake of pneumococcal vaccination, was indicated in four of the research abstracts.</p> <p>This vaccine was also indicated as preventing admissions from mastoiditis but not for acute sinusitis.</p>	<p>↓</p> <p>↓</p> <p>↔</p>
<p>Assessment of the impact on hospital utilisation of an observation unit for croup was positive and resulted in a reduction of admissions and a resource saving.</p>	<p>↓</p>
<p>Senior registrar support for ENT in the emergency department was found to increase the number of patients discharged.</p>	<p>↓</p>
<p>A nurse-led programme of anticipatory guidance for the prevention of emergency department visits for ear pain reduced visits by 80 percent.</p> <p>Five abstracts had relevant aims and concluded either with advice or stated that further research was required and in particular this was the case for telephone assistance models, the impact of which was found to be variable.</p>	<p>↓</p>
<p>A large study from Finland found that many very preterm babies do not have multiple morbidities but the proportion that do have utilise healthcare more frequently and for longer periods in the first three years of life.</p>	<p>↑</p>
<p>One abstract emphasised the fact that epistaxis was rare in the first two years of life and if identified in the emergency department staff should seek child protection expertise.</p>	<p>Note</p>
<p>A large 20 year cross sectional study conducted in England using hospital episode statistics found that while the overall tonsillectomy rate fell by 44% the admission rate for tonsillitis rose by 310% (Pearson's $r=-0.67$, $p=0.01$). The researchers concluded that efforts to reduce tonsillectomy's are correlated with a significant rise in emergency admissions and no net savings.</p>	<p>Note</p>

5.5.2 DEHYDRATION AND GASTROENTERITIS

A total of 47 abstracts were returned for dehydration and gastroenteritis, 30 were excluded on the basis of; inconclusive findings, small sample size, not sufficiently focussed on reducing hospital admissions, focussed on developing world countries and diarrheal disease.

Symbols: reduce AHA (↓); increase AHA (↑) and no effect on AHA (↔).

Findings from the research literature	Impact on AHA
Abstracts relating to Rotavirus vaccine indicated the significant reduction in the incidence of rotavirus gastroenteritis and the significant reduction in emergency hospital admissions.	↓
In a sample of 1,385 it was estimated that 100% full breastfeeding among 4-month old infants would avoid 56% of hospital admissions in infants younger than one year with infections (respiratory and gastrointestinal).	↓
The use of antiemetics for children with vomiting related to gastroenteritis stopped a proportion vomiting and reduced the need for intravenous rehydration, allowed oral rehydration and avoided immediate hospital admission	↓
One study stated that the use of hospital admission for gastrointestinal problems can be reduced (by 21%) if appropriate alternatives to hospital admission are available – next-day appointments at a specialist outpatient clinic.	↓
Analysis of whether intravenous compared to oral rehydration reduces avoidable hospital admissions was inconclusive	↔
There is no evidence that education programs or primary care follow-up soon after emergency department visits are associated with a lower rate of subsequent visits	↔

5.5.3 ASTHM reducing avoidable admissions in children

A total of 127 abstracts were returned for asthma, 87 were excluded on the basis of; inconclusive findings, small sample size, not sufficiently focussed on reducing hospital admissions, too focussed on testing the effectiveness of different drugs or the way in which drugs were administered and US studies looking at paying for healthcare variables.

Symbols: reduce AHA (↓); increase AHA (↑) and no effect on AHA (↔).

Findings from the research literature	Impact on AHA
<p>A small number of abstracts analysed the effectiveness of ‘continuity of care’</p> <p>High continuity of care for patients with asthma (aged 5 to 45 years) was associated with a 60% to 75% reduction in emergency department visits and an approximate 25% reduction in the number of hospitalisations</p>	↓
<p>Several abstracts looked at asthma education programmes for children with and parents whose children had asthma:</p> <ul style="list-style-type: none"> • Programmes tailored to lower socio-economic groups, parents with low literacy and/or low health literacy were effective in reducing hospitalisation • Programmes within schools tailored to children with asthma reduced hospital use • One programme with improved school nurse links to primary care in a deprived area reduced hospital use • Asthma education of children and parents in the emergency department reduced future visits and admissions (video) • Two abstracts and one systematic review of asthma education concluded that it made no difference to hospital and health care utilisation 	↓ ↓ ↓ ↓ ↔
<p>Integrated care models for paediatric asthma patients (combinations of different elements) resulted in significant reductions in emergency department visits (e.g. 57%) in admissions (e.g. 74%) and in bed days (e.g. 71%).</p>	↓
<p>Treatment of allergic rhinitis in patients with asthma was associated with significant reductions in hospital admissions</p>	↓
<p>Early identification of allergies and treatment of these was associated with a reduction in hospital use</p>	
<p>Risk registers and adherence to effective pathways were associated with less hospital utilisation of children with asthma</p>	↓
<p>Several abstracts focussed on second hand smoke exposure and the effects were greater utilisation of emergency departments and hospitalisation for children with asthma</p>	↑ ↓

