

# Video Self-Modeling for a Student with Dravet Syndrome: an Intervention Involving Parents During Covid-19 Pandemic in Italy

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## Case Report

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# Abstract

Video-modeling instruction (VMI) offers several advantages in term of increased efficiency, control over the presentation of stimuli and logistical factors. These characteristics seems to be important in term of helping families of individuals with developmental disabilities during the restriction due to the Covid-19 global pandemic in Italy. The purpose of this study was to investigate the effects of video self-modeling (VSM) on three different behaviors of a 12-year-old boy with Dravet syndrome. The mother of the boy was instructed to use VMI through the use of role playing and performance feedback in order to directly implement the procedure. A multiple baseline design across behaviors was used. The dependent variable was the number of correct responses for each behavior. Results showed the procedure was effective in increasing the performance of the participant. Considerations were made related to the potential that a tele health intervention could have in term of efficiency, sustainability and parents' involvement during and after the health emergency.

## Introduction

The Covid 19 global pandemic has necessitated a change in how rehabilitation services for people with disabilities are delivered. Telehealth interventions can be a way to help contain the spread of the virus, especially for the services that involve close contact between user and therapist, as in the case of Applied Behavior Analysis (ABA), (Cox et al., 2020). While working on this text, the restrictions are slowly decreasing, but the need remains to redesign more effective ways of helping the most vulnerable members of the population. This need is especially real for all those living with severe conditions, for whom the return to normality seems even more delayed than the rest of the population.

In Italy, a state of emergency was declared on 11 March 2020. Service providers for individuals with special educational needs have changed how they provide services after the start of the lockdown to provide new resources to families. The delivery of interventions based on ABA has undergone changes and integrations. In Italy, ABA has not reached a status of parallel discipline to that of the United States. There are no training programs for undergraduate students and a few training programs for Italian universities (Cihon et al., 2018). Services that provide interventions based on ABA for people with autism and intellectual disability are not recognized as essential health services. For these reasons, the variation in the way interventions is provided, influenced by the spread of Covid-19, has not always been linear and precise within the various services on the Italian territory. Therefore, professionals have started to evaluate the feasibility and opportunity of a transition, at least temporarily, towards telehealth services to provide behavior analysis services. The therapist provides instructions to the client through the use of video-conferencing systems (Rodriguez, 2020).

This study aims to describe an intervention conducted in online mode for Andrew, a boy with Dravet syndrome (DS). DS is characterized by frequent, prolonged seizures, developmental delays, speech disorders, and motor and orthopedic problems (Villas et al., 2017). This intervention was part of a more comprehensive intervention, which, starting from an assessment of skills and a risk analysis in the home

environment, aimed to help Andrew's family in a moment of particular difficulty in managing family routines. The intervention package consisted of a structured interview with parents, followed by a phase of supervision of the parents for the implementation of interventions in the most critical areas. During the phase of interviews with parents, researchers investigated 3 main areas: assessment of preferences, risk assessment, and assessment of academic skills. The purpose of preference assessment was to identify activities and stimuli that were acceptable to Andrew; risk assessment was to investigate possible types of problem behaviors emitted in the home environment while academic skills assessment was to identify Andrew's skill levels to set the objectives of the intervention. Overall, the assessment aimed to collect all the information needed to design the most effective online intervention strategy.

The existing emergency suggested using high-tech solutions, as they aim to contribute to better results or to provide a more efficient or cost-effective outcome. When using a video-modeling instruction (VMI) strategy, the goal is to provide a means to model behaviors that are otherwise not easily modeled in vivo (or at least not modeled repeatedly). The reasons for using VMI are varied.

Its use is often linked to logistical factors rather than evidence of increased efficiency (Ayres et al., 2017). Moreover, the use of this strategy can help the learner focus on critical stimuli because the video can make them more salient by the educational devices used during its creation (Sherer et al., 2001). The therapist has more control over the presentation of stimuli in a video because it eliminates the spontaneously occurring changes in the natural environment. The therapist can then make sure that parents who teach the same skill use the same model. This procedure can eliminate the risk of presenting different models for teaching the same task during instruction (Ayres, et al., 2017).

The opportunity to use rehabilitation services has decreased dramatically for families with disabled children. Therefore, they have to take on essential roles in supporting and managing their children, often without being regularly trained in the delivery of specialized interventions based on ABA. For this reason, the use of the video modeling strategy can be useful in increasing fidelity in the delivery of education by para-professionals who have little or no training in discrete evidence presentation (DTT), also showing a high level of social validity (Cardinal et al., 2017). This strategy has also proven effective in reducing the need for a behavioral analyst during initial training and reducing the cost of interventions implemented by parents in the home setting (Barboza et al., 2019).

