Common mistakes, negligence and legal offences in paediatric dentistry: a self-report

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Abstract

AIM: To identify the type and relative prevalence of mistakes, negligence and legal offences (MNLOs) performed or nearly performed by paediatric dentists during their entire career. **METHODS:** The population consisted of 25 (29.4%) certified and 48 (56.5%) non-certified paediatric dentists, and 12 (14.1%) residents in paediatric dentistry. A structured anonymous questionnaire accessed occupational characteristics and frequencies of MNLOs (0, 1-4, 5-10, >10). **RESULTS:** The most prevalent MNLOs related to the performance of radiographs: bite-wings with overlapping teeth (90%), overturned film (30%), film over-exposure (48%), faulty film development (84%) and exposure of the same side of film twice (32%). Other MNLOs were drilling an intact tooth (37%), misdiagnosing existing radiographic caries (63%), anaesthetising the wrong tooth (49%), accidental incision of the cheek/lips during treatment (73%), administering an incorrect dose of antibiotic (49%) or analgesics (24%), extracting the wrong tooth (15%), documenting the wrong tooth in the patient's file (63%), and a child swallowing an instrument (33%) or clasp (15%). Prevalent MNLOs included administering sedation to a child who had not fasted (32%), sedating without monitoring (9%), treating children without receiving signed parental consent (15%) and losing a radiograph (64%). **CONCLUSIONS:** MNLOs occur commonly during various operative dental treatments. Means to raise awareness and to implement regulations should be addressed to limit these mistakes.

Introduction

Mistakes, negligence and legal offences (MNLOs) are common in medicine and dentistry, and can contribute to increasing legal claims against medical and dental professionals [Sloan and Shadle, 2009]. In Israel, most dental practitioners (N = 5,234, 85% of the total population of the Israeli dental practitioners) are obligated to report any incidence or suspicion of a legal action against them to the Medical Consultants International Company (MCI) as part of their professional liability insurance terms. According to the MCI report, the number of claims in Israel increased by 223%, from 1991 to 2010 (Fig. 1). These claims were mostly related to negligence, lack of knowledge or expertise, or fault with no negligence, rather than to innocent mistakes. As a result, the index cost of the dental insurance increased by 45 times (Fig. 2).

Figure 1. *Number of claims in dentistry in Israel from 1991-2009, according to data from the Medical Consultants International Company (MCI).*

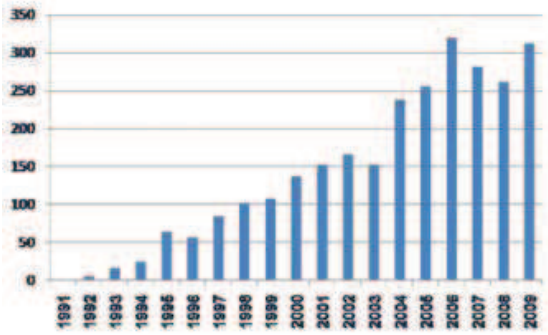
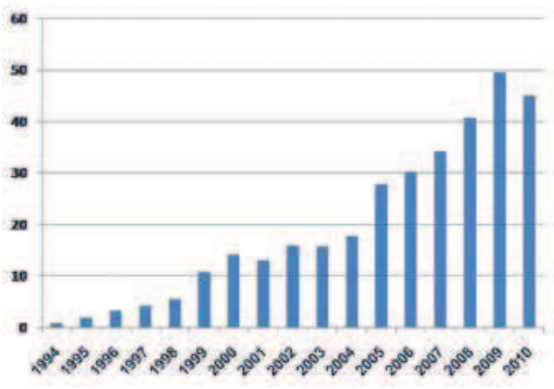


Figure 2. *Index of insurance cost in Israel from 1994-2010, according to data from the Medical Consultants International Company (MCI).*



Factors directly or indirectly related to this growing awareness to MNLOs include education, increase financial ability to receive quality treatment, accessibility to information, especially through the internet [Umefjord et al., 2006; Hancocks, 2003], publicity in the media regarding medical mistakes, a growing number of lawyers per population, and the public's awareness of their rights to obtain a second opinion.

