The attitude of Czech dental patients to the use of rubber dam

Martin Kapitan MUDr,* Lenka Hodacova MUDr PhD,† Julie Jagelska MDDr,‡ Jiri Kaplan MUDr MDDr,§ Romana Ivancakova MUDr CSc¶ and Zdenka Sustova MUDr**

*Doctoral student, ¶Associated Professor, **Assistant Professor, Department of Dentistry, Charles University in Prague, Faculty of Medicine in Hradec Kralove, and University Hospital, Hradec Kralove, †Assistant Professor, Department of Social Medicine, Charles University in Prague, Faculty of Medicine in Hradec Kralove, ‡General Dental Practitioner, Centrum stomatologie Impla, Hradec Kralove, §General Dental Practitioner, MUDr. et MDDr. Jiri Kaplan, Pardubice, Czech Republic

Abstract

Correspondence

Martin Kapitan, MUDr
Associate Professor
Department of Dentistry
University Hospital
Sokolska 581
Hradec Kralove 500 05
Czech Republic
E-mail: martin.kapitan@seznam.cz

Accepted for publication

31 May 2013

Keywords: care expectations,
patient's attitude, questionnaire,
rubber dam, standard of care, survey

Background The most frequent arguments against rubber dam are that patients generally do not like it and the prolonged time of treatment. However, according to several studies, the attitude of patients towards rubber dam is rather positive.

Objective To find out the attitudes of patients to treatment with rubber dam; to determine influence of the circumstances of treatment or factors about patients; and to establish a mean time needed for rubber dam placement.

Design A questionnaire survey.

Setting and participants Patients of general dental practitioners, university clinical specialists and undergraduate dental students.

Results A total of 179 questionnaires were distributed, from which 150 were returned. The mean time needed for rubber dam placement was 4 min for students and < 2 min for dentists. For 56% of patients, this had been their first experience with rubber dam. A total of 77% of patients indicated a higher level of comfort during treatment with rubber dam. A preference to the future rubber dam usage was indicated by 86% of patients. The preference to the further rubber dam usage was statistically significantly affected by the level of comfort during the treatment with rubber dam ($P < 0.001$) and by the sufficiency of explanation of reasons for rubber dam usage ($P < 0.05$). The other factors presented no statistically significant influence on patients' attitude to rubber dam usage.

Conclusions The attitude of patients to rubber dam was rather positive in our study. The time needed for rubber dam application was rather short.

Introduction

Rubber dam is considered an ideal device for operation field isolation in dentistry, one which enables a high-quality treatment.¹ Training in the proper use of rubber dam has become a fundamental part of the curriculum for students of dentistry.^{2,3} The usage of rubber dam is an integral element in the recommended protocol guidelines in cariology and endodontics published by various medical associations.¹ Undeniably, in current cariology and endodontics, both undergraduate education in the use of rubber dam and its later practical use should belong to standard knowledge and skills.^{2,3} Rubber dam, however, is quite rarely used in general practice, both in the Czech Republic and in many other countries.^{4,5} The most common arguments mentioned by general dental practitioners against rubber dam are as follows:⁶⁻⁹

1. Patients generally do not like when rubber dam is used.
2. The cost of treatment increases.
3. The time of treatment is prolonged.

These arguments have been mentioned most often by those dentists who themselves do not use rubber dam.⁷ According to studies conducted in other countries, the attitude of patients towards rubber dam is rather positive.^{10,11} Specific statistics regarding the Czech Republic have as of yet not been compiled.

The aims of this study were:

1. To find out information about the attitudes of patients who have been treated with rubber dam.
2. To determine whether these opinions were influenced by the circumstances of treatment (the category of the operator, the time of placement and the duration of presence, and the sufficiency of explanation to the patient).
3. To find out whether certain factors about patients (age, gender, smoking, instances of cardiovascular or respiratory disease or allergies) influenced their opinion.
4. To establish a mean time needed for rubber dam placement and to evaluate for any

association of the time taken to place rubber dam with increasing operator experience.