The literature reported various ways of using video-modeling (Park et al., 2019). Some describe the use of video modeling to teach academic skills (Burton et al., 2013; Creech-Galloway et al., 2013; Kellems et al., 2016). Among these is video self-modeling (VSM), an application in which the individual must observe himself while accurately performing the target behavior (Dowrick, 1999). VSM is a specific form of VMI, in which the individual has the opportunity to see himself as a competent model (Mason et al., 2016). Self-observation has three main advantages: it clarifies how to perform a given skill at its best, strengthens beliefs in one's abilities (Bandura, 1997), and is a means to discriminate between positive or negative behaviors consequences (Skinner, 1953).

Burton et al. (2013), assessed the effects of using VSM on the acquisition of mathematical skills for 4 adolescents with autism and intellectual disability. Participants had to watch a video of themselves solving mathematical problems. The study results showed a functional relationship between the use of VSM and the performance of mathematical skills. Marcus and Wilder (2009) used the VSM strategy to teach 3 participants to identify letters of the alphabet correctly. The results of this study showed that all participants achieved the criteria of mastery for the new skill.

In this study, the researchers implemented an online intervention using a VSM strategy for presenting DTT during parental rehabilitation sessions for Andrew, a boy with Dravet's Syndrome. The objective of the described procedure was to improve performance in academic areas found to be weak following the assessment of the skills measured through a structured interview given to parents.

## **Methods**

### **Participant and Setting**

The participant in this study was Andrew, a 12-year-old boy with Dravet syndrome. Andrew had severe psychomotor retardation and needed constant supervision by the referring adults due to frequent seizures.

He was able to produce 5-word sentences, mainly used to request activities or objects he liked. Andrew attended the first class of lower secondary schools in Italy. During his school years, Andrew had learned to name numbers up to 30 correctly and was able to place them in ascending order up to number 20. However, he was not able to order them in descending order. Andrew was able to name all the components of a face but could not position them correctly. As far as reading is concerned, he was able to name all the letters of the alphabet and read 2-letter syllables correctly.

However, he was not able to read bi-syllabic words independently. Andrew was selected to participate in this study because the family requested specialist support for the continuation of school activities and behavioral management, interrupted due to the lockdown as a result of the health emergency. The setting was the study of Andrew's home, where there was a table, two chairs, and a laptop computer. Materials that the mother used for school activities were on the table: notebooks, stationery, colors, and sheets.

### **Experimental Design and Data Collection**

For this study, the researchers used an experimental multiple baseline across behaviors design (Cooper et al., 2007). The researchers conducted measurements on the selected skills following an interview conducted with parents during the first remote coaching meetings, specifically concerning the items investigating the academic areas where Andrew encountered the most significant difficulties. The parents reported persistent difficulties in mathematical learning, reading, and spatial placement of stimuli. Specifically, the measurements concerned the following skills:

- a. order numbers in sequence;
- b. position eyes, nose, mouth and ears on the oval of the face;
- c. reading bi-syllabic flat

Each baseline and intervention session included the presentation of 5 trials, the results recorded by the researcher, connected via a video-conferencing app. For (a) each request was related to the positioning of a single number in descending order; for (b) each request was related to the positioning of a part of the face (e.g., the nose); for (c) each request was related to the reading of a bi-syllabic word.

### **Interobserver agreement**

Researchers video-recorded all phases of the study. In the VSM phase, the experimenter (first author) and a second observer (second author) independently viewed 50% of the recordings of the trials submitted to Andrew. The two coders discussed the procedures before viewing the recordings to reach acceptable levels of agreement. The interobserver agreement was then calculated on discrete trials by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. The percentage of agreements in the VSM phase was 100%.

### **Treatment Fidelity**

To evaluate the fidelity to the treatment, an observer (second author), viewed 40% of the trials conducted during the VSM phase, measuring the correct presentation of the DTT. Table 1 shows the check-list used. The accuracy in the presentation of the tests was 100%.

### **Independent Discrete Trials Presentation**

Get the student's attention before presenting the antecedent. Present faultless antecedents, including written or vocal stimuli. Wait 5 s for the student to respond.

For correct answers, present reinforcement immediately.

For wrong answers, do not use prompts and move on to the next trial.

*Table 1.* Check-list used to evaluate fidelity to the treatment.

### **Materials**

*Interview.* The interview administered to parents consisted of 45 items divided into 3 main areas: (1) assessment of preferences, (2) risk assessment, (3) assessment of academic skills. The authors used a modified version of the Vineland Adaptive Behavior Scale (Sparrow, Cicchetti, & Saulnier, 2016), to identify the areas to focus on the telehealth intervention.

*Numbers, faces, and words.* The materials used for this study were: a series of flashcards measuring 6x9 cm on which were printed the numbers from 10 to 19; 10 sets of stimuli, each consisting of a sheet of

paper depicting the oval of the face and flashcards depicting eyes, ears, nose and mouth (5 sets were hand-drawn, and 5 sets contained photographs); 40 flashcards on which were printed flat bi-syllabic words written in capital letters).

*Video.* The experimenter, remotely connected through a video conferencing app, recorded the work sessions, during which the mother presