

Increasing the Ability of Children with Autism in Performing Oral Hygiene through Photographs: A Single Subject Study in Indonesia

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Abstract

Autism is a developmental disorder in children that now affects 1 : 88 children in the world. As many as 50% of school-age children with autism face difficulty in independently performing oral hygiene. This research seeks to increase the ability of children with autism in performing oral hygiene through the use of photographs. The methodology of the research is quantitative quasi-experimental through the single subject design. The three research subjects are school-age children with autism, and their parents also participated in this research. Intervention is conducted through a series of photographs on the steps in performing oral hygiene after the ability trend in the baseline phase is observed. Assessment of the ability to perform oral hygiene is done in the baseline, intervention, maintenance, and generalization phases. The result is that the ability to perform oral hygiene for Children A, B, and C increases from 14, 21, and 22 to 30, 31, and 30. The ability to perform oral hygiene for the three children increases after intervention and settles in the generalization phase.

Abstrak

Peningkatan Kemampuan Anak Autis Menggosok Gigi melalui Foto: Studi Subjek Tunggal di Indonesia. Autisme merupakan gangguan perkembangan pada anak dengan prevalensi kejadian 1 : 88 anak di dunia. Sebanyak 50% anak autis usia sekolah mengalami kesulitan dalam menggosok gigi secara mandiri. Penelitian ini bertujuan untuk meningkatkan kemampuan menggosok gigi anak autis usia sekolah menggunakan foto. Metodologi penelitian kuantitatif kuasi eksperimen dengan menggunakan desain subjek tunggal (*single subject design*). Sebanyak tiga orang subjek penelitian yang merupakan anak autis usia sekolah beserta orangtua mereka berpartisipasi dalam penelitian ini. Intervensi diberikan menggunakan rangkaian foto mengenai tahapan dalam menggosok gigi setelah terlihat *trend* kemampuan pada fase *baseline*. Pengukuran kemampuan menggosok gigi dilakukan pada fase *baseline*, intervensi, *maintenance*, dan generalisasi. Hasilnya, kemampuan menggosok gigi Anak A, B, dan C meningkat dari 14, 21, dan 22 menjadi 30, 31, dan 30. Kemampuan menggosok gigi pada ketiga anak meningkat setelah dilakukan intervensi dan menetap pada fase generalisasi.

Keywords: autism, performing oral hygiene, photographs, school-age children, stimulation

Introduction

Autism is a developmental disorder in children with a relatively high prevalence throughout the world. The number of autism occurrences in the United States is 1 : 88 and in South Korea at 2.6%.¹ It is speculated that the number of autism occurrences in Indonesia is not that different, because autism is not influenced by nationality and an economic level.² School-age Children belong to an age group with a considerably large population. The populations of school-age children in Kenya and Indonesia are consecutively 62% are 51% from the total population of children in the country.^{3,4} In the mean time, the

population of school-age children in Sudan is 66% from the total population of children in the country.⁵

There are three main signs and characteristics in children with autism. The three signs and characteristics are a disturbance in communication and language, disturbance in social interaction, and “repetitive behavior” as well as interest only towards certain things.⁶ School-children with autism in general face difficulty to perform daily activities independently.⁷

There are some known factors that influence children with autism in performing their daily activities. These

factors include low motivation to learn new things, their level of intelligence quotient (IQ), and disturbance in spatial representations.^{6,8,9} These make autistic children into a group of individuals with dependent care based on a theory that is the activity that is done by an individual who is social dependent.¹⁰

As many as 50% of school-age children with autism face challenges in performing oral hygiene. The data are gathered from a brief survey conducted on ten parents of children with autism in Jakarta.

Some policies related to children with autism has been issued by the Indonesian government. These policies include screening, stimulation, detection, and early intervention in growth, as well as a policy for autistic children to study at inclusive schools.¹¹ The growth stimulation that literature for children with autism includes speech therapy, occupation therapy, playing therapy, pharmacology therapy, food therapy, sensory integration therapy, auditory integration therapy, biomedical treatment therapy, hydro therapy, and music therapy.¹²

The growth stimulation that is often used to enhance the independence of the autistic child in daily activities is through occupation therapy. However, the therapy is usually performed in a growth clinic where the parents cannot play an active role because the interaction revolves around the child and the therapist. In addition, the parents must prepare a special budget for therapy as well as the transportation to the clinic. For this reason, special stimulation is required to assist parents in providing therapy for their children.

Methods

The research is a quantitative model that uses the single subject design. The single subject design is a design that is suitable for measuring changes in the behavior of individuals.¹³ There are four phases in this research design, which are baseline, intervention, maintenance, and generalization phases. The minimum sample in this design is three individual persons.

This research uses a series of photographs of the steps in performing oral hygiene as visual stimulant equipment to train children to be able to independently perform oral hygiene. Visual stimulation is known to be a safe stimulation for children with autism considering that they are highly sensitive to environmental stimulants related to light, audio, as well as motion.¹⁴

Three children with autism were given intervention using a series of photographs that displayed the steps in performing oral hygiene. The criteria for inclusion of this research's subjects include school-age children with cognitive disturbance, Asperger's syndrome, PDD-NOS,

non-cooperative parents, and siblings with the same disturbance.

The researcher has conducted an ethical review before starting the research. Ethical review was done at the Faculty of Nursing, Universitas Indonesia (FIK UI) by taking into consideration ethical principles which are beneficence, respect for human dignity, justice, and anonymity/privacy.¹⁵

The instrument that is used is a checklist page about the steps in performing oral hygiene assessed by parents and researchers. The researcher develops the instrument through a review of various literatures related to performing oral hygiene. There are eleven assessment points that were given a score based on the child's ability to perform each of the point. The minimal score is 11 and the maximum score is 33. Assessment is done in all four research phases. In the baseline phase, assessment was done as many as three times and ended after data stability was achieved. Data are said to be stable when 80-90 % of the data are $\pm 15\%$ from the mean value. Assessment during the intervention phase was done four times while assessment during maintenance and generalization phases was conducted one time each. The researcher conducted the first time assessment from each phase and then continued by the parents after similar assessments were given by the researchers.

Testing related to validity and instrument reliability is done by using the interrater reliability test. The researcher taught the mothers of the research subjects about the way to teach children to perform oral hygiene through a series of photographs. The researcher then asked the mother to perform the stimulation to the child. Together with the mother, the researcher assessed the child's performance using a checklist as the instrument. The assessment result of the researcher and the mother was then analyzed to discover the value p. If the value of p is larger than the value of alpha, the result is significant; but if the value of p is smaller than the value of alpha, the result is insignificant.¹⁶

Results and Discussion

The three children who participated in the research were boys aged 8, 10, and 14 years old. Assessment results of the children's ability to perform oral hygiene from the baseline phase to the generalization phase are summarized in Figure 1 and Table 1. The three children achieved stability in the baseline phase after assessment was conducted five times. The three children also showed an increasing trend/slope, so it can be concluded that the three children's ability to perform oral hygiene increased.

In Child A, the ability to perform oral hygiene in the baseline phase experienced an increase of ten points from the first assessment to the fifth, while the ability of

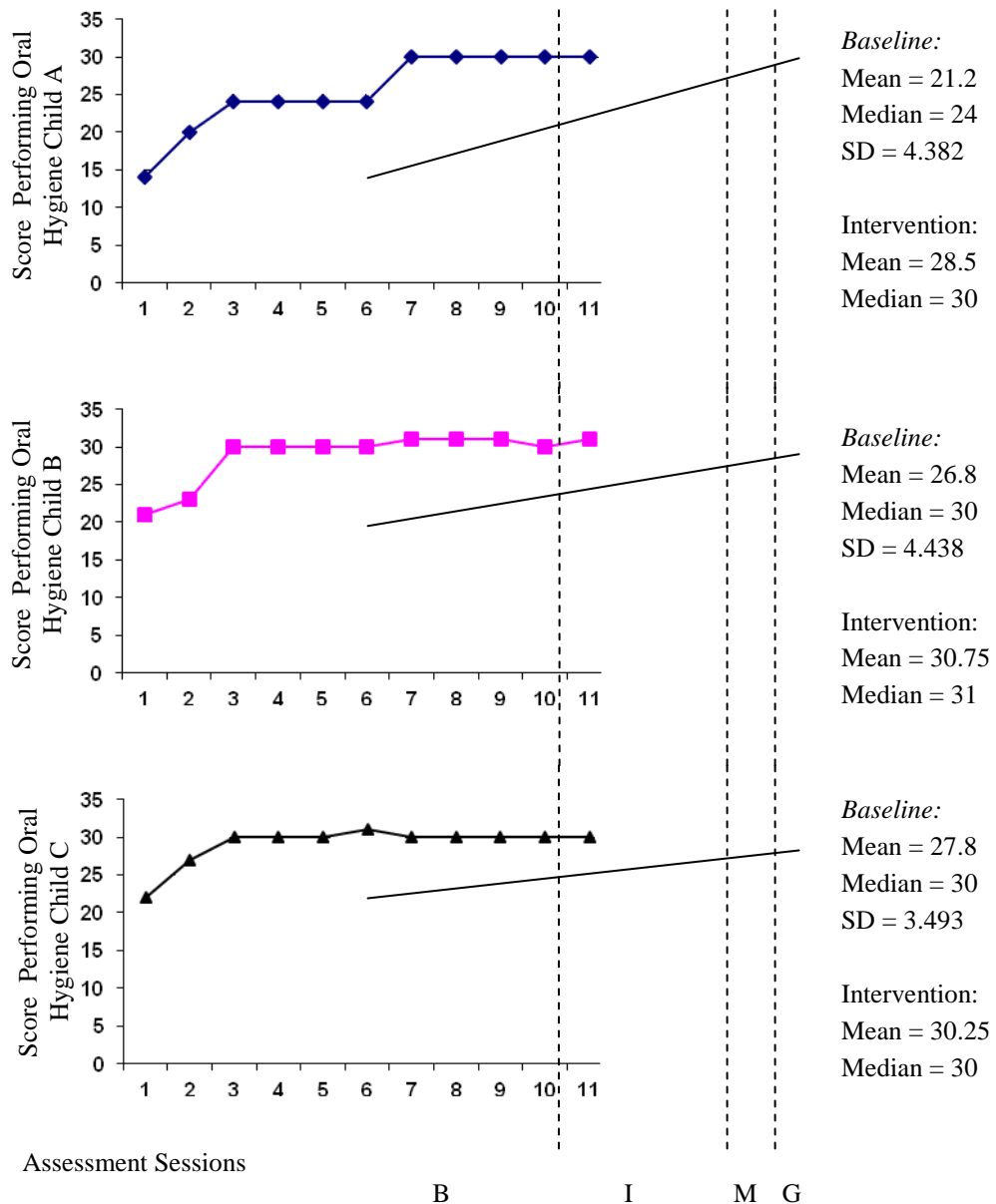


Figure 1. The Relation Between Photograph Usage Stimulation and Ability to Perform Oral Hygiene Children A, B, and C in the Baseline, Intervention, Maintenance, and Generalization Phases for School-age Children with Autism in Jakarta and Depok in May 2014 (n = 3)

the intervention phase increased six points from the first assessment to the fourth. There was no change in the score from the assessment of the fifth baseline phase to the first assessment of the intervention phase, as well as the assessment of the fourth intervention phase into the maintenance phase, and from the maintenance phase to generalization. Independence at the preparation step in performing oral hygiene increased by 25% from the baseline phase to the intervention phase and increased by 2.9% from the intervention phase to the maintenance phase while the maintenance phase to the generalization phase there was no change. Independence at the performing step of oral hygiene increased by 48.4% from the baseline

phase to the intervention phase and increased by 5.3% from the intervention phase to the maintenance phase while from the maintenance phase to the generalization phases there was no change. Independence in the cleaning phase increased by 19.6% from the baseline phase to the intervention phase, increased by 9.1% from the intervention phase to the maintenance phase, and did not experience any change from the maintenance phase to the generalization phase.

For Child B, the ability to perform oral hygiene in the baseline phase experienced an increase by nine points from the first assessment to the fifth assessment, while

Table 1. Analysis of the Ability to Perform Oral Hygiene for School-age Children with Autism in Jakarta and Depok in May 2014 (n = 3)