Home based interventions- asthma education and smoking cessation resulted in decreased healthcare utilisation	
Overweight children who present to the emergency department with acute asthma exacerbations are significantly more likely to be admitted to hospital than non overweight children	↑
Telephone healthcare was found to have no effect on hospital utilisation or admissions relating to asthma	↔
Increased levels of air pollution are associated with an increase in admissions for asthma NHS A&A and the LAs have carbon reduction targets	↑
One abstract found a threefold increased risk of hospitalization in subjects who received the trivalent inactivated flu vaccine (sample size 261)	?relevance to UK
A small number of abstracts attempted to test whether area based socio-economic measures for assessing the risk of readmission in children with asthma were useful. Those identified as having medium to high risk of readmission were 5 times as likely to report financial hardship and 3 times more likely to report psychological distress. This information may assist with targeting a broader range of interventions.	Note
Several studies stated that improved management of asthma in the community will reduce avoidable hospital admissions	Note

UTI

A total of 14 abstracts were returned for UTI, 8 were excluded on the basis of; inconclusive findings/statements, focussed on reducing intensive care unit admissions, studies from the US examining costs and patient insurance and testing/comparing different antibiotics.

Symbols: reduce AHA (↓); increase AHA (↑) and no effect on AHA (↔).

Findings from the research literature	Impact on AHA
Four abstracts concluded that 'fever resolution' in young children is rapid and can be managed safely in a short stay unit, a day treatment centre or as an outpatient.	↓
Ambulatory treatment with IV antibiotics is effective in over 70% of children aged between 3 months to five years and is an alternative to hospital	↓
One very large study emphasised the importance of proper screening and management of paediatric UTIs by a paediatrician in an outpatient setting	↓
It is more cost effective to manage outpatient treatment of UTIs by conducting urine testing and prescribe narrow spectrum antibiotics than to prescribe broad spectrum antibiotics without urine testing	↓

Data tables for figures

Figure 1

EASR	A&A	East Ayrshire	North Ayrshire	South Ayrshire
All admissions	13389	13369	13742	9743
CI lower	13131	12927	13315	9383
CI upper	13647	13810	14170	10102
Routine Admissions	4,460	4,269	4,103	4,776
CI Lower	4314	4,022	3,974	4,491
CI Upper	4607	4,516	4,332	5,060
Emergency Admissions	8,929	9,100	9,360	8,143
CI Lower	8,716	8,734	9,003	7761
CI Upper	9,142	9,466	9,716	8525

Figure 2

EASR	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Routine admissions	4957	4708	4189	4639	3503
CI Lower	4676	4410	3826	4247	3127
CI Upper	5238	5006	4552	5031	3878
Emergency admissions	10313	9545	8455	7117	7025
CI Lower	9906	9116	7919	6629	6466
CI Upper	10720	9974	8991	7606	7584
All admissions	15271	14253	12645	11756	10528
CI Lower	14776	13731	11997	11130	9855
CI Upper	15765	14775	13292	12383	11201

Figure 3

	A&A	East Ayrshire	North Ayrshire	South Ayrshire
EASR				
Female Emergency	8411	8669	8984	7298
CI	8118	8159	8489	6785
CI	8704	9178	9478	7811
Female Routine	4335	3849	4573	4579
CI	4131	3515	4234	4183
CI	4540	4183	4912	4975
Male Emergency	9431	9519	9732	8935
CI	9123	8993	9219	8371
CI	9739	10045	10245	9499
Male Routine	4585	4689	4208	4949
CI	4375	4325	3879	4542
CI	4795	5054	4536	5455

Figure 4

Age Specific Rate	0-4	CI		5-9	CI		10-14	CI		15-19	CI	
		Lower	Upper		Lower	Upper		Lower	Upper		Lower	Upper
A&A routine	4,954	4646	5277	5,293	4976	5625	3,298	3049	3563	4,225	3961	4503
A&A emergency	19296	18684	19923	4986	4679	5309	4512	4219	4819	5441	5140	5754
EA routine	5164	4639	5732	5495	4944	6090	3013	2605	3467	3274	2875	3714
EA emergency	20026	18979	21116	4678	4171	5229	4791	4272	5355	5344	4830	5898
NA routine	4214	3754	4715	5310	4796	5864	3549	3134	4004	3324	2950	3731
NA emergency	20086	19065	21147	5378	4861	5935	4907	4417	5437	5536	5050	6055
SA routine	5675	5058	6346	5034	4464	5656	3294	2840	3800	4973	4443	5549
SA emergency	17320	16228	18465	4838	4280	5447	3680	3199	4213	5423	4869	6023

Figure 5

EASR	A&A	East Ayrshire	North Ayrshire	South Ayrshire
Male ACSC admissions	3811	3891	4039	3416
CI Lower	3615	3555	3709	3066
CI Upper	4006	4227	4370	3765
Female ACSC admissions	3606	3494	4169	3556
CI Lower	3413	3170	3828	3192
CI Upper	3798	3818	4510	3920

Figure 6

EASR	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Child admissions	4350	3907	3503	3024	2893
CI lower	4086	3631	3158	2705	2532
CI upper	4615	4182	3848	3343	3253