Methods

A questionnaire was designed (Fig. 1) based on questionnaires used in similar studies in other countries.^{10,11} The questionnaires in these studies contained questions about patients' personal details, previous experience with rubber dam, current experience and preference for rubber dam usage in the next visit. Moreover, there were information about the procedure performed, the time needed for rubber dam placement and the duration of its use. The original questionnaire was translated to Czech language and back to English by two independent professional translators to avoid any translation errors. A few issues were added regarding the category of the operator, help of assisting person, information about smoking, cardiovascular or respiratory diseases, allergies and detailed information about patient's feelings about positive and negative properties of rubber dam. The pilot study was performed in a group of ten voluntary patients to test the questionnaire and the method. No changes in the questionnaire were necessary according to the pilot study.

The survey was performed in three groups of patients divided according to the category of operator. In the first group were patients of general dental practitioners (group DP) from two different practices. The second and third groups consisted of patients treated at the university Department of Dentistry in Hradec Kralove by clinicians (group CP) and dental students (group SP). Participating dentists in private practices were general dental practitioners who work routinely with rubber dam. Participating clinicians were university clinical specialists who also use rubber dam routinely. Participating students were undergraduate dentistry students from the last 2 years of their studies. These students are taught to use rubber dam in all restorative and endodontic treatments, but as yet they have little or no experience with work with rubber dam.

To be filled out by dentist:

Operator:

Time of rubber dam placement (minutes) Help of assistant:

Time of rubber dam presence in the oral cavity (minutes)

Treatment performed:

To be filled out by patient:

☒ Please indicate your response with an 'X' in the corresponding box.

1. Gender 2. Age 3. Do you smoke?

4. Do you suffer from any cardiovascular or respiratory condition?

5. Do you have any allergies? If so, what are you allergic to?

6. Has this been your first experience with rubber dam?

7. Have you undergone treatment with rubber dam in different dentist's office?

8. Did the operator sufficiently explain to you reasons for the use of rubber dam?

9. Were you convinced of the need of rubber dam after this explanation?

10. In your opinion who benefits most from use of the rubber dam?

11. Was the level of comfort during treatment with the usage of rubber dam higher, the same or lower?

12. What bothered you during treatment with rubber dam?
More than one answer possible.

☐ Difficulty swallowing or breathing.

☐ Placement of rubber dam took too long.

☐ Impossibility of rinsing mouth during treatment.

☐ Impossibility of communicating with operator during treatment.

☐ Pain caused by rubber dam.

☐ Other. Indicate

13. What do you consider to be a benefit of using rubber dam?
More than one answer possible.

☐ No accumulation of water in mouth.

☐ No irritation of the mouth by solutions used.

☐ No risk of swallowing or inhalation of foreign bodies.

☐ Increase in the quality of treatment performed.

☐ Decrease in infection transmission.

☐ Other. Indicate

14. Would you prefer rubber dam in your next treatment?

Figure 1 Questionnaire.

Before the beginning of the treatment, all the patients were informed about the reasons for rubber dam usage and about the conditions of

participation in this study. They were informed that rubber dam was used routinely in the workplace regardless the participation in the

study. They were told that the functions of rubber dam were to isolate the working field, to prevent accumulation of water in mouth during the treatment, to prevent accidental, mechanical or chemical injury of surrounding tissues, to prevent ingestion and aspiration of foreign bodies, to prevent saliva contamination of root canals during endodontic treatment, to keep the cavity dry during the filling to ensure the quality of the restoration. They were also told that the participation in the questionnaire enquiry was voluntary and anonymous; they had the right to refuse their participation at any time.

The times of rubber dam placement and presence were measured using stopwatch by the assisting person (nurse or assisting student). The placement time was measured from the beginning to the end of application without the time of previous rubber dam preparation. The time of presence was measured from the finishing of rubber dam application to its removal. These times were noted on the questionnaire together with information about the category of operator (dental practitioner, clinician or student), help of assistant (yes or no) and type of treatment (filling, root canal treatment or other). After the end of the treatment, the questionnaire was given to the patient, who was asked to fill in its second part. This was performed for all the patients consecutively treated with rubber dam. No exclusion criteria were applied. Patients who were willing to participate in the study filled in the questionnaires in the waiting room to avoid the influence of the operator on their answers. The patients could refuse to fill in the questionnaires. The completed questionnaires were thrown into closed labelled boxes. The favourable opinion of this method was issued by the Ethics Committee of the University Hospital Hradec Králové. None of the patients filled in more than one questionnaire.