Adding to the trend of increased legal claims is a growing interest among caregivers to study the prevalence and the types of common MNLOs in order to prevent them. In their review of mistakes among anaesthesiologists, medical surgeons and physicians in emergency rooms and in intensive care units in the United States of America, Wheeler and

Wheeler [2005] showed that the prevalence of errors related to drug prescriptions or administration of proper dosages ranged from 0.01% to 19%. Medication error rates as high as 98% were reported using disguised observation of intravenous drug administration in a children's hospital. These errors often include incorrect timing of administration, while only 2% involved the wrong dose.

The objectives of the present study were to identify the types and prevalence of MNLOs performed by certified and non-certified paediatric dentists, and residents in paediatric dentistry during their entire practice, according to their anonymous reports.

Methods

This study included 85 Israeli paediatric dentists who attended at least one of the Israel Society of Dentistry for Children conferences held during 2008. Participants filled out an anonymous structured questionnaire that accessed information regarding demographics (age, gender), occupational characteristics (seniority, time interval since post-certification in paediatric dentistry) and frequency of performing MNLOs according to the following fields: history taking (anamnesis), dissemination of information to parents, documentation, document preservation, radiographs, drug prescription, diagnosis, anaesthesia, restoration, pulp therapy, extraction, sedation and safety. Dentists were asked to report the frequency each MNLO listed in the questionnaire (0, 1-4, 5-10, >10) during their entire career that they had performed or nearly performed (i.e. corrected before the error was completed) .

Statistical analysis Differences in the lifetime prevalence of MNLOs among CPD and NCPD and among young and senior dentists were determined using a uni-variant analysis ($\chi 2$test). Analyses were performed using SPSS software Number 9.0, for Windows (SPSS Inc. Chicago, IL, USA).

Results

Attending the three consecutive Israeli Society of Paediatric Dentistry conferences were 25 (29.4%) certified paediatric dentists (CPD), 12 (14.1%) residents in paediatric dentistry (RPD) and 48 (56.4%) non-certified paediatric dentists (NCPD, i.e, general dentists who treated children, though they lacked postgraduate training in paediatric dentistry). The number of years practicing as a dentist ranged from 1-45 (mean 13.65 ±10.25): 37 worked 1-10 years (young) and 48 more than 10 years (seniors). The CPDs worked as certified paediatric dentists for 1 to 40 years (median = 8 years; 11.35 ± 11.4 years).

As the number of residents in paediatric dentistry was limited, and all studied either at The Maurice and Gabriela Goldschleger School of Dental Medicine, Tel Aviv University or at the Hebrew University-Hadassah School of Dental Medicine, Jerusalem, their seniority in dentistry was easily assessed. Their careers as dentists ranged from 2 to 7 years.

Precise evaluation of the response rate was not possible since the questionnaires were filled out at three annual meetings. The number of participants at each conference ranged from 120 to 150. The overall response rate was 57%. However, as some members did not participate in all the meetings, the response rate was also calculated according to the total number of members in the society at the time of the study. The response rate of NCPDs was estimated to be 40% (48/120), CPDs – 31% (25/80) and RPDs – 60% (12/20). The distribution of reported frequencies of performed and nearly performed MNLOs is shown in Table 1.

RPDs, CPDs and NCPDs reported statistically significant differences in their performing, or nearly performing the following types of MNLOs, at least once:

- Not taking medical history from patients (overall: 54%)
  - CPDs – 14 (56%), NCPDs – 30 (63%) and RPDs – 2 (17%), p=.017. CPD vs. NCPD, p= non-significant (NS)
- Documenting treatment in another patient's file (overall: 41%):
  - CPDs – 13 (52%), NCPDs – 19 (40%) and RPDs – 1 (8%), p=.02. CPD vs. NCPD, p=NS
- Losing a patient's file (overall: 33%):
  - CPDs – 11 (44%), NCPDs – 17 (35%) and RPDs – 0, p=.025. CPD vs. NCPD, p=NS
- Ignoring patient sensitivity to medications (overall: 32%):
  - CPDs – 5 (20%), NCPDs – 22 (46%) and RPDs – 0, p=.003. CPDs – 5 (20%) vs. NCPDs – 22 (46%), p=.006
- Making an accidental incision in the cheek, lip or tongue during operative treatment (overall: 73%):
  - CPDs – 13 (52%), NCPDs – 38 (79%) and RPDs – 11 (92%), p=.013. CPDs vs. NCPDs, p=NS
- Breaking an instrument inside a root canal (overall: 53%):
  - CPDs -19 (76%), NCPDs – 22 (46%) and RPDs – 4 (33%), p=.017. CPDs -19 (76%) vs. NCPD – 22 (46%), p=.02

