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Capacity building for parents of children with special needs in dental emergency management at Rumah Anak Prestasi, Surabaya

Tania Saskianti, Mega Moeharyono Puteri, Udijanto Tedjosasongko, Laila Fatmawati, Ingrid Widanty, Dena Savira Andriani

Department of Pediatric Dentistry, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia
Jl. Mayjen Prof. Dr. Moestopo No. 47, Surabaya, East Java 60132, Indonesia

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ABSTRACT

Children with special needs poses higher risk of dental trauma, and parents are usually prompted as the first responders. At Rumah Anak Prestasi, Surabaya, a community-based center for children with special needs, the preparedness of parents to manage dental emergencies was still limited. This community service program aimed to strengthen parents' knowledge and practical capacity in managing dental emergencies among children with special needs at Rumah Anak Prestasi, Surabaya. The program was planned with the partner and was participated by 50 parents. The activities included a lecture with audiovisual learning, communication training based on the Picture Exchange Communication System (PECS) as a supporting strategy, and hands-on simulation with an emergency dental kit. Program outcomes were evaluated using pre-test and post-test knowledge assessments. After the program, the mean knowledge score was increased from 6.9 to 9.7 out of 10, and the first aid steps for dental trauma, including the handling and storage of an avulsed tooth, were practiced by the parents. These results show a short-term gain in parental capacity. Regular refresher sessions and follow-up with the partner are recommended to keep this capacity over time.

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1. INTRODUCTION

Rumah Anak Prestasi is a community-based educational center for children in Surabaya, East Java, Indonesia. The center provides education and health programs for children with special needs, including children with autism spectrum disorder, Down syndrome, cerebral palsy, and intellectual disabilities. Children are usually accompanied by their parents, with mothers comprising the majority of caregivers who provide support at home. Families of children with special needs often face limited access to education and health services (Bastani et al., 2021). In Surabaya, an increasing need for dental care has also been reported among children with Down syndrome (Dewi et al., 2021). Although several health programs have been implemented at Rumah Anak Prestasi, dental emergencies remain an important concern because they are unpredictable and can occur at any time. Therefore, parents need to understand appropriate dental emergency management so that they can provide appropriate first aid when needed.

✉ Corresponding Author: **Tania Saskianti**: Tel. +62 31 5030255 | E-mail: tania-s@fkg.unair.ac.id

The American Academy of Pediatric Dentistry defines special health care needs as any impairment or limiting condition that requires medical management, health care intervention, or the use of specialized services or programs (American Academy of Pediatric Dentistry, 2025). In Indonesia, the number of persons with disabilities was reported to reach 22.97 million, representing approximately 8.5 percent of the population (Kementerian Koordinator Bidang Pembangunan Manusia dan Kebudayaan, 2023). Moreover, individuals with special health care needs have been found to face a higher risk of traumatic dental injuries, particularly those with cerebral palsy, attention-deficit/hyperactivity disorder, and Down syndrome, with a pooled prevalence of approximately 23 percent reported in this population (Devi K. et al., 2024; Silveira et al., 2020). Poor oral health and a high burden of dental caries are also common in these children (Aggarwal et al., 2025; Zemene et al., 2024), and emergency department visits for nontraumatic dental conditions have been reported among children with special health care needs (Imani et al., 2024).

Dental trauma often occurs at home, where professional care may not be immediately available; making parents the first responders. According to the 2020 guidelines of the International Association of Dental Traumatology (IADT), prompt and appropriate first aid, such as immediate replantation of an avulsed permanent tooth or its storage in a suitable medium, is critical for achieving a favorable prognosis (Bourguignon et al., 2020; Fouad et al., 2020; Levin et al., 2020). Inappropriate first aid measures, such as storing an avulsed tooth in a dry environment or failing to preserve a fractured tooth fragment, can reduce tooth survival and increase the risk of pulp necrosis and infection (Dean, 2022; Laforgia et al., 2025; Nowak et al., 2026). However, parental knowledge of the emergency management of dental trauma remains limited in many countries. Only about half of parents know the appropriate immediate action following tooth avulsion, and only about one in five know an appropriate storage medium (Tewari et al., 2023).