The distribution and collection of questionnaires were terminated when the amount of 50 questionnaires was reached in each subgroup. Data were statistically analysed in NCSS 2007 using methods of descriptive statistics, non-

parametric Mann–Whitney test, Kruskal–Wallis one-way analysis with *post hoc* Dunn's test, chi-squared test or Fisher's test, logistic regression. Selected level of significance was $\alpha = 0.05$. The questions 11 and 14 were analysed in two categories (higher and same/lower; yes and no/I do not know). The results were compared with the results of similar studies performed in other countries.^{10,11}

Results

A total of 179 questionnaires were distributed to the patients, from which 150 were completed and used in the statistical analysis, making the response rate 87.7%. Forty-three percent of the patients ($n = 64$) were men and 57% ($n = 86$) were women. The age range was from 16 to 69 years with mean age 35.9 years, and median 33 years. The differences in patients' age between the categories of operators were statistically significant ($P < 0.001$). The mean age in the SP group (28.5 years) was statistically significantly lower than in both the DP group (39.4 years; $P < 0.001$) and CP group (39.8 years; $P < 0.001$). Age difference between groups DP and CP was not statistically significant.

The times needed for the application and duration of the rubber dam in the oral cavity are given in Table 1. Statistically significant differences between the categories of the operators were found both in the time of rubber dam application and in the duration of rubber

Table 1 Times of rubber dam placement and duration of presence

	Minimum	Mean	Median	Maximum
Rubber dam placement (min)				
Dentists	0.5	1.58	1	5
Clinicians	1	1.5	1	5
Students	1	4.07	3.5	10
Total	0.5	2.38	2	10
Rubber dam presence (min)				
Dentists	15	58.2	50	140
Clinicians	10	42.3	40	100
Students	15	88.5	90	150
Total	10	63	60	150

dam presence ($P < 0.001$). The placement time was statistically significantly longer in SP than in DP and CP ($P < 0.001$). The difference in placement time between DP and CP was not statistically significant. The duration of the rubber dam presence was statistically significantly longer in SP than in DP and CP ($P < 0.001$); and in DP longer than in CP ($P < 0.05$). Information regarding the help of an assisting person, as well as the range of performed treatments is given in Tables 2 and 3. Students most often placed the rubber dam with the help of assisting person, clinicians least often ($P < 0.001$). No other type of procedures except dental filling and root canal treatment were performed in the patients in our sample. Root canal treatment was more often carried out by clinicians; students did fillings more often. The range of treatment in general dentists was similar as a total average. These differences were found to be statistically significant ($P < 0.001$).

Among the patients in the study, 20% ($n = 30$) identified themselves as smokers, 4% ($n = 6$) as having cardiovascular or respiratory condition, 25% ($n = 38$) as suffering from allergies. Of the latter, group 1 patient was allergic to latex, so in this case, a vinyl membrane was used.

For 56% of patients ($n = 84$), this had been their first experience with rubber dam. Of patients with previous experience, 14% ($n = 9$) declared that rubber dam had been used during their treatment in other dental workplace.

A total of 92% of patients ($n = 138$) who filled in the questionnaire thought that the operator sufficiently explained the purpose of rubber dam to them. Ninety-one percent of

Table 3 Treatment performed

	Filling <i>n</i> (%)	RCT <i>n</i> (%)
Dentists	36 (72)	14 (28)
Clinicians	22 (44)	28 (56)
Students	45 (90)	5 (10)
Total	103 (69)	47 (31)

patients ($n = 136$) were convinced of the efficiency of rubber dam usage after this explanation. Patients who stated that the operator explained sufficiently the purpose of rubber dam to them were correspondingly convinced of the efficiency of rubber dam usage ($P < 0.001$). These patients thereafter mentioned less complaints about difficult in swallowing or breathing ($P < 0.05$) and about the impossibility of rinsing their mouth during treatment ($P < 0.01$).

A total of 87% of patients ($n = 131$) thought that rubber dam was beneficial for both dentist and patient. For 6% of patients ($n = 9$), rubber dam seemed beneficial only for the dentist, and 5% of patients ($n = 8$) considered rubber dam to be beneficial only for the patient. One percent of patients ($n = 2$) thought that rubber dam was not beneficial to anyone.

A total of 77% of patients ($n = 115$) indicated a higher level of comfort during treatment with rubber dam, while 23% ($n = 35$) registered the same or lower level of comfort, compared with the treatment without rubber dam. None of the factors, such as patients age, gender, smoking, presence of cardiovascular or respiratory disease, allergies, category of operator, the time of rubber dam application, the duration of rubber dam presence and a previous experience with rubber dam, shown statistically significant influence on the level of comfort in our study.