For the following types of performed and nearly performed MNLOs, statistically significant differences were observed between senior and young dentists, the latter including RPD:

Types of MNLOs more frequently reported by senior dentists

- Not taking medical history from a patient (overall: 54%): Senior – 32 (67%), Young – 14 (38%), p=.01
- Not signing parents on the treatment planning (overall: 58%): Senior – 33 (69%), Young – 16 (43%), p=.032
- Taking bite-wings with inverted film (29%): Senior – 19 (40%), Young – 6 (16%) (p=.035)

One type of MNLOs more frequently reported by young dentists

- Leaving a wooden wedge in the gingiva that caused post-operative pain (overall: 18%): Young – 11 (30%), Senior – 4 (8%), p=.022

Table 1. Distribution {number (%)} of reported performed and nearly performed MNLOs, according to their repetition frequency.

Field of MNLO	Type of MNLO	Number (%) of dentists performing MNLO	Number (%) of dentists nearly performing MNLO	Number (%) of dentists who reported repeating this MNLO in various frequencies		
				1-4	5-10	>10
Anamnesis/ History	Not taking medical history from a patient*	36 (42)	10 (12)	37 (80)	5 (11)	4 (9)
Dissemination of information to parents	Not reporting treatment plan to the parents in advance*	13 (15)	4 (5)	13 (77)	4 (24)	0
	Not explaining treatment plan to the parents in advance*	17 (20)	9 (11)	23 (89)	2 (8)	1 (4)
	Treating a child without oral consent from parents*	9 (11)	3 (4)	10 (83)	1 (8)	1 (8)
	Not signing parents on the treatment planning	44 (52)	5 (6)	18 (37)	6 (12)	25 (51)
Documentation	Not documenting performed treatment in a patient's file*	31 (37)	12 (14)	39 (91)	3 (7)	1 (2)
	Incorrect documentation of a tooth to be treated‡,§	37 (44)	16 (19)	49 (93)	3 (6)	1 (2)
	Documentation of treatment in another patient's file‡,§	25 (29)	10 (12)	33 (94)	2 (6)	0
Document preservation	Loss of a patient's file†	22 (26)	6 (7)	27 (96)	1 (4)	0
	Loss of patient's radiograph†	48 (57)	6 (7)	42 (78)	6 (11)	6 (11)
	Loss of patient's document†	8 (9)	2 (2)	9 (90)	0	1 (10)
Radiographs	Double exposure – the same film§	24 (28)	3 (4)	24 (89)	2 (7)	1 (4)
	Double exposure – the same side§	24 (28)	3 (4)	24 (89)	2 (7)	1 (4)
	Taking bite-wings with overturned film‡	21 (25)	4 (5)	21 (84)	3 (12)	1 (4)
	Performing faulty film development§	68 (80)	3 (4)	28 (39)	19 (27)	24 (34)
	Over-exposure of an intra-oral radiograph§	37 (44)	3 (4)	19 (48)	12 (30)	9 (23)
	Taking bite-wings with overlapping teeth§	76 (89)	1 (1)	17 (22)	20 (26)	40 (52)

