pronounced inverse association with birth weight without adjustment for other birth dimensions, and adjustments for both birth length and head circumference strengthened the association with haemorrhagic stroke. These data do not support a special role for birth weight relative to head size, but they suggest that the risk of haemorrhagic stroke is related to impaired growth of soft tissue mass relative to bone growth.[4]

The established aetiology of stroke differs by subtype, although hypertension is an important risk factor for occlusive and haemorrhagic stroke. Raised blood pressure is also associated with impaired fetal growth.[5] However, whether the difference between stroke subtypes in the strength of the association of stroke with birth weight is mediated by blood pressure has yet to be established.

We thank Rawya Mohsen for managing the study database.

Contributors: EH and DL wrote the paper. EH carried out the analyses. MGK acted as the statistical expert in the study, and HL contributed with his knowledge of the cohort and stroke. DL had the original study idea and will act as the guarantor of the paper.

Funding: The Uppsala birth cohort study was established using grants from the UK Medical Research Council and the Swedish Council for Social Research. No funding was received towards the study.

Competing interests: None declared.

1 Leon DA, Lithell HO, Vågerö D, Koupilová I, Mohsen R, Berglund L, et al. Reduced fetal growth rate and increased risk of death from ischaemic heart disease: cohort study of 15 000 Swedish men and women born 1915-29. *BMJ* 1998;317:241-5.
2 National Board of Health and Welfare, Sweden. Hospital discharge register. http://www.sos.se/epc/par/pareng.htm (accessed 20 July 2001).
3 Eriksson JG, Forsen T, Tuomilehto J, Osmond C, Barker DJ. Early growth, adult income, and risk of stroke. *Stroke* 2000;31:869-74.
4 Leon DA, Johansson M, Rasmussen F. Gestational age and growth rate of foetal mass are inversely associated with systolic blood pressure in young adults: an epidemiologic study of 165,136 Swedish 18-year old men. *Am J Epidemiol* 2000;152:597-604.
5 Huxley RR, Shiell AW, Law CM. The role of size at birth and postnatal catch-up growth in determining systolic blood pressure: a systematic review of the literature. *J Hypertens* 2000;18:815-31.

(Accepted 10 July 2001)

Unnecessary school absence after minor injury: case-control study

Peter M Barnes, Lorna Price, Alison Maddocks, Ronan A Lyons, Pam Nash, Michael McCabe

Department of Community Child Health, Swansea NHS Trust, Central Clinic, Swansea SA1 1LT
Peter M Barnes *specialist registrar*
Lorna Price *staff grade doctor*
Alison Maddocks *consultant*

Department of Public Health, Iechyd Morgannwg Health Authority, Swansea SA1 1LT
Ronan A Lyons *senior lecturer*

Local Accident Centre, Neath General Hospital, Neath SA11 2LQ
Pam Nash *consultant*

Accident and Emergency Department, Swansea NHS Trust, Morriston Hospital, Swansea SA6 6NL
Michael McCabe *consultant*

Correspondence to: A Maddocks alison.maddocks@swansea-tr.wales.nhs.uk

BMJ 2001;323:1034–5

Children acquire many of the academic and social skills they need for their adult lives at school. Excessive absence from school is associated with educational failure, particularly when children miss more than 11% of school days.[1] Each year, one in three British children goes to an emergency department for treatment, predominantly with minor injuries, but the effect on school attendances has not been quantified.[2]

This study was designed to investigate the number of days missed from school after children attended one of three local emergency departments with minor injuries. We defined minor injuries as those not requiring admission to hospital and not affecting mobility or the ability of the child to care for himself or herself.

Method and results

This case-control study involved children resident in, and attending school full time in, the Welsh counties of Swansea and Neath Port Talbot during the autumn school term of 1999. A case was defined as a child who attended the local emergency department on a Sunday preceding a school week with an injury that should not prevent school attendance. The children and their families were not informed of inclusion in the study. The next child of the same sex on the class register was chosen as a matched control. Ethical approval was obtained from Morgannwg Local Research Ethics Committee.

For each case, we obtained the age, sex, home postcode, school attended, and nature of the injury from the emergency department's records. School attendance for each half day in the week that followed the injury was recorded from the school register for the case pupil and the matched control (along with the control pupil's home postcode). For a randomly chosen sample of 100 pairs, we recorded the school attendance for each half day in the school week that preceded the minor injury.

Relation between minor injuries and subsequent school attendance in pupils in full time education in two Welsh counties

Injury	Number (%) of injuries	Mean (range) number of half days
Bruise	115 (27)	7.9 (0-10)
Sprain	110 (26)	7.1 (0-10)
Laceration	66 (16)	6.7 (0-10)
Fracture	57 (14)	5.5 (0-10)
Head injury	28 (7)	7.8 (0-10)
Puncture wound	9 (2)	7.3 (0-10)
Bite	8 (2)	6.9 (0-10)
Abrasion	7 (2)	8.0 (2-10)
Nasal injury	7 (2)	6.9 (1-10)
Eye injury	6 (1)	8.7 (4-10)
Burn/scald	5 (1)	6.0 (0-10)
Foreign body*	3 (1)	9.3 (8-10)
Haemarthrosis	1 (<1)	0
All	422	7.4 (0-10)

*Tissue injury such as from a splinter or metal fragment.