Answers to the questions 'What bothered you during treatment with rubber dam?' and 'What do you consider to be a benefit of rubber dam?' are summarized in Tables 4 and 5. Negative answers were more frequent in group SP. Positive answers were more frequent in group CP.

Table 2 Help of assistant

	Yes <i>n</i> (%)	No <i>n</i> (%)
Dentists	24 (48)	26 (52)
Clinicians	10 (20)	40 (80)
Students	36 (72)	14 (28)
Total	70 (47)	80 (53)

Table 4 Stated negative properties of rubber dam usage

What bothered you during treatment with rubber dam?	Total <i>n</i> (%)	DP <i>n</i> (%)	CP <i>n</i> (%)	SP <i>n</i> (%)
Impossibility of communicating with operator during treatment	50 (33)	10 (20)	14 (28)	26 (52)
Difficulty in swallowing or breathing	32 (21)	10 (20)	7 (14)	15 (30)
Impossibility of rinsing mouth during treatment	21 (14)	8 (16)	1 (2)	12 (24)
Placement of rubber dam took too long	11 (7)	2 (4)	2 (4)	7 (14)
Pain caused by rubber dam	10 (7)	1 (2)	5 (10)	4 (8)
Other	7 (5)	2 (4)	1 (2)	4 (8)
Total	131	33	30	68

More than one answer was possible; the answers are ordered from the most frequent.

A total of 86% of patients ($n = 129$) indicated a preference to the usage of rubber dam in their next treatment, while 14% ($n = 21$) did not express this preference. Logistic regression analysis was performed to find out which factors had an influence on the patients preference to further rubber dam usage. In the first step, logistic regression was carried out for 11 factors (age, gender, cardiovascular or respiratory disease, allergy, smoking, first experience with rubber dam, sufficient explanation, level of comfort, time of rubber dam placement, time of rubber dam presence and type of operator). According to our data, the three factors with the biggest influence were: the level of comfort of the treatment with rubber dam, the sufficiency of explanation of reasons for rubber dam usage and first experience with rubber dam. Logistic regression was then recalculated with these three factors. Increased probability of non-expressing the preference to further rubber dam usage was related with the feeling of the same or lower level of comfort (OR = 19.9; 95% CI 6.0–66.3; $P < 0.001$), as well as with the considering the explanation of reasons for

Table 5 Stated positive properties of rubber dam usage

What do you consider to be a benefit of using rubber dam?	Total <i>n</i> (%)	DP <i>n</i> (%)	CP <i>n</i> (%)	SP <i>n</i> (%)
No risk of swallowing or inhalation of foreign bodies	106 (71)	29 (58)	40 (80)	27 (54)
No accumulation of water in mouth	102 (68)	34 (68)	33 (66)	35 (70)
Increase in the quality of treatment performed	102 (68)	34 (68)	36 (72)	32 (64)
No irritation of oral mucosa by solutions used	78 (52)	28 (56)	27 (54)	23 (46)
Decrease in infection transmission	64 (43)	16 (32)	25 (50)	23 (46)
Other	4 (3)	0 (0)	1 (2)	3 (6)
Total	456	141	162	143

More than one answer was possible; the answers are ordered from the most frequent.

rubber dam usage as insufficient (OR = 5.8; 95% CI 1.2–27.6; $P < 0.05$), and with the first experience with rubber dam (OR = 2.9; 95% CI 0.8–9.6; $P = 0.086$).

Discussion

This study was designed with the goal of obtaining the maximum possible information about patient's opinions concerning their experience with the usage of a rubber dam and to examine the influence of various factors.

The number of respondents surveyed was similar to that of previous studies.^{10,11} The authors are aware that the main limitation of the study was the sample size. However, as the number of general dental practitioners who use rubber dam regularly is quite small in the Czech Republic⁵ and the participation in the study prolonged the treatment time, it was really problematic to find suitable general den-

tal practitioners willing to co-operate. The participating general dental practitioners were selected just according to the regular usage of rubber dam regardless their age, gender or other factors.

