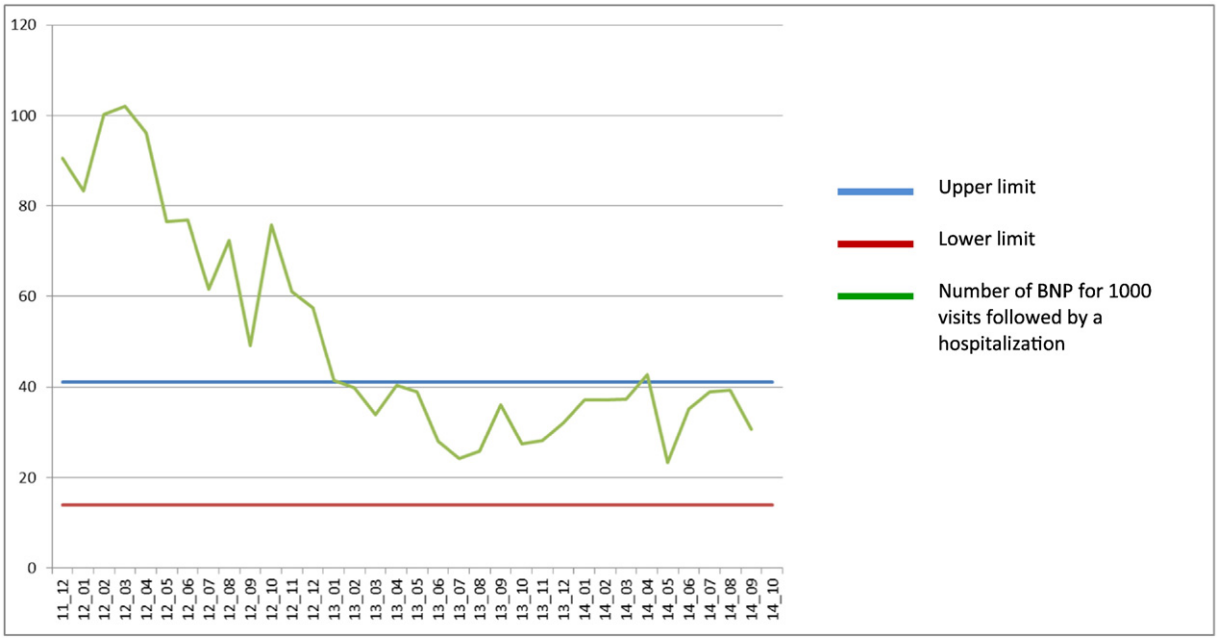

Fig. 2. Evolution of the rate of BNP prescribing in the ED.

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Characteristics of defenestrating craniofacial injuries in pediatric patients☆

To the Editor:

Defenestration is a leading cause of morbidity and mortality in children. Falls from windows are considered as a public-health problem in industrial countries [1,2,3]. In France, its incidence is estimated around 250/year [4]. A survey from the French National Health Watch Institute showed that defenestration occurred principally in young children despite an adult supervision, and through security equipped opening [4]. In most pediatric studies about defenestration, intentional falls were excluded from the analysis [1,5,6]. Incidence of facial fractures is low in young children [7,8], probably thanks to anatomical consideration (bone elasticity, absence of pneumatization of sinuses), and to lower behavioral risks. However, 9–10% of pediatric facial fractures result from high-level falls [9,10]. No study described precisely facial trauma in pediatric cases of defenestration.

The aim of this study was to analyze craniofacial injuries resulting from defenestration, to describe their characteristics, and to compare those resulting from accidental falls to those resulting from intentional high-base jumps.

We conducted a study from 2009 to 2012 at Necker Children Hospital, including 105 living children (<15 year-old), admitted for defenestration.

Age, gender, season, intentional or accidental falls, estimated height of fall, initial Glasgow coma scale (GCS) were collected. Soft tissue injuries were analyzed, though a chart review. Organ and bone injury were reviewed through a whole-body-CT-Scans analysis.

Defenestration occurred principally in male patient (sex ratio = 4/3), and in young patients (mean age = 6.8 year-old, SD = 4.7). Defenestration was classified as accidental falls (n = 72) or intentional (n = 31).

Accidental falls occurred in younger children (mean age = 4.36 year-old, from 3 months to 14 year-old) with a seasonal

☆ High-level falls are a leading cause of morbidity and mortality in children in industrialized countries with high-rise buildings. The aim of this study is to determine craniofacial trauma characteristics in pediatric defenestration and to differentiate intentional or accidental falls.

predilection (summer, spring). In this subgroup, the mean initial Glasgow was 10.62 (from 3 to 15), the mean level floor was 3 levels (from 1 to 7). In this group, 9 patients died in intensive care (1.2%) (Table 1).

Intentional falls occurred in older children (mean age = 12.6 year-old, range from 5 to 15) without seasonal predilection. Mean initial GCS score was 12.9 (from 3 to 15), the mean level floor was 3.5 levels (from 1 to 9). In this group, 2 patients died in intensive care (3%) (Table 1).