Differences in school attendance between the matched pairs were analysed by using the one sample *t* test and Wilcoxon's matched pairs signed ranking test. A Townsend small area deprivation score was calculated for each child, and the children's attendances were analysed in relation to these scores.[3]

Overall, 422 case-control pairs were identified in 130 schools; 251 (59%) pairs comprised boys. Ages ranged from 4 to 16 years (mean 10.6 years). The type and frequency of injury were recorded along with the mean number of half days present in school for each injury type (table).

We excluded 57 minor fractures and one haemarthrosis from further analysis as they could be argued to be more serious injuries. We analysed attendance for the remaining 364 case-control pairs only.

Case children attended significantly fewer half days in school after injury than control children (7.38 *v* 9.40, $P<0.001$). Deprivation scores for matched pairs did not differ significantly, and there was no association between missed time at school and deprivation score. Mean half day attendance in the week preceding injury did not differ significantly between case children and control children (9.25 *v* 9.59, $P>0.1$).

Comment

On average, one full school day was missed unnecessarily after children presented to hospital emergency departments with minor injuries. As children with and without injuries had similar previous school attendance, the resulting loss could be attributed to the injury. The cumulative loss was great given the high frequency of such injuries. Repeated absences of this type could contribute to educational difficulties, especially in children whose attendance is already suboptimal for other reasons.

We propose that health professionals are more proactive in stressing the importance of children attending school after minor injury when there is no medical reason to prevent attendance. Improved liaison between emergency departments, school health services, and local education authorities might help to reduce the unnecessary burden of minor injury.

We are grateful for the valuable assistance of the emergency department staff, all participating schools, and Mrs Lisa Webb for her secretarial help.

Contributors: MM had the original idea for the study and, together with PN, facilitated the collection of data in the accident and emergency departments and drew up definitions for minor injury. AM facilitated the interagency and interdepartmental working, liaised with the education authority, submitted the application to the ethics committee, and is guarantor for the study. PB and LP designed the data collection form, collected the data, established the database, liased with individual schools, and input the data. RL advised on the research method, provided statistical advice, and analysed the data. The paper was written jointly by all authors.

Funding: None.

Competing interests: None declared.

1 Klerman LV. School absence—a health perspective. *Pediatr Clin North Am* 1988;35:1253-69.
2 Lyons RA, Lo SV, Heaven M, Littlepage BNC. Injury surveillance in children—usefulness of a centralised database of accident and emergency attendances. *Inj Prev* 1995;1:173-6.
3 Townsend P, Phillimore P, Beattie A. *Health and deprivation: inequality and the north*. London: Croom Helm, 1998.

(Accepted 11 July 2001)

Social deprivation in Duchenne muscular dystrophy: population based study

Kate Bushby, Simon Raybould, Sara O'Donnell, James G Steele

Duchenne muscular dystrophy is an X linked disorder affecting approximately 1 in 3500 male live births. The incidence remains stable in most populations, maintained by a high rate of new mutations in the dystrophin gene.[1] We observed that a higher than expected proportion of families of patients with Duchenne muscular dystrophy seemed to be from a deprived background, even at the time of first diagnosis (usually by age 5). We measured the level of material deprivation based on the place of residence at the time of diagnosis of all patients with Duchenne muscular dystrophy in the north of England to test the hypothesis that this single gene disorder is associated with social deprivation.

Participants, methods, and results

Records of children with Duchenne muscular dystrophy in the Northern region of England have been scrupulously maintained since the 1960s, and we believe that ascertainment in the region is complete. We analysed data from the whole group of families with Duchenne muscular dystrophy in the region and also subdivided the group into four categories according to the origin of the mutation in the family (table).

In all, 229 of the 246 families with children diagnosed as having Duchenne muscular dystrophy between 1967 and 1999 in the Northern region had valid postcodes available at diagnosis. We linked

Institute of Human Genetics, International Centre for Life, Newcastle upon Tyne NE1 3BZ
Kate Bushby *professor of neuromuscular genetics*

Centre for Urban and Regional Development Studies, University of Newcastle upon Tyne, Newcastle upon Tyne NE1 7RU
Simon Raybould *senior research associate*

continued over

Townsend scores of enumeration districts with and without families with Duchenne muscular dystrophy

	Duchenne muscular dystrophy				No Duchenne muscular dystrophy (n=6624)		
Group	No	Median	Range	Interquartile range	Median	Interquartile range	Significance
All cases	229	3.44	−5.74 to 10.12	0.34 to 5.45	1.46	−2.04 to 4.74	P<0.0001
History in earlier generation	42	3.15	−5.74 to 10.12	0.65 to 5.05	1.46	−2.04 to 4.74	P<0.0001
New mutation in mother	62	4.45	−4.71 to 9.59	1.76 to 5.63	1.46	−2.04 to 4.74	P<0.0001
New mutation in child	40	2.63	−5.66 to 8.46	−0.38 to 4.96	1.46	−2.04 to 4.74	P=0.001
No earlier history: mutation origin unknown	85	3.35	−2.63 to 7.41	−1.87 to 5.36	1.46	−2.04 to 4.74	P<0.0001

BMJ 2001;323:1035–6

Further details of methods are on the BMJ's website