Table 1 continued

Diagnosis	Missed diagnosis of radiographic dental caries‡	47 (55)	7 (8)	50 (93)	2 (4)	2 (4)
	Missed diagnosis of periodontitis‡	6 (7)	3 (4)	9 (100)	0	0
	Missed diagnosis of supernumerary or hypodontia‡	18 (21)	2 (2)	15 (75)	1 (5)	4 (20)
	Development of dental abscess after deep restoration§	49 (58)	1 (1)	36 (72)	14 (28)	0
Local anaesthesia/ analgesia	Anaesthetising the wrong tooth§	27 (32)	14 (17)	40 (98)	0 (0)	1 (2)
	Injecting wrong anaesthetic solution‡,§	4 (5)	0	4 (100)	0	0
Restoration	Treating a wrong tooth‡,§	6 (7)	7 (8)	13 (100)	0	0
	Drilling an intact tooth‡,§	26 (31)	5 (6)	29 (94)	2 (7)	0
	Restoring the same primary tooth more than twice‡,§,#	20 (24)	1 (1)	17 (81)	3 (14)	1 (5)
	Restoring the same permanent tooth more than twice‡,§,#	23 (27)	3 (4)	21 (81)	5 (19)	0
	Using expired dated restorative material‡	25 (29)	2 (2)	26 (96)	0 (0)	1 (4)
	Wrong cementation of pre-formed crown§	10 (12)	7 (8)	17 (100)	0	0
	Acrylic set inside the mouth§	20 (24)	1 (1)	19 (91)	2 (10)	0
	Leaving a wooden wedge in the gingiva that caused post-operative pain§	12 (14)	3 (4)	14 (93)	1 (7)	0
Pulp therapy	Breaking an instrument inside the root canal‡,§	41 (48)	4 (5)	43 (96)	2	0 (4)
	Performing perforation during pulp therapy§	20 (24)	4 (5)	24 (100)	0 (4)	0 (0)
Extraction	Extracting the wrong primary tooth‡	7 (8)	3 (4)	10 (100)	0	0
	Extracting the wrong permanent tooth‡	5 (6)	3 (4)	8 (100)	0	0
	Extracting a permanent tooth instead of a primary tooth‡	3 (4)	2 (2)	5 (100)	0	0
	Extracting the primary tooth with its correspondent tooth bud§	13 (15)	0 (100)	13	0	0

Table 1 continued

Prescribing drugs	Not prescribing antibiotic at the end of treatment when needed‡	18 (21)	6 (7)	21 (88)	1 (4)	1 (4)
	Prescribing a wrong dose of antibiotic‡	27 (32)	14 (17)	40 (98)	0	1 (2)
	Prescribing a wrong dose of analgesic‡	16 (19)	4 (5)	19 (95)	0	1 (5)
	Ignored patient sensitivity to medications	11 (13)	16 (19)	26 (96)	1 (4)	0
	Not prescribing prophylactic -antibiotics when needed‡	10 (12)	7 (8)	17 (0)	0 (100)	0
Sedation	Treating a non-fasting child by sedation‡	22 (26)	5 (6)	23 (85)	0	4 (15)
	Patient vomited during dental treatment under sedation‡,§	28 (33)	2 (2)	26 (87)	3 (10)	1 (3)
	Giving a wrong dose of sedative-drug‡	4 (5)	3 (4)	7 (100)	0	0
	Sedating without monitoring by pulse-oximeter‡	4 (5)	3 (4)	6 (86)	1	0
Safety	Swallowing an instrument‡,§	10 (12)	18 (21)	28 (100)	0	0
	Swallowing a clasp of rubber-dam§	5 (6)	8 (9)	13 (100)	0	0
	Making an accidental incision in the cheek/lip or tongue§	57 (67)	5 (6)	55 (89)	6 (10)	1 (2)

Legal offence*, negligence‡, mistake§, lack of knowledge#

Discussion

Although Hippocrates's famous motto 'Primum non nocre' (first, do no harm) was stated over 2000 years ago, research of the nature and frequencies of mistakes in paediatric dentistry remains sparse, as are regulations of safety standards. The publication in the English language of only one study investigating MNLOs, commonly occurring while taking dental radiographs [McKeown et al., 2005], exemplifies this.

In the present study we did not distinguish between mistakes, negligence and legal offences. This is because some MNLOs can be regarded as mistakes or negligence depending on the circumstances. For example, breaking an instrument inside a root canal can be regarded as negligence if instruments are not replaced regularly, while the breaking of a new instrument may occur by mistake. Our data do not enable differentiation between these cases.

We evaluated retrospectively the prevalence of performed and nearly performed MNLOs during the entire life practice of CPDs, NCPDs and residents in paediatric dentistry. We combined numbers of performed and nearly performed MNLOs so as to increase awareness to their prevention. However, we note that accurate incidence per year needs be estimated prospectively or by dividing the frequency of MNLOs per year by the estimated number of procedures performed.