The three groups of operators were selected, because we wanted to survey patients in different situations. The clinicians (university clinical specialists) represented a group of dental practitioners, who provided only specialized care, and the patients were referred to them by general dentists for particular treatment. We assumed the patients of clinicians could feel different about the treatment just because they were in another, specialized clinical workplace, which could have been unusual to them. The general dental practitioners represented the dentists providing a primary care; their patients were used to visit them for treatment regularly. The students represented a group of operators starting with using rubber dam, which could have influenced the opinions of their patients.

The lower mean age in group SP corresponds with the fact that students often treat patients in the same age group, that is, their friends, schoolmates, etc. The average age in groups DP and CP was not statistically significantly different from the average age of the entire Czech population on 31. 12. 2010. This average age was 40.8 years, as published by Czech statistical office.¹²

The average times of rubber dam application and duration of presence were similar to those in the studies of Filipović *et al.*¹⁰ and Stewardson and McHugh.¹¹ Like in these studies, these factors had no influence on preference for rubber dam usage in the future. Our expectations that students would need more time both for rubber dam placement as well as the entire treatment procedure were confirmed. The time needed for rubber dam placement by the students in our study was a bit shorter than in other published studies, where the time was from 4.4 to 5 min and 4 sec.^{10,11,13}

Surprisingly, the treatment time (time of rubber dam presence) was shorter in clinicians than in dental practitioners. We expected that the length of treatment would be the same or

longer in clinicians, because of the increased difficulty of cases they deal with. We assume the difference in length of treatment time is caused by the fact that clinicians deal with complex endodontic cases more often, with the treatment often being performed in more phases with interim treatments. Despite the longer total duration of treatment, single visits can be shorter. On the contrary, for private dentists, it is advantageous to plan and combine treatment into one longer visit (e.g. block restoration), and so the total duration of treatment is reduced.

Interestingly, our results showed a longer time needed to place rubber dam in cases in which the aid of an assistant was required. Reasons for this are that students need help of an assisting person more often because of their lower experience with rubber dam, and dentists apply rubber dam faster even without assistance than students do even with help of an assisting individual.

For more than half of the patients, this was their first experience with rubber dam. This result is similar to studies of Filipović *et al.*¹⁰ and Stewardson and McHugh.¹¹ Only nine patients in our study indicated previous rubber dam experience in a different workplace. These results confirm the low level of rubber dam usage by Czech dental practitioners, as shown by Kapitan and Šustová.⁵

The finding that the rubber dam is beneficial for both dentist and patient was indicated by patients in our study more often than in the study conducted by Filipović *et al.*¹⁰

More than three quarters of patients indicated a higher level of comfort during the treatment with rubber dam than without one. Patients who indicated a higher level of comfort during treatment with rubber dam more often showed a preference for the use of rubber dam in future treatments. The same finding was presented by Stewardson and McHugh.¹¹

Regarding the negative consequences of the rubber dam, it can be assumed that the limitation of communication with the operator bothered the patients to a higher degree than the presence of rubber dam itself. On average, each

patient marked less than one negative answer. Thus, common concerns of dentists about patients' intolerance of rubber dam are unjustified. Patients much more frequently indicated the positive properties – about three on average – of rubber dam usage.

In contrary to the studies by Filipović *et al.*¹⁰ and Stewardson and McHugh,¹¹ in which students' patients would prefer the future use of a rubber dam less often than the patients of dentists, in our survey, the category of operator had no statistically significant influence on preference for rubber dam in future treatments. We also found no statistically significant influence related to a patient's gender or age, which was again in contradiction to the findings of Stewardson and McHugh.¹¹ In their study, in DP subgroup, women preferred rubber dam more often than men; in SP subgroup, there was no difference. Further, in their study, the preference for rubber dam increased with increasing age of patients, however, these differences were not statistically significant.

Patients in our study would prefer the use of rubber dam in future treatments more often than in the studies of Filipović *et al.*¹⁰ and Stewardson and McHugh.¹¹ The part of the patients with preference of future rubber dam use was quite high. As the number of rubber dam regular users is rather small in the Czech Republic,⁵ there is a high discrepancy between the offer of treatment with rubber dam by dentists and the demand of the patients. This finding is really alarming, because rubber dam is considered a standard of dental care.¹

The only factors with statistically significant influence on the preference to the rubber dam usage found in our study were declared lower or same comfort of treatment and insufficient explanation of reason for rubber dam usage. It seems these two factors were the key to the patients' acceptance of rubber dam usage. According to these results, it could be drawn as a conclusion that the operator should properly communicate with the patient about rubber dam usage.