As observed at Rumah Anak Prestasi, parents' preparedness to manage dental emergencies remained limited. This need was identified jointly with the partner through preliminary interviews with parents, discussions with the management of Rumah Anak Prestasi, and observations of emergency preparedness at the center. The assessment found that most parents had never received education on dental trauma, were unfamiliar with the proper storage of an avulsed tooth, and that no emergency dental kit was available at the center. Three needs were subsequently agreed upon with the partner: (1) Basic knowledge of dental trauma and first aid; (2) Simple strategies for communicating with children during an emergency; and (3) Practical skills in using an emergency dental kit.

Based on these needs, a capacity-building program was planned together with the partner and Ikatan Dokter Gigi Anak Indonesia (Indonesian Association of Pediatric Dentists), East Java Branch. A simple and audiovisual-based approach was chosen to accommodate across parents' diverse education levels, and the oral health knowledge of caregivers has been linked to their education level and to their relationship with the child (Ali et al., 2025). Printed and visual media also have been deployed to educate parents, teachers, and caregivers of children with autism spectrum disorder (Wahluyo et al., 2023). The Picture Exchange Communication System (PECS) was also included as a supporting communication strategy. PECS has been shown to improve expressive communication in non-verbal children with autism (Fahliza et al., 2025), and it has been used to support oral health assessment and toothbrushing in autistic children (Renuka et al., 2022; Syahrir et al., 2024). The oral health knowledge of deaf adolescents has also been improved with PECS media (Mansoor et al., 2022).

This community service program aimed to strengthen parents' knowledge and practical capacity in managing dental emergencies among children with special needs at Rumah Anak Prestasi, Surabaya.

2. METHODS

This activity was designed as a community capacity-building program and was carried out in five stages: (1) Needs assessment with the partner; (2) Preparation; (3) Implementation of capacity-building activities; (4) Outcome evaluation; and (5) Handover and follow-up planning. The activity was held at Rumah Anak Prestasi in Semolowaru, Surabaya, on May 20, 2025, and lasted approximately five hours and 30 minutes, from 7:00 a.m. to 1:00 p.m.

Partner and Participants

The partner of this program was Rumah Anak Prestasi, Surabaya at Semolowaru represented by Social Services of Surabaya City Government. The partner contributed to the planning of the schedule and materials, the coordination of the parents as participants, and the provision of the venue and supporting facilities. The program was conducted by lecturers and students of the Faculty of Dental Medicine, Universitas Airlangga in collaboration with Ikatan Dokter Gigi Anak Indonesia (Indonesian Association of Pediatric Dentists), East Java Branch. Fifty parents of children with special needs at Rumah Anak Prestasi participated voluntarily, and all of them completed both the pre-test and the post-test.

Preparation

Participant preparation began with initial socialization to inform the parents of children with special needs at Rumah Anak Prestasi about the program. Participant willingness was then documented through enrollment and informed consent, followed by attendance confirmation and collection of demographic data two weeks before the event. The implementation team subsequently prepared all necessary materials, tools, and training equipment. On the day of the program, participants completed the registration process, during which their attendance and identity were verified at the venue entrance before the program began.





Figure 1. Lecture session presented by Speaker
Figure 2. Educational session using the Picture Exchange Communication System

Implementation of Capacity-Building Activities

The capacity-building activities began with a pre-test questionnaire to assess the participants' baseline knowledge of dental trauma, covering the definition of dental trauma, anatomical structures involved, causes, preventive measures, appropriate first aid, management of conscious children following trauma, and the proper management and storage of an avulsed tooth. This was followed by a lecture and audiovisual education on the causes, prevention, and management of dental emergencies that may occur in children with special needs (Figure 1). Training based on the Picture Exchange Communication

System (PECS) was also provided as a supporting communication strategy (Figure 2). Simple pictures were used to guide parents through the appropriate procedures during a dental emergency involving children. As supplementary training material, PECS-related skills were not evaluated as an outcome of the program.

A simulation workshop using an emergency dental kit was conducted to train participants in managing dental emergency situations (Figure 3). Parents practiced first-aid procedures, including the handling of an avulsed tooth and its proper storage in a suitable medium. A post-test questionnaire, identical to the pre-test, was subsequently administered to assess changes in participants' knowledge (Figure 4).



Figure 3. Practical session demonstrating dental emergency management with an emergency dental kit
Figure 4. Participants filling out the post-test questionnaire at the end of the program

Evaluation

Program outcomes were evaluated using pre-test and post-test knowledge assessments. The 10-item questionnaire, with a maximum score of 10, was administered before and after the activities. Changes in scores were used as a supporting indicator of program outcomes. The normality test indicated that the data were not normally distributed (Shapiro–Wilk test, $p < 0.05$). Therefore, pre-test and post-test scores were compared using the Wilcoxon signed-rank test, and the effect size was calculated using Cohen's d for paired samples. Practical skills provided by facilitators during the simulation were not included in the assessment.

3. RESULTS AND DISCUSSION

Results

Initial conditions

Fifty parents of children with special needs participated in the program (Table 1). The participants were predominantly female (98 percent), and most were aged 35–54 years (80 percent). Most participants had a senior high school education (62 percent), and the majority were housewives. These characteristics indicate that the participants are primarily responsible for caregiving at home and may therefore be the first to respond when dental trauma occurs.

The children, however, represented a diverse range of special needs. The most common condition was being a slow learner (17 children; 34 percent), followed by speech delay (6 children; 12 percent), autism spectrum disorder (4 children; 8 percent), global developmental delay (4 children; 8 percent), and hearing impairment (4 children; 8 percent). Other conditions included attention-deficit/hyperactivity

disorder (ADHD) (3 children; 6 percent), Down syndrome (3 children; 6 percent), visual impairment (1 child; 2 percent), Pierre Robin syndrome (1 child; 2 percent), rubella syndrome (1 child; 2 percent), intellectual disability (1 child; 2 percent), and a combination of congenital talipes equinovarus (CTEV) and arthrogryposis multiplex congenita (AMC) (1 child; 2 percent). This diversity reflects the range of children receiving services at Rumah Anak Prestasi and supports the need for a flexible and practical approach to dental emergency communication and management.

Five of the 50 children (10 percent) had a previous experience of dental trauma. None of the participating parent had previously received specific training in dental first aid. However, all 50 parents (100 percent) had previously received general dental health education through consultation sessions available at Rumah Anak Prestasi.

Detailed information regarding specific caregiving challenges was not systematically collected during the baseline assessment. This information should be incorporated into future needs assessments allow the program to be further tailored to the individual needs of families and children with different special healthcare needs.

Table 1. Characteristics of the participants (parents of children with special needs)

Variable	Category	n (%)
Gender	Male	1 (2%)
	Female	49 (98%)
Age (years old)	<25	1 (2%)
	25–34	0 (0%)
	35–44	17 (34%)
	45–54	23 (46%)
	>54	9 (18%)
Education	Junior high school	3 (6%)
	Senior high school	31 (62%)
	Diploma	4 (8%)
	Bachelor's degree	11 (22%)
	Other	1 (2%)
Occupation	Employee	2 (4%)
	Entrepreneur	6 (12%)
	Other (Mostly Housewife)	42 (84%)

Before the program, the mean knowledge score was 6.9 ± 1.47 out of 10, with scores ranging from 4 to 9. This finding indicated that the parents had some basic knowledge of dental trauma but still had gaps in specific emergency management procedures.

Implementation of capacity-building activities

The activities were carried out in the following sequence (Figures 1–4). First, an audiovisual lecture was delivered on the causes, prevention, and initial management of dental trauma (Figure 1). This was followed by PECS-based communication training as a supporting strategy (Figure 2). The parents then practiced first-aid procedures using an emergency dental kit, including the appropriate handling and

storage of an avulsed tooth (Figure 3). The parents were directly involved in the practical component rather than receiving lecture-based education alone. They followed demonstrations and practiced the first-aid procedures using the emergency dental kit. All 50 participants remained until the end of the program and completed both the pre-test and post-test questionnaires (Figure 4).

The partner supported the implementation by coordinating the participating parents and facilitating the activities at Rumah Anak Prestasi. This involvement enabled the educational content and practical training to be delivered within the partner's existing community setting.

Changes in knowledge and practical skills

After the program, the mean knowledge score was increased from 6.9 ± 1.47 to 9.7 ± 0.58, with a mean difference of 2.8 points (Figure 5). The minimum score was increased from 4 to 8, and the maximum score was increased from 9 to 10; a perfect score was obtained by many parents. The smaller standard deviation after the program shows that the knowledge gap between the parents was reduced.

Figure 5 presents the minimum, mean, and maximum scores for the group and does not show changes at the individual participant level. The change in knowledge was statistically significant (Wilcoxon signed-rank test, $p < 0.001$), with a Cohen's d of 1.9. The statistical analysis was used as a supporting evaluation of the capacity-building process rather than as the primary measure of program effectiveness.

During the simulation, parents practiced basic dental first-aid procedures, including the handling and storage of an avulsed tooth. However, practical skills, confidence, and use of PECS were not assessed using a formal scoring instrument. Therefore, participation in the practical activities should be interpreted as evidence of exposure to and practice of the procedures rather than as evidence of measured improvement in practical competence.

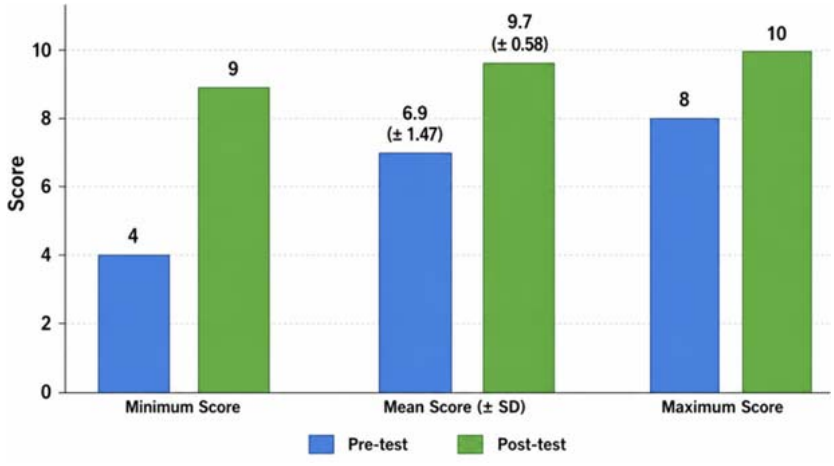


Figure 5. Minimum, mean (± SD), and maximum knowledge scores of the parents before and after the program (N = 50)

Outputs and partner capacity

The program resulted in outputs that remained within the partners after the activity. An emergency dental kit was provided for use in dental emergency situations at Rumah Anak Prestasi. The educational materials used during the program and PECS picture materials were also made available to support continued communication and dental emergency education.

These outputs complemented the knowledge gained by the parents by providing practical resources that could be accessed when a dental emergency occurs. The availability of the emergency kit and educational materials at the partner institution also provides a basis for continued use of the training materials beyond the implementation day.

Sustainability and follow-up

The program provides a basis for continued dental emergency education at Rumah Anak Prestasi through the educational materials, PECS materials, and emergency resources introduced during the activity.

Future continuation should include periodic refresher education for parents, training of partner staff or selected parent representatives as local facilitators, and regular checking and resupplying the emergency dental kit. Follow-up evaluation should also be conducted approximately three to six months after the program to assess knowledge retention and the continued use of the emergency resources. Practical first-aid skills and PECS use should be assessed using a simple observation checklist in future activities.

Discussion

The program was relevant to the needs of the partner. The parents at Rumah Anak Prestasi are the main caregivers, and they are the first persons who respond when dental trauma occurs at home. Simultaneously, a higher risk of dental trauma has been reported in individuals with special needs (Devi K. et al., 2024; Silveira et al., 2020), and limited knowledge of dental trauma management has been reported among parents in many countries (Tewari et al., 2023). For this reason, the content of the program was focused on the first aid steps recommended by the IADT, especially the handling and storage of an avulsed tooth (Bourguignon et al., 2020; Fouad et al., 2020).

The parents were actively involved throughout the program. Rather than only listening to a lecture, they also practiced the first-aid procedures using an emergency dental kit. All 50 parents remained until the end of the program and completed both questionnaires, indicating complete participation and follow-up during the activity period. The partner's involvement in coordinating the parents and facilitating the activities also supported implementation within the existing community setting.

The main observed capacity change was a short-term increase in knowledge. After the program, the lowest score (8) was close to the highest pre-test score (9), and the variation in scores among parents decreased. The statistical test supports this change, but a more important outcome was that the parents were exposed to and practiced the basic first-aid procedures. Prompt and appropriate first aid can improve the prognosis of avulsed or fractured teeth (Laforgia et al., 2025; Levin et al., 2020). Therefore, the knowledge and procedures introduced through the program may be applied by parents at home and at the center when dental trauma occurs.

PECS was used as a supporting communication strategy and was not evaluated as a separate outcome. PECS has been used to improve expressive communication in non-verbal children with autism (Fahliza et al., 2025) and to support oral health care in autistic children (Renuka et al., 2022; Syahrir et al., 2024). In this program, PECS was introduced so that simple pictures could be used by the parents to communicate with and guide the child during a dental emergency. The correct use of PECS by the parents in real emergencies should be assessed in future programs.

The outputs that remain with the partner are important for the continuation of the program. The oral health knowledge of caregivers is related to their education level and to their relationship with the

child (Ali et al., 2025); therefore, fathers, other family members, and teachers should also be involved in future sessions. The program can be continued by the partner if trained parent representatives or staff act as local facilitators and if the emergency dental kit is checked regularly.

Several limitations are also observed. First, detailed information about specific caregiving challenges was not systematically collected. Second, there was no control group, so the observed change in knowledge cannot be attributed exclusively to the program. Third, the post-test was administered immediately after the activity, and long-term knowledge retention was not assessed. Fourth, practical first-aid skills, confidence, and PECS use were not evaluated using formal instruments. Finally, the sustainability of the program has not yet been evaluated. Future activities should therefore include periodic refresher training, follow-up assessment three to six months after the intervention, practical skill assessment, and regular maintenance of the emergency dental kit.

4. CONCLUSION AND RECOMMENDATIONS

This community service program improved the knowledge and capacity of the parents at Rumah Anak Prestasi, Surabaya, to manage dental emergencies for children with special needs. The program was planned with the partner and combined a lecture with audiovisual-based learning, PECS-based communication as a supporting strategy, and hands-on simulation with an emergency dental kit. After the program, the mean knowledge score was increased from 6.9 to 9.7 out of 10, and the basic first aid steps for dental trauma, including the handling and storage of an avulsed tooth, were practiced by the parents. These results show an immediate, short-term improvement in parental knowledge. The long-term retention of this knowledge, the use of PECS in real emergencies, and the sustainability of the program have not yet been evaluated.

Based on the limitations of this program, five recommendations are given. First, refresher sessions should be held regularly by the partner, with trained parent representatives or staff as local facilitators. Second, practical first aid skills and PECS use should be assessed with a simple observation checklist in the next program. Third, knowledge retention and the use of first aid in real cases should be followed up three to six months after the program. Fourth, the emergency dental kit and a written response procedure should be kept at the center and checked regularly. Fifth, fathers, other family members, and teachers should also be included, and a comparison group should be established while reevaluating the program.

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