Seven patients were affected by autistic disorders.

In this study, 4 patients demonstrated no detectable injury.

Among all patients, 41 patients had craniofacial fractures and 11 facial soft tissue injuries. In the group with craniofacial injury, the mean GCS score at admission was lower than in the group without (Table 1).

Craniofacial fractures were mostly represented by cranial vault fractures and orbital fractures (Table 2).

In the subgroup accidental falls, 34 patients (47.2%) had craniofacial fractures, *versus* 7 (22.6%) in the subgroup intentional falls (Table 3).

Extra-craniofacial injuries were present in 92 patients (Fig. 1, Table 4), and principally represented by chest and limb injuries.

In the subgroup accidental falls, craniofacial, chest and limb lesions were most frequent; whereas, in intentional falls, limb, spinal and chest lesion were more noticed (Table 3).

In the study, craniofacial injuries occurred in almost half cases. As previously described [5,6,11] defenestration mainly occurred during spring and summer, and were mainly accidental falls through opened unsecured windows. However, two critical periods of life could be identified in this study for increased risks of defenestration: the first one between 3 and 5 years of age, and the second one during early adolescence. These results are consistent with previously published literature [5,6,11]. During early childhood around 3–5 years of age, mobility increases, pre-school children are so more independent, but cannot assume efficiently awareness of danger [12]. The second period is during adolescence, and could be related to a significant and increasing incidence suicide attempts [13].

We clearly could identify significant differences between these 2 group of defenestration. In accidental falls, victims are younger and have a higher head to body ratio. Direct downward falling, frequent head tilt, absence of danger awareness preventing protective maneuvers with arms and limbs forward projection, put younger children at higher risks of direct primary cranio-facial impacts resulting in more frequent cranial vault and orbital fractures [14].

In intentional falls, children are older and craniofacial injuries are less common. Children more frequent upward jumps and landing legs first, are more likely to result in severe limbs, pelvis, or spine injuries. The characteristics of injuries are there more similar to those encountered in adults where falls from windows, result in similar injuries with the exception of more frequent cerebral injuries in adolescents [15].

Table 3
Characteristics of injuries without craniofacial localization.

Type of injuries	n	Average age (years)	Standard deviation	Average height of fall
Chest injuries	55	6,08	4,58	3,52
Limb injuries	48	8,47	4,8	4,25
Encephalic injuries	43	6,25	4,3	3,9
Abdominal injuries	28	6,21	4,58	4,66
Rachis injuries	23	11	4,17	3,85
Pelvis injuries	8	9,58	5,6	4,5

Table 1
Clinical data (Glasgow score, age, fall height) for patients with craniofacial fractures and in voluntary and accidental fall group.

	Craniofacial fractures (n = 41)	Group 1 (n = 34)	Group 2 (n = 7)
Glasgow score	9 (3–15)	8 (3–15)	11 (3–15)
Age	5,9 (1,16–14)	4,7 (0,25–12)	11,8 (8–14)
Fall height	3,08 (1–7)	3 (1–8)	3,2 (1–7)
	Facial fractures (n = 16)	Group 1 (n = 13)	Group 2 (n = 3)
Glasgow score	10 (3–15)	10 (3–15)	11 (3–15)
Age	5,3 (2,5–14)	3,8 (0,25–7)	11,6 (10–14)
Fall height	3 (1–7)	2,9 (1–7)	3,33 (2–4)
	Cranial fractures (n = 12)	Group 1 (n = 10)	Group 2 (n = 2)
Glasgow score	8 (3–15)	8 (3–14)	9 (3–15)
Age	6,18 (1,66–14)	5,3 (1,66–12)	10,5 (8–13)
Fall height	2,7 (1–4)	2,75 (3 − 11)	2,5 (1–4)
	Cranial and facial fractures associated (n = 13)	Group 1 (n = 11)	Group 2 (n = 2)
Glasgow score	8 (3–15)	7 (3–15)	14,5 (14–15)
Age	6,46 (2–14)	5,18 (3–14)	13,5 (13–14)
Fall height	3,5 (1 − 13)	3,4 (1–8)	4 (3–5)

Table 2
Characteristics of craniofacial injuries.

Type of injuries	n (% of craniofacial injuries)	Average age (years)	Standard deviation	Average height of fall (metres)
Cranial fracture	25 (23,8%)	6,32	4,56	3,13
Orbital fracture	15 (14,3%)	6,31	4,66	2,66
Teeth injuries	10 (9,5%)	5,35	3,83	3,75
Zygomatic fracture	8 (7,6%)	4,56	2,38	3,5
Mandibular fracture	6 (5,7%)	4	3,03	4,25
Le Fort fracture	4 (3,8%)	3,5	0,4	5,66
Nasal fracture	4 (3,8%)	5,81	5,35	3,25
Naso-orbital-ethmoidal fracture	3 (2,9%)	7,33	5,13	5
Wounds	18 (17,1%)	6,22	4,25	3,23
Dermabrasion	13 (12,4%)	5,53	4,68	3,41