Are there any limits to the dental treatment of children?

Aim The objective of this paper is to describe and discuss the most commonly occurring limits in care provision between a dentist and a child, i.e. provider and recipient.

Methods The study was conducted online in the form of an anonymous questionnaire survey. We were looking for dentists to answer two basic modeled situations during the treatment of deciduous teeth (filling and extraction) in 4-year-old and 8-year-old children. Each modeled situation had 9 possible clinical scenarios. The age was chosen to factor the cooperation of a preschool- and a school-age child.

Results When observing the subgroups of dentists, using a p value <0.05, a relation to age and experience of the dentists was proved among the 4-year-old rather than the 8-year-old children. Dentists with longer experience are more likely to make a filling or an extraction. Dentists with a shorter length of experience perform extractions. In total, 75.4–83.0% of the dentists do not agree with leaving the tooth without any treatment, and if the child is not cooperating they refer them to a university hospital. Dentists with longer experience and a greater number of treated children do not see barriers when treating a child.

Statistics Statistical analysis was performed by an independent statistician using MedCalc programmes. Level of statistical significance was set at 95% probability of hypotheses validity (p = 0.05).

Conclusion The experience gained through clinical practice and the number of treated children show to be fundamental for the treatment of child’s deciduous teeth and for the selection of a treatment method. Dentists acquire sufficient knowledge through their education in the faculties of medicine. The limit is the child itself, therefore it is desirable to build specialised centres for their treatment.

Introduction

Paediatric dental care is nowadays often mentioned in the media, especially with regard to the availability of dental care for children. The reasons why child’s treatment does not happen may be the physician’s personality, their knowledge, type or the economic aspects of paediatric dental treatment. From the viewpoint of the relationship between the provider and the recipient of the dental care, preschool children are a high-risk group, i.e. children with deciduous teeth. A child under 3 years does not have the ability to cope with dental treatment [Alwin et al., 1991] and the dental fear is greater in younger children than older ones [Vasakova et al., 2017]. The link between dental fear and acquired anxiety has been confirmed not only by studies [Ten Berge et al., 2002; Milsom et al., 2003; Karjalainen et al., 2003], but also persists in the minds of parents [Tamošiūnas et al., 2013]. Parents are an important factor [Khodadadi et al., 2016] during the children’s dental treatment. They fear the subsequent post-treatment trauma to their child, therefore their influence often causes, despite the efforts of the dentist, that the treatment of tooth decay is unsuccessful. Another factor during a child’s dental treatment is the performed intervention. Increasing anxiety is linked to the extractions, not the fillings [Milsom et al., 2003; Karjalainen et al., 2003].

The goal of this paper is to describe and discuss the most common limits that occur when treating the deciduous teeth of children in the Czech Republic.

Materials and methods

Study characteristics

The anonymous questionnaire survey was focused on two basic options for treating deciduous teeth, that is making a filling or extraction in a preschool and school-age child with consideration of dentist’s level of experience. Another aspect was the attitude of the dentist when the child is not cooperating. Whether the dentist finishes the treatment or chooses to refer the child to a specialist – paediatric dentist, or to the university workplace. As an anonymous questionnaire survey this research did not qualify for evaluation in a research ethics committee.

Group of doctors

The questionnaires were distributed to the Czech
dentist’s available emails via regional dental chamber organisations between February and April 2014 (the number of working dentists 8,033, paediatric dentists 20; source: the annual report of Czech Dentist Chamber 2014). The minimum number of subjects was 300 as set by the methodology of the WHO [Petersen and Baez, 2013]. The questionnaire was completed by 411 dentists.