We found that the types and prevalence of MNLOs performed during dental treatment in children is similar, whether carried out by certified or non-certified, young or senior, paediatric dentists. Possibly, participating dentists may have actually reported the occurrence of MNLOs only during the last few years, or alternatively, during the first years of practice, after which they may have been subsequently corrected. Additionally, the participating dentists may have consciously or unconsciously forgotten some of their past MNLOs or may have been unaware of them. The observation that 16% claimed that they never wrongly developed an intra-oral radiograph and 10% claimed that they never took bite-wing radiographs with overlapping teeth, reinforces this assumption. Our data support those of Wheeler and Wheeler [2005] who showed recording of higher rates of mistakes in observational studies than in self-reporting studies. In the current study, we only evaluated frequencies of MNLOs up to a maximum of >10 times. Interestingly, though resident dentists usually practice under tight supervision, prevalence of MNLOs was lower for them in only 4 of 47 types.

MNLOs in documentation and prescription Approximately one-half of the dentists participating in this study admitted having prescribed the wrong dose of antibiotics, and one-quarter the wrong dose of analgesic drugs. Such MNLOs can result in sub-optimal therapeutic outcomes, fatal hepatotoxicity [Prescott, 1980] or bacterial resistance. In their systematic evaluation of 2,044 prevented (near-miss) errors in analgesic orders in a teaching hospital, Smith and Lesar reported an overall error rate of 2.87 per 1,000, with the error rate more than twice as high in paediatric patients than in adults [Smith and Lesar, 2011].

MNLOs in diagnosis In the current study, the highest frequencies of MNLOs were reported for taking and developing intra-oral radiographs. Faulty radiographs may be related to the high frequency reported for misdiagnosis of dental caries (63%) and for drilling an intact tooth (37%). These results support those of Nysther and Hansen [1983] who reported an accuracy of only 4.6% of 2,409 pairs of bite-wing radiographs. Despite the high rate of error, radiographs remain the most common and important diagnostic tool in dentistry. An imperfect radiograph may result in deficient treatment or in unnecessary x-ray exposure. Thus, there is a need to develop other accurate and predictable tools to diagnose inter-proximal caries, as well as to improve the quality of intra-oral radiographs.

MNLOs in operative treatments Extraction of a wrong tooth is a reason for legal suits against oral surgeons and dentists [Lee et al., 2007]. While we observed 43% frequency for this MNLO, Peleg et al. [2010]reported only 54 insurance claims for wrong tooth extractions in Israel during the years 1993 to 2004. General practitioners performed 72% of the extractions; 77% occurred in polyclinics. Evidently, not all cases are claimed, and, specifically not extraction of primary teeth, as is included in the current study. Chang et al. [2004] reported the effectiveness of an educational program to reduce the incidence of wrong-site tooth extraction in the outpatient department of a university hospital in Taiwan.

The Committee of the Health Organisation in the USA classified MNLOs as sentinel events as they can threaten life or can cause serious physical or emotional damage, and thus necessitate intervention and investigation. Before September 2005, wrong extractions comprised 12.5% of sentinel events with an increasing tendency. Therefore, the Committee of the Health Organisation in the USA issued guidelines to prevent incorrect treatment, or treatment of a wrong patient. Three principal steps were recommended: 1) a pre-operative verification process to ensure that all relevant documents are available before initiating treatment and that the patient understands the procedure; 2) marking the operative site; and 3) taking 'time out' immediately before starting the procedure for final verification of the correct patient, procedure and site [Lee et al., 2007].

In the current study, anaesthetisation of the wrong tooth was reported by 49% of the dentists, with one of them reporting the highest frequency option for this MNLO. Accidental incision in the cheek/lip or tongue was also frequently reported (73%). Nevertheless, no additional reports about these MNLOs were found in PUBMED literature search. The high prevalence of accidental incision in the cheek/lip or tongue among paediatric dentists may be related to unpredictable movements and behaviour of children, especially uncooperative ones. The high frequency of this MNLO reported by residents (92%) compared with certified paediatric dentists (52%) may be due to the lack of experience of the former in predicting the need for using local analgesia, sedation or general anaesthesia.