Component	Child A	Child B	Child C
Stability	Stable after 5 assessments resulting in 14, 20, 24, 24, and 24 consecutively from the first to the fifth assessment.	Stable after 5 assessments resulting in 21, 23, 30, 30, and 30 consecutively from the first to the fifth assessment	Stable after 5 assessments resulting in 22, 27, 30, 30, and 30 from the first to the fifth assessment.
Change in level for every phase	Bincreased by 10 points, I increased by 6 points	B increased by 9 points, I increased by 1 point	Bincreased by 8 points, I decreased by 1 point
Change in level between phases	B – I fixed (from 24 to 24), I – M fixed (from 30 to 30), M – G fixed (from 30 to 30).	B – I fixed (from 30 to 30), I – M decreased by 1 point (from 31 to 30), M – G increased by 1 point (from 30 to 31).	B – I increased by 1 point (from 30 to 31), I – M fixed (from 30 to 30), M – G fixed (from 30 to 30).
Trend / slope	Increased (from 14 to 30)	Increased (from 21 to 31)	Increased (from 22 to 30)
Sub-scale Analysis	Independence during the preparation step: B – I increased by 25 % I – M increased by 2.9 % M – G fixed Independence during the performing step: B – I increased by 48.4 % I – M increased by 5.3 % M – G fixed Independence during the cleaning step: B – I increased by 19.6 % I – M increased by 9.1 % M – G fixed	Independence during the preparation step: B – I increased by 25 % I – M decreased by 8.6 % M – G increased by 12.5 % Independence during the performing step: B – I increased by 4.7 % I – M increased by 4.9 % M – G fixed Independence during the cleaning step: B – I increased by 25 % I – M increased by 4.3 % M – G fixed	Independence during the preparation step: B – I increased by 12.5 % I – M fixed M – G fixed Independence during the performing step: B – I increased by 10.5 % I – M decreased by 1.6 % M – G fixed Independence during the cleaning step: B – I – M – G fixed
Conclusion	Performance increased	Performance increased	Performance increased

the ability in the intervention phase increased by one point from the first assessment to the fourth assessment. There was no change in score from the fifth assessment in the baseline phase to the first assessment in the intervention phase, but there was a decrease by one point from the fourth assessment in the intervention phase to the maintenance phase, and there was an increase by one point from the maintenance phase to the generalization phase. Independence in the preparation level to perform oral hygiene increased by 25% from the baseline phase to the intervention phase, but it fell 8.6% from the intervention phase to the maintenance phase, and increased from the maintenance phase to the generalization phase by 12.5%. Independence during the stage of conduct in performing oral hygiene decreased by 4.7% from the baseline phase to the intervention phase and increased by 4.9% from the intervention phase to the maintenance phase, while the maintenance phase to the generalization phase did not experience any change. Independence during the cleaning step increased by 25% from the baseline phase to the intervention phase, increased by 4.3% from the intervention phase to the maintenance phase, and did not experience any change from the maintenance phase to the generalization phase.

For Child C, the ability to perform oral hygiene in the baseline phase experienced an increase by eight points from the first assessment to the fifth assessment, while the ability in the intervention phase fell by one point from the first assessment to the fourth assessment. There was an increase by one point from the fifth assessment in the baseline phase to the first assessment in the intervention phase, while there was no change in the fourth assessment in the intervention phase to the maintenance phase, as well as from the maintenance phase to the generalization phase. Independence in the preparation phase in performing oral hygiene increases by 12.5% from the baseline phase to the intervention phase, but the independence from the intervention phase to the maintenance phase and from the maintenance phase to the generalization phase did not experience any change. Independence in the stage of performing oral hygiene increased by 10.5% from the baseline phase to the intervention phase, and it fell 1.6% from the intervention phase to the maintenance phase, while from the maintenance phase to the generalization phase there was no change. Independence in the stage of cleaning did not experience any change in the fourth phase.

For Child A, in the baseline phase, data stability was achieved in the fifth assessment with an increasing tendency. The scores achieved from the first assessment to the fifth consecutively are 14, 20, 24, 24, 24. The average score of the independence of Child A in this phase is 21.2. During the first assessment of this phase, all the activities related to performing oral hygiene were done by the child with the full help from the parents, except for gargling that used a glass helped to an extent and the returning of the toothbrush and toothpaste to their place was done independently. In the fifth assessment, most of the activities related to performing oral hygiene could be done by the child and helped to an extent by the parents except cleaning the tongue which was still helped by the parents, while opening the cap of the toothpaste, squeezing the toothpaste on the toothbrush, and returning the toothbrush and toothpaste to their place were done independently. This occurred probably because Child A was not familiar yet with the presence of a researcher, and also because the assessment was done at times that were not common for the child to perform oral hygiene. The first assessment was done by the researcher together with the parents but not at the times when the child is used to performing oral hygiene. The child is used to performing oral hygiene while taking a bath in the morning and late afternoon while the researcher came when the child had already finished bathing. This is in line with the statement from Willis (2009) stating that if there is even the smallest change to the routine of a child, this will affect the child's mood. The average score of Child A during the baseline phase was much smaller than the average score of the baseline phase for Children B and C. This happened probably because of the fact that Child A is the youngest compared to Children B and C so that Child A required the most adaptation in performing oral hygiene.