**Questionnaire selection**

The self-administered questionnaire was made in Google forms and fulfilled online. The acquired data were stored to the Microsoft Excel file by submitting the questionnaire and the date of submitting was the only identifier of a respondent. The first six closed-ended questions were asking the age group of the responders and general experience with treating of a child (frequency and number of treated preschool and school-aged children in a certain time interval). In further four close-ended questions the respondents answered to the model situations of two basic options of treating a deciduous tooth. For the observation itself we created 4 clinical situations out of 2 model groups: a 4-year-old preschooler (hereinafter “P”) and an 8-year-old school-age child (hereinafter “S”) and the 2 most performed interventions on deciduous teeth: filling and extraction. These 4 situations had 9 clinical scenarios, see Tab. 1. Under what circumstances do the dentists perform the treatment, do not perform the treatment, send the child home, refer them to a specialist – a paediatric dentist at the university hospital, and if they consider the demands of the parents. The last question was dedicated to other possible aspects that contribute to the decisions when treating a child. The level of agreement or disagreement to these clinical questions was assessed by Likert five-pointed scale with these answers “totally agree”, ”mostly agree”, ”don’t know”, ”mostly disagree”, ”totally disagree”.

**Statistical methods**

For the qualitative values, the representation in each category was shown in percentage, and the deviation from the expected rates in Z-scores. Quantitative values were not assessed. The difference in relative frequency distribution between the groups was assessed by a Chi-square test in contingency tables. All the statistical tests were two-tailed with a significance level of p < 0.05. The calculations were done by an independent statistician using MedCalc software (MedCalc Software Version 17, Belgium).

**Results**

By categorising respondents into age groups (group A – 25-35 years, 42.3%; B – 36-45 years, 13.6%; C – 46-55 years, 13.0%; D – above 55 years, 31.1%) we assessed the effect of their length of experience. Another factor evaluated was the knowledge increases with the length of experience from 31-50% to 89.3%, 94.3%. Group D more often completely disagree with the allegations that smaller anatomical proportions are more difficult to work with (p = 0.05), group A agrees that all experienced dentists (C, D) send the child home when not cooperating, see Tab. 3. Group E4, 8 refers to a non-cooperating 4-8-year-old child with a filling/extraction to a university hospital, groups F4, 8 and G4, 8 perform the intervention regardless of the age and treatment, even if the child is not cooperating, see Tab. 4, 5. 84.4% of the dentists disagree that they would lack sufficient knowledge to treat the child. It is 80.5% within group A, and the knowledge increases with the length of experience to 89.3%, 94.3%. Group D more often completely disagrees with the allegations that smaller anatomical proportions are more difficult to work with (p = 0.05), group A chooses this option the least. Group E4 agrees that all preschool children cry and cannot sit still, whereas group F4 and G4 disagree (p = 0.02). Group G4 disagrees that with a small child the treatment is more complicated, and they have less room to work (p = 0.05).

**Child aged 4 years and filling of deciduous teeth**

Group D attempts to treat the tooth of a 4-year-old child and sends them home if not cooperating (p = 0.003), group A disagrees with it. Also, group D agrees with referring a non-cooperating child to a paediatric dentist (p = 0.01). Finally, groups D (p = 0.002) and F4 (p = 0.001) disagree with referring the child to a university hospital, while both groups B and E4 agree, group G4 does not know. Groups C, D, E4 do not agree to treat despite non-cooperation of the 4-year-old (p = 0.01), group F4 and G4 agree (p = 0.004). Groups F4 and G4 (p = 0.03) do not agree that the 4-year-old child should be referred without an attempt to treat the teeth, the group E4 agrees (p = 0.02).

**Child aged 4 years and extraction of deciduous teeth**

Dentists from group D agree with not performing an extraction in a 4-year-old child (p = 0.03), they are glad for cooperation at least during the check-up. Groups D and E4...
ARE THERE ANY LIMITS TO DENTAL TREATMENT OF CHILDREN?

Scenario 1
I will not risk the possible future uncooperation. I will not bother the child. I am glad, that she/he allows the examination.

Scenario 2
I will not treat/extract the tooth in absence of any pain, because they are deciduous.

Scenario 3
I will try to treat/extract the tooth and I will send the child home in case of uncooperation.

Scenario 4
I will try to treat/extract the tooth and I will send the child to the paediatric dentist in case of uncooperation.

Scenario 5
I will try to treat/extract the tooth and I will send the child to the nearest dental faculty in case of uncooperation.

Scenario 6
I will try to treat/extract the tooth, even if the child is uncooperative.

Scenario 7
I will not treat/extract the tooth. I will refer the child for the treatment to the nearest paediatric dentist.

Scenario 8
I will not treat/extract the tooth. I will refer the child for the treatment to the nearest dental faculty.

Scenario 9
I will do whatever parents will demand.

TABLE 1 Proposed clinical scenarios of the therapeutic options (tooth treatment/extraction) presented in the Questionnaire.

<table>
<thead>
<tr>
<th>Age groups of treated children</th>
<th>Percentage of respondents in the groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preschool children</td>
<td>E4 - 36.0%  F4 - 56.7%  G4 - 4.9%  H4 - 2.4%</td>
</tr>
<tr>
<td>School age children</td>
<td>E8 - 18.3%  F8 - 69.1%  G8 - 11.9%  H8 - 0.7%</td>
</tr>
</tbody>
</table>

group E4 – 0-5 treated preschool children per month; group F4 – 6-30 treated preschool children per month; group G4 – above 31 treated preschool children per month; group E8 – 0-5 treated school age children per month; group F8 – 6-30 treated school age children per month; group G8 – above 31 treated school age children per month; H8 – missing data

TABLE 2 Percentage of respondents in the groups according to the number of treated preschool/school age children per month.

Treatment of 4-year-old child with filling

<table>
<thead>
<tr>
<th>Age group of respondents</th>
<th>Scenario 1 (do nothing)</th>
<th>Scenario 2 (no pain, do nothing)</th>
<th>Scenario 3 (uncooperative, home)</th>
<th>Scenario 4 (uncooperative, paediatric dentist)</th>
<th>Scenario 5 (uncooperative, faculty)</th>
<th>Scenario 6 (immediately paediatric dentist)</th>
<th>Scenario 7 (immediately faculty)</th>
<th>Scenario 8 (parent demand)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10.9%</td>
<td>10.9%</td>
<td>40.6%</td>
<td>42.4%</td>
<td>53.3%</td>
<td>48.6%</td>
<td>2.5%</td>
<td>3.7%</td>
</tr>
<tr>
<td>B</td>
<td>17.9%</td>
<td>19.6%</td>
<td>33.3%</td>
<td>30.0%</td>
<td>40.4%</td>
<td>44.2%</td>
<td>2.0%</td>
<td>4.0%</td>
</tr>
<tr>
<td>C</td>
<td>15.1%</td>
<td>17.0%</td>
<td>46.0%</td>
<td>32.6%</td>
<td>44.2%</td>
<td>26.2%</td>
<td>2.9%</td>
<td>8.0%</td>
</tr>
<tr>
<td>D</td>
<td>21.1%</td>
<td>28.1%</td>
<td>56.8%</td>
<td>40.2%</td>
<td>49.1%</td>
<td>47.3%</td>
<td>10.8%</td>
<td>10.6%</td>
</tr>
</tbody>
</table>