One-half of the dentists reported that their patients swallowed a bur or clasp of a rubber dam during treatment. From data of two insurance companies representing 24,651 French general dentists over 11 years, one endodontic instrument was aspirated and 57 were ingested [Susini et al., 2007]. Forty-three other dental items were aspirated and 409 were ingested. For the endodontic instruments: the incidence of aspiration was 0.001 per 100,000 root canal treatments and the incidence of ingestion was 0.12 per 100,000 root canal treatments. The lower frequencies compared with the present study is evidently due to the fact that not all patients who swallow instruments sue insurance companies.

Approximately one-third of the dentists in our study, of whom 70% were NCPDs, reported administering sedation to children who did not fast. According to Israeli law, NCPDs are not allowed to sedate a child. Four dentists admitted making this mistake, with the maximum frequency option, and. about one-third (17 NCPDs and 12 CPDs) reported that some of their sedated patients vomited during treatment. As not every non-sedated child vomits during treatment, it could be speculated that the number of sedated children who did not fast was even higher. Vomiting during treatment could result from parents not reporting and dentists not verifying that the child had abstained from food or drink before treatment, or because the recommended duration of the fast was too short. It is possible that some cases occurred before guidelines for fasting were established or due to lack of awareness of the existing guidelines. In any case, such MNLO puts the child at considerable risk, and can thus be regarded as neglect rather than as a simple mistake.

Another MNLO associated with improper delivery of sedation is not monitoring the sedated child. Seven dentists admitted that they 'forgot' to monitor their sedated patients by pulse oximeter during treatment. Similarly, in a survey among paediatric dentists conducted immediately after the issuance of updated guidelines for sedation by the American Academy of Pediatric Dentistry (AAPD) and the American Academy of Pediatrics (AAP), Wilson found that 10% of 1,758 respondents did not use monitors when N_2O was used in combination with other sedative agents [Wilson, 1996]. The data in the

current study does not distinguish between the use of monitors before and after issuance of the guidelines. Such MNLOs can lead to life-threatening situations that could prompt government authorities to issue an order to prevent paediatric dentists from administering sedation and to transfer this responsibility solely to anaesthesiologists.

Distribution of MNLOs according to prevalence and number of repetitions (Table 1) The more frequently reported MNLOs were not usually associated with apparent body damage or with a legal claim. In contrast, less frequently reported MNLOs were mostly correlated with permanent and obvious body damage, such as treating a wrong tooth, extracting a wrong primary tooth, prescribing a wrong dose of a sedative drug and swallowing an instrument. Such MNLOs are usually associated with claims or involve another professional, such as paediatricians in the emergency room. Consequently, the patients are also more aware of them.

Improving patient safety and decreasing MNLO occurrence The traditional approach to attributing errors to individual fault over the past decade ignores the fact that most MNLOs are made by hard working and well-trained individuals. These MNLOs are unlikely to be prevented by admonishing people to be more careful, or by suing them. Instead, the modern approach holds that humans will inevitably err and that safety depends on creating systems that anticipate errors and either prevent or catch them before they cause harm [Wachter, 2008]. British psychologist James Reason's 'Swiss cheese model' of accidents has been widely embraced as a mental model for system safety [Reason 1990]. The Swiss cheese model highlights the need to focus less on trying to perfect human behaviour (a futile undertaking) and more on aiming to shrink the holes in the cheese and create multiple overlapping layers of protection to decrease the probability that the holes will ever align and let an error slip through.

Whatever form the discussions take, all appropriate disciplines (dentists, assistants, hygienists and administrators) should be involved in attempts to identify, prevent, and suggest non-punitive solutions for MNLOs [Pierluissi et al., 2003]. Discussions should also include the non-medical impact of the MNLOs, with legal, social and economic effects on both the patient and the system. In addition to open discussions at conferences, dental schools should contribute to improving patient safety by establishing means to disseminate information about unsafe conditions and errors from staff, via 'incident reporting systems' [Vincent, 2003].

Conclusion

This study showed that the prevalence and diversity of MNLOs in paediatric dentistry in Israel are relatively high. These findings have implications for dental institutions, and educational and residency programs for paediatric dentists. The main limitation of this study is the retrospective design and its basis on long term recall. Prospective studies are needed to accurately evaluate the frequency of mistakes among dentists. Discussion and regulation are important to increase awareness and decrease prevalence.

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