The intervention phase was done in four assessments, which were on 17-20 May 2014 at 16.00. During the first assessment in this phase, the ability of Child A to perform oral hygiene did not undergo any change with the result of the fifth assessment in the baseline phase. Change began to happen in the result of the second assessment where there were 30 points from the previous 24 points. During these scores, most of the activities in performing oral hygiene for the child could be done independently except for brushing the upper part and the front path of the teeth, and for cleaning the tongue it was still partly helped by the parent. The score was still the same for the results in the third and fourth assessment in the intervention phase. This is possible because Child A had to adjust first to the intervention instrument before understanding it well, as in line with Willis's statement that a child needs adjustment before being able to accept change in their daily routine.¹⁴ The average ability of Child A in performing oral hygiene in the intervention phase is 28.5. This shows an increasing

tendency in the ability of Child A's oral hygiene performance from the baseline phase to the intervention phase. The researcher gave some compliment every time the child could perform the oral hygiene well.

The maintenance and generalization phases for Child A were done each in one time assessment. The maintenance phase was done in the house of the research subject using the same equipment and the same bathroom but without a series of photographs as a supporting tool. In the mean time, the generalization phase was done in the same place but by using a different glass and a different toothbrush. The scores achieved from each assessment is 30. This score did not change from the previous score in the intervention phase. In the mean time, the oral hygiene performance of Child A in both phases increased compared to one in the intervention phase, because the average score of Child A's performance in the intervention phase is 28.5. This shows that effective intervention was given to improve Child A's oral hygiene performance. This also proves Orem's theory that states nursing agency is required to increase the independence of the individual to do self care.¹⁰

In Child B, in the baseline phase, data stability was achieved during the fifth assessment with a tendency to increase. Consecutively, the results from the first assessment to the fifth is 21, 23, 30, 30, 30. During the assessment in the first phase, all the activities related to performing oral hygiene were partly assisted by the parents, except for preparing the toothbrush, cleaning the tongue, and returning the brush and toothpaste to their place; while gargling using a glass and brushing the upper row of the teeth could be done independently. For the fifth assessment, most of the activities related to performing oral hygiene, as well as returning the toothbrush and the toothpaste to their place initially were partly helped by the parents. This occurred probably because Child A was not familiar yet with the presence of a researcher, and also because the assessment was done at times that were not common for the child to perform oral hygiene. The first assessment was done by the researcher together with the parent but not at the times when the child is used to performing oral hygiene. The child is used to performing oral hygiene while taking a bath in the morning and late afternoon, while the researcher came in the afternoon. The researcher let the child play first with siblings before the child was asked to perform oral hygiene. This is in line with Willis' statement regarding change in the daily routine of children autism which can affect the mood changes of the child. The average score of the independence of Child B in this phase is 26.8.¹⁴ This score is smaller than the average score in the baseline phase for Child C but bigger than the average score of the baseline phase in Child A. This occurred probably because Child B is younger than Child C but older than

Child A. In addition, along with their age, the possibility of stimulation given to Child B was larger than the one given to Child A but smaller than to Child C.

The intervention phase was done in four assessments, which were on 27-28 May 2014 at 06.30 and 16.00. During the assessment in the first phase, the ability of Child B in performing oral hygiene did not have any changes with the result of the fifth assessment in the baseline phase. Change could be seen in the result of the second assessment which is 31 points from the previous 30 points. From this score, most the activities related to performing oral hygiene, except cleaning the tongue were still assisted by the parents. The researcher gave compliment to the child for the child's improvement in performing oral hygiene. The score remained the same for the result of the third and fourth assessments in the intervention phase. This occurred probably due to the fact that Child B had to get used to the intervention instrument before being able to use it. The average score of the ability of Child B in performing oral hygiene is 30.75. This shows the improvement in the performance of Child B's for oral hygiene from the baseline phase to the intervention phase.

The maintenance and generalization phases in Child B was done separately during one time assessment. The maintenance phase done in the research subject's house used the same equipment and the same bathroom but with a series of photographs as a supporting device. The generalization phase was done in the same place but using a scoop to get the water out from the water tub. The score achieved for each assessment is 30 for the maintenance phase and 31 for the generalization phase. The score did not have any change from the intervention phase to the maintenance phase, but it went through a one point increase in the generalization phase. In the mean time, there was a tendency of improvement for performing oral hygiene in Child B in the maintenance phase while there was a decrease from the intervention phase because the average score of Child B in performing oral hygiene in the intervention phase is 30.75.

In the generalization phase, the performance increased again into 31 points. This shows that in the early phase of maintenance, Child B required adaptation to perform oral hygiene without the help of a series of photographs as supporting device; however, for the generalization phase in Child B appeared to have used to performing oral hygiene without using photographs. If we link this to Orem's theory, the ability of the nurse to train parents to help make their children independent (nursing agency), so then this can truly improve the individual's self care.¹⁰

In Child C, in the baseline phase, the stability of data was achieved in the fifth assessment with a possibility to increase. Consecutively, the scores achieved from the

first assessment to the fifth are 22, 27, 30, 30, 30. In the assessment in the first phase, the activities of putting the toothpaste on the toothbrush, brushing the upper and lower teeth, and cleaning the tongue could still be done by the child with full assistance by the parents; while activities related to preparing of the toothbrush and opening the cap of the toothpaste were done partly by the parents; and for gargling, brushing the upper part of the teeth, rinsing the toothbrush, and returning the toothpaste and toothbrush to their place could be done independently by the child. During the fifth assessment, most of the activities related to performing oral hygiene could be done independently by the child except for cleaning the tongue, brushing the upper and lower part of the teeth which were still partly helped by the parents. This probably happened because Child C was not in a good mood when the researcher came for the first time.

The researcher came to Child C's house at 16.00. At that time, Child C was playing a game on his mother's laptop. When the researcher came, it was in fact a good time because Child C did not have his afternoon bath yet, because he usually takes a bath at 16.30. At 16.30, Child C was reluctant to take a bath because he was still in the backyard looking for insects which is Child C's hobby. Close to 17.00 Child C wanted to take a bath but not with the researcher around. However, with the help of the parents, Child C was willing to brush his teeth but ended up not wanting to in the end. This occurred probably because the child was not used to the presence of a researcher so assessment of the child's performance in oral hygiene should not be done in the first meeting between the researcher and the child. The average score of the independence of Child C in this phase is 27.8. This is the highest score compared to Child A and Child B. This occurred probably because Child C is the oldest compared to Child A and Child B. In addition, along with age, the possibility of stimulation given to Child C was more than to Child A and Child B.

The intervention phase was done in four assessments, on 31 May-1 June 2014 at 06.00 and 17.00. During the assessment of the first phase, the ability of Child C in performing oral hygiene improved one point into 31 from the result of the fifth assessment in the baseline phase which is 30. From this score, most of the activities related to performing oral hygiene could be done independently, except cleaning the tongue and brushing the upper part of the teeth which were still partly assisted by the parents. In the assessment of the second phase, the score of the ability of Child C went back up to 30. The score remained the same during the third assessment and the fourth in the intervention phase. The average score for Child C's ability in

performing oral hygiene in the intervention phase is 30.25. This shows a tendency of improvement in the

ability of Child C to perform oral hygiene from the baseline phase to the intervention phase. The researcher gave compliment over the success of the child and gave a present based on the child's hobbies.

The maintenance and generalization phases for Child C was done each during one time assessment. The maintenance phase was done at the home of the research subject with the same equipment and the same bathroom but without using a series of photographs as a supporting device. The generalization phase was done in the same place but with a different scoop. The score obtained from both phases are each 30. The score experiences a fall from the intervention phase to the maintenance phase by 0.25 points but does not experience a change during the generalization phase. This shows that the initial phase of maintenance, Child C required adaptation to perform oral hygiene without using a series of photographs as a supporting device; however during the generalization phase it appeared that Child C was more accustomed to performing oral hygiene without using supporting photograph series. In this case, nursing agency in Orem's theory has an important role in improving a child's independence.¹⁰

Conclusions

From the results of the research, it can be concluded that the subjects of this research are three children with autism at school-age and are boys. The baseline phase for the three children was achieved after five assessments. Child C achieves the highest ability followed by Child B and Child A. The average ability of performing oral hygiene for Child C is 27.8, while for Child B and Child A each achieves an average score of 26.8 and 21.2. The intervention phase in the three children was done throughout four assessments. Child B has the highest average ability of performing oral hygiene followed by Child C and Child A. The average score in performing oral hygiene for Child B is 30.75 while the average score for the ability of performing oral hygiene for Child C and Child A each is 30.25 and 28.5. The maintenance phase for the three children was done in one assessment. The ability of the three children in performing oral hygiene achieves the same score that is 30 points for each child. The generalization phase for the three children was also done in one assessment. Only Child B experiences an increase in the ability to perform oral hygiene in this phase. Child A and Child C each have the same score as in the maintenance phase.

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