Treatment of 4-year-old child with extraction

<table>
<thead>
<tr>
<th>Age group of respondents</th>
<th>Scenario 1 (do nothing)</th>
<th>Scenario 2 (no pain, do nothing)</th>
<th>Scenario 3 (uncooperative, home)</th>
<th>Scenario 4 (uncooperative, paediatric dentist)</th>
<th>Scenario 5 (uncooperative, faculty)</th>
<th>Scenario 6 (immediately paediatric dentist)</th>
<th>Scenario 7 (immediately faculty)</th>
<th>Scenario 9 (parent demand)</th>
</tr>
</thead>
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<tr>
<td>A</td>
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<td>14.4%</td>
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<td>38.9%</td>
<td>56.1%</td>
<td>60.1%</td>
<td>6.3%</td>
<td>7.0%</td>
</tr>
<tr>
<td>B</td>
<td>17.9%</td>
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<td>15.7%</td>
<td>18.8%</td>
<td>34.0%</td>
<td>64.4%</td>
<td>2.0%</td>
<td>5.8%</td>
</tr>
<tr>
<td>C</td>
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<td>17.5%</td>
<td>15.2%</td>
<td>35.4%</td>
<td>45.2%</td>
<td>4.1%</td>
<td>6.3%</td>
</tr>
<tr>
<td>D</td>
<td>21.1%</td>
<td>28.1%</td>
<td>25.0%</td>
<td>27.6%</td>
<td>40.5%</td>
<td>48.2%</td>
<td>14.0%</td>
<td>11.9%</td>
</tr>
</tbody>
</table>

Treatment of 8-year-old child with filling

<table>
<thead>
<tr>
<th>Age group of respondents</th>
<th>Scenario 1 (do nothing)</th>
<th>Scenario 2 (no pain, do nothing)</th>
<th>Scenario 3 (uncooperative, home)</th>
<th>Scenario 4 (uncooperative, paediatric dentist)</th>
<th>Scenario 5 (uncooperative, faculty)</th>
<th>Scenario 6 (immediately paediatric dentist)</th>
<th>Scenario 7 (immediately faculty)</th>
<th>Scenario 8 (parent demand)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5.2%</td>
<td>6.3%</td>
<td>33.5%</td>
<td>33.0%</td>
<td>44.0%</td>
<td>40.7%</td>
<td>7.0%</td>
<td>9.5%</td>
</tr>
<tr>
<td>B</td>
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<td>20.4%</td>
<td>30.0%</td>
<td>47.7%</td>
<td>2.0%</td>
<td>5.9%</td>
</tr>
</tbody>
</table>
agree that if the deciduous tooth indicated for extraction doesn’t cause pain, it doesn’t have to be extracted as it is temporary (p = 0.03). The same is not agreed by groups A, F4, G4 (p = 0.003). Sending the child home when not cooperating during the extraction is not agreed by group F4, whereas groups E4 and G4 agree (p = 0.04). Groups A (p = 0.04) and F4 (p = 0.006) agree with sending the non-cooperating 4-year-old for extraction to a paediatric dentist. Group A refers the non-cooperating child for extraction to the university hospital (p = 0.0005), groups D, F4 (p = 0.004) and G4 (p = 0.05) disagree. Groups E4 and F4 disagree with referring the 4-year-old for tooth extraction to a university hospital without attempting extraction (p = 0.004), group G4 agrees. Despite non-cooperation of the child, groups A, B, F4, G4 (p = 0.02) perform a dental extraction, group D absolutely disagrees (p = 0.04).

**Child aged 8 years and filling of deciduous teeth**

Group A disagrees that they would not treat the deciduous teeth of an 8-year-old child and that they would settle for doing just a check-up (p = 0.006), whereas group D agrees. Groups D (p = 0.003) and E (p = 0.02) agree, whereas groups F8 and G8 disagree that the deciduous teeth in an 8-year-old child does not have to be treated. Group A (p = 0.03) agrees, group D disagrees (p = 0.04) with referring the non-cooperating 8-year-old for the treatment to a university hospital. Group E8 (p = 0.01) does not agree with treating the tooth of an 8-year-old despite non-cooperation, they also refer the 8-year-old indicated for the treatment to a paediatric dentist without a previous attempt to treat the tooth (p = 0.04).

**Child aged 8 years and extraction of deciduous teeth**

Group A disagrees with sending the 8-year-old child home when not cooperating during the extraction (p = 0.02), while group D agrees. None of the groups specifically comment on the statement that they will extract the deciduous tooth despite that the 8-year-old is not cooperating; except for group C, which doesn’t know (p = 0.01). Groups E8 (p = 0.04) and G8 (p = 0.004) agree with referring the 8-year-old to a paediatric dentist without previous extraction attempt, group F8 disagrees. Sending the 8-year-old to a university hospital without previous extraction attempt is not agreed by groups E8 and F8 (p = 0.04), group G8 agrees (p = 0.0008). Group E8 disagrees that the tooth extraction should be done in the 8-year-old despite their non-cooperation (p = 0.02).

**Discussion**

The majority of dentists (according to their age and method of the treatment for the child 67-93%) in the Czech Republic do not agree with leaving a deciduous tooth without any treatment, i.e. without filling or extraction. A study from Germany, that was investigating reasons why teeth of children between age 3 and 6 are not treated, showed that the limiting factors are the dentists themselves, not the parents, as was expected. And the reason is a low financial reward for the filling procedure [Spleith et al., 2009]. This result correlates with the fact that 62-66% of Czech dentists do not oblige the parents’ wishes (they follow the indication criteria based on the teeth condition); therefore the parents are not the limit when treating deciduous teeth in our country. The dentists refer more untreatable 4-year-olds to be treated elsewhere, as in studies abroad, where children under 4 years of age are perceived as difficult [Rutkauskas et al., 2015]. Overall, we found much less statistically significant differences with p<0.05 in the 8-year-old children. This corresponds with the improvement of communication skills with age. According to the dentists in the USA, the smallest portion of all treated patients is represented by children under 4 years of age [Rutkauskas et al., 2015]. Those who treat children more often refer them less to a university hospital or a paediatric dentist [McQuistan et al., 2005]. They are able to deal with treating non-cooperating children because they have greater experience. Four-year-olds comprise a greater percentage of referred children. The same result came from a survey among fresh university graduates, who are in a postgraduate program of paediatric dentistry and do not feel as confident when treating children from the age of 6 months to 3 years [Rutkauskas et al., 2015], which is the spectrum of children that are not generally part of the practical teachings at the faculty of medicine.

Groups that treat 31 or more children per month refer the non-cooperating 8-year-old children more often to the hospital, as it is appropriate for an older child having a pharmacological intervention to be in a hospital facility.

<table>
<thead>
<tr>
<th>Age group of respondents</th>
<th>Scenario 1 (do nothing)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.6%</td>
<td>11.5%</td>
<td>20.1%</td>
<td>36.3%</td>
<td>45.2%</td>
<td>54.4%</td>
<td>6.3%</td>
<td>7.5%</td>
<td>15.5%</td>
</tr>
<tr>
<td>B</td>
<td>8.9%</td>
<td>17.9%</td>
<td>28.3%</td>
<td>20.4%</td>
<td>36.7%</td>
<td>46.7%</td>
<td>0.0%</td>
<td>1.9%</td>
<td>17.9%</td>
</tr>
<tr>
<td>C</td>
<td>7.5%</td>
<td>13.2%</td>
<td>28.6%</td>
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<td>23.4%</td>
<td>50.0%</td>
<td>8.2%</td>
<td>10.9%</td>
<td>15.1%</td>
</tr>
<tr>
<td>D</td>
<td>16.4%</td>
<td>21.1%</td>
<td>30.7%</td>
<td>31.5%</td>
<td>31.3%</td>
<td>51.4%</td>
<td>9.1%</td>
<td>11.6%</td>
<td>22.7%</td>
</tr>
</tbody>
</table>

**TABLE 3** Preferences of the clinical scenarios in suggested therapeutic option according to the age groups of the respondents.

<table>
<thead>
<tr>
<th>Child aged 8 years and filling of deciduous teeth</th>
</tr>
</thead>
</table>
| Group A disagrees that they would not treat the deciduous teeth of an 8-year-old child and that they would settle for doing just a check-up (p = 0.006), whereas group D agrees. Groups D (p = 0.003) and E (p = 0.02) agree, whereas groups F8 and G8 disagree that the deciduous teeth in an 8-year-old child does not have to be treated. Group A (p = 0.03) agrees, group D disagrees (p = 0.04) with referring the non-cooperating 8-year-old for the treatment to a university hospital. Group E8 (p = 0.01) does not agree with treating the tooth of an 8-year-old despite non-cooperation, they also refer the 8-year-old indicated for the treatment to a paediatric dentist without a previous attempt to treat the tooth (p = 0.04).

<table>
<thead>
<tr>
<th>Child aged 8 years and extraction of deciduous teeth</th>
</tr>
</thead>
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| Group A disagrees with sending the 8-year-old child home when not cooperating during the extraction (p = 0.02), while group D agrees. None of the groups specifically comment on the statement that they will extract the deciduous tooth despite that the 8-year-old is not cooperating; except for group C, which doesn’t know (p = 0.01). Groups E8 (p = 0.04) and G8 (p = 0.004) agree with referring the 8-year-old to a paediatric dentist without previous extraction attempt, group F8 disagrees. Sending the 8-year-old to a university hospital without previous extraction attempt is not agreed by groups E8 and F8 (p = 0.04), group G8 agrees (p = 0.0008). Group E8 disagrees that the tooth extraction should be done in the 8-year-old despite their non-cooperation (p = 0.02).

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Groups that treat 31 or more children per month refer the non-cooperating 8-year-old children more often to the hospital, as it is appropriate for an older child having a pharmacological intervention to be in a hospital facility. And
about the number of treated children, they are aware of the possible complications [Vinckier et al., 2001]. Another reason discovered to refer a child is non-cooperation [Sekiguchi et al., 2000]. The group of dentists that treat children the least is convinced that all little children cry. This again reflects a lack of experience with children. Dentists with longer experience and a greater number of children treated do not think that they have insufficient space for work, which shows their routine in treating children.

Dentists with different lengths of experience differ in their approach to the treatment; those in the age group of 25-35 years more often refer a non-cooperating child to a university hospital, see Tab. 3. Extraction for a non-cooperating child is performed by all age groups, as not performing it may lead to serious consequences. This fact correlates with a sufficient knowledge in treating children. Czech dentists do not rely as much on a specialist in paediatric dentistry, which differs from the results of studies from abroad [Garg et al., 2013]. They predominantly refer to a university hospital, see Tables 3, 4, 5. This leads to an overload of those that should primarily focus on teaching. When assessing the length of experience of Czech dentists, the questionnaire survey shows that with increasing experience they also have more knowledge, as they comment on the treatment more clearly. This corresponds with research from abroad, where the amount of knowledge increases with age [Patil, 2016; Rutkauskas et al., 2015]. On the other hand, there are studies that did not show the link between age and the amount of knowledge [Treasure, 2015].

The majority of Czech dentists (84.4%) disagree that they lack sufficient knowledge to treat a child. It is 80.5% within the age group of 25-35 years and knowledge increases with the length of practice in 89.3%, 94.3%. We explain this trend by the lawful obligation to lifelong learning for the length of practice in 89.3%, 94.3%. We explain this trend by the lawful obligation to lifelong learning for physicians in the Czech Republic. Studies involving this topic show that dentists who completed further education perceive the non-cooperating children as a challenge [Strøm et al., 2015].

**Conclusion**

When treating children in the Czech Republic, the acquired experience, method of treatment and age of the treated child are crucial. Dentists with shorter length of practice refer more often uncooperative children to the faculty for the treatment. Extractions are more often performed than fillings in uncooperative children by the dentists. Most referred group is 4-year-old. A child under 4 years of age is a limit itself due to their mental development, communication and coping abilities, therefore establishing specialised centres that would focus on the treatment of children under 4 years seems to be the solution. Czech dentists predominantly refer the patients to a university hospital and not to a paediatric dentist. Further educating dentists in paediatric dentistry is desirable. More profound studies are necessary for more detailed and complex insight into this matter.

**Conflict of interest**

The authors declare no conflict of interest.

**Acknowledgements**

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**REFERENCES**