Figure 7

EASR	ENT	Dehydration & Gastrointestinal	Asthma	Constipation	Dyspepsia & Ulcer
East Ayrshire	1089	1036	473	234	220
CI Lower	960	911	391	175	163
CI Upper	1217	1161	556	293	278
North Ayrshire	1131	1015	610	272	300
CI Lower	1004	895	520	212	235
CI Upper	1258	1135	699	332	366
South Ayrshire	899	758	365	263	241
CI Lower	768	639	287	194	174
CI Upper	1029	878	443	332	308
Ayrshire & Arran	1051	951	494	256	256
CI Lower	977	880	445	221	219
CI Upper	1126	1021	543	292	293

Figure 8

Age Specific Rate	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
ENT	1065	1099	780	784	645
CI Lower	940	963	636	637	500
CI Upper	1202	1249	946	954	819
Dehyd & GI	1057	856	650	728	751
CI Lower	933	736	519	587	594
CI Upper	1194	989	803	893	938
Asthma	620	510	397	356	337
CI Lower	525	419	297	260	235
CI Upper	726	615	521	477	469
Constipation	324	253	214	143	173
CI Lower	257	190	142	84	103
CI Upper	403	330	309	225	274

Dyspepsia	251	225	206	190	250
CI Lower	193	166	136	122	164
CI Upper	322	298	300	283	367

Figure 9

Age specific rate	Unintentional	CI Lower	CI Upper	Intentional	CI Lower	CI Upper
0-4	1588	1416	1775	15	3	45
5-9	1032	895	1185	0	0	0
10-14	943	812	1089	285	216	371
15-19	766	656	889	655	553	769

Figure 10

Age specific rate	Unintentional	CI Lower	CI Upper	Intentional	CI Lower	CI Upper
East Ayrshire	1110	988	1242	227	174	291
North Ayrshire	1081	967	1204	326	266	397
South Ayrshire	967	844	1102	190	138	255

Figure 11

Age specific rate	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Intentional	344	304	130	174	96
CI lower	275	235	76	109	46
CI Upper	426	387	208	264	177
Unintentional	1272	1090	806	879	645
CI lower	1135	954	656	723	500
CI upper	1421	1239	972	1058	819

Figure 12

Age specific rate	Head Injury	CI Lower	CI Upper	Burns	CI Lower	CI Upper	Poisoning	CI Lower	CI Upper
0-4	740	624	871	67	36	114	308	235	397
5-9	255	187	337	10	1	37	36	14	74
10-14	255	189	336	0	0	0	275	207	359
15-19	329	259	414	4	0	25	557	463	663

Figure 13

Age specific rate	Head Injury	CI Lower	CI Upper	Burns	CI Lower	CI Upper	Poisoning	CI Lower	CI Upper
East Ayrshire	407	334	490	15	4	38	260	203	328
North Ayrshire	434	364	515	33	16	60	392	325	468
South Ayrshire	319	251	401	9	1	31	237	179	309

Figure 14

	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009	2008-2010	2009-2011	2010-2012
IMR	5.5	5.5	6.7	5.9	5.9	4.5	4.9	4.7
CI Lower	4.2	4.2	5.3	4.6	4.6	3.3	3.7	3.6
CI Upper	7.1	7.0	8.4	7.5	7.5	5.9	6.4	6.2

Figure 14 - Child Mortality Rates 2003-2012

Child Death Rate	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009	2008-2010	2009-2011	2010-2012
0-4 yrs	1.48	1.42	1.66	1.39	1.38	1.03	1.05	0.98
CI Lower	1.10	1.10	1.30	1.10	1.10	0.80	0.80	0.70
CI Upper	1.80	1.80	2.00	1.70	1.70	1.30	1.40	1.20

5-9 yrs	0.09	0.10	0.08	0.08	0.05	0.05	0.05	0.07
CI Lower	0.04	0.04	0.03	0.03	0.01	0.01	0.01	0.02
CI Upper	0.20	0.21	0.19	0.10	0.15	0.15	0.15	0.18
10-14 yrs	0.07	0.08	0.14	0.15	0.15	0.11	0.13	0.13
CI Lower	0.02	0.03	0.07	0.07	0.07	0.04	0.05	0.06
CI Upper	0.16	0.18	0.26	0.26	0.27	0.22	0.25	0.26
15-19 yrs	0.57	0.47	0.60	0.69	0.65	0.53	0.51	0.48
CI Lower	0.41	0.32	0.43	0.51	0.47	0.38	0.35	0.33
CI Upper	0.78	0.66	0.81	0.92	0.87	0.74	0.71	0.67

Figure 15 – IMR and Mortality Rates Children under 20 years 2003-2012

	IMR	CI Lower	CI Upper	CMR	CI Lower	CI Upper
East Ayrshire	5.6	4.4	7.1	0.53	0.45	0.62
North Ayrshire	5.6	4.5	7	0.47	0.39	0.55
South Ayrshire	4.5	3.3	6	0.46	0.37	0.55

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