Although there was a significant difference in time of rubber dam application between

dentists, as a group of experienced operators, and students, as a group of inexperienced operators, there were no significant differences between the patients of dentists and students in terms of declared level of comfort of treatment with rubber dam and their preference to the rubber dam usage in the future treatment. This finding should motivate those dentists who do not use rubber because of feeling inexperienced in rubber dam application to start using it.

Conclusions

The attitude of patients to the usage of rubber dam was rather positive in our study. The overwhelming majority (more than three-fourths) of our patients tolerated treatment with rubber dam to a great extent, they appreciated the benefits and would prefer its usage in further treatments.

A proper explanation from the operator influenced the patients' attitude in a positive way. The circumstances of neither treatment (times of application and duration of presence of rubber dam as well as the type of operator) nor other factors (gender, age, smoking, general diseases and allergies) had a statistically significant influence on patients' attitude to rubber dam usage in our sample.

The time needed for rubber dam application was rather short. Compared with the entire duration of treatment, the application of rubber dam always presents only an insignificant delay. In addition, the time needed to place the rubber dam decreases with increasing experience of the operator.

Acknowledgements

The authors want to thank all participants of the survey, Dr. Eva Cermakova from Computer Technology Center, Charles University in Prague, Faculty of Medicine in Hradec Králové, for help with statistical analysis, and Mr. Daniel Paul Sampey MFA from the Department of English and American Studies, University of Pardubice, Czech Republic, for help with language revision of the article.

Source of funding

The study was supported by the programme PRVOUK P37/13/550 and P37/09.

Conflict of interest

No conflict of interest has been declared.

References

- 1 European Society of Endodontology. Quality guidelines for endodontic treatment: consensus report of the European Society of Endodontology. *International Endodontic Journal*, 2006; **39**: 921–930.
- 2 Schulte AG, Pitts NB, Huysmans MCDNJM, Splieth C, Buchalla W. European core curriculum in cariology for undergraduate dental students. *European Journal of Dental Education*, 2011; **15** (Suppl. 1): 9–17.
- 3 Buchalla W, Wiegand A, Hall A. Decision-making and treatment with respect to surgical intervention in the context of a European Core Curriculum in Cariology. *European Journal of Dental Education*, 2011; **15** (Suppl. 1): 40–44.
- 4 Ahmad IA. Rubber dam usage for endodontic treatment: a review. *International Endodontic Journal*, 2009; **42**: 963–972.
- 5 Kapitan M, Šustová Z. The use of rubber dam among Czech dental practitioners. *Acta Medica (Hradec Králové)*, 2011; **54**: 144–148.
- 6 Hill EE, Rubel BS. Do dental educators need to improve their approach to teaching rubber dam use? *Journal of Dental Education*, 2008; **72**: 1177–1181.
- 7 Lynch CD, McConnell RJ. Attitudes and use of rubber dam by Irish general dental practitioners. *International Endodontic Journal*, 2007; **40**: 427–432.
- 8 Mala S, Lynch CD, Burke FM, Dummer PMH. Attitudes of final year dental students to the use of rubber dam. *International Endodontic Journal*, 2009; **42**: 632–638.
- 9 Whitworth JM, Seccombe GV, Shoker K, Steele JG. Use of rubber dam and irrigant selection in UK general dental practice. *International Endodontic Journal*, 2000; **33**: 435–441.
- 10 Filipović J, Jukić S, Miletić I, Pavelić B, Malčić A, Anić I. Patient's attitude to rubber dam use. *Acta Stomatologica Croatica*, 2004; **38**: 319–322.
- 11 Stewardson DA, McHugh ES. Patients' attitudes to rubber dam. *International Endodontic Journal*, 2002; **35**: 812–819.
- 12 Czech Statistical Office [internet]. Population by age as of 31 December 2010 [updated 2011 Apr 29, cited 2011 Nov 21]. Available at: [http://www.czso.cz/csu/2011edicniplan.nsf/eng/76002C85E7/\\$File/400311007.pdf](http://www.czso.cz/csu/2011edicniplan.nsf/eng/76002C85E7/$File/400311007.pdf).
- 13 Baltadjian H, Mahseredjian S. Time taken to position a rubber dam by fourth year dental students at the University of Montreal. *Journal of the Canadian Dental Association*, 1992; **58**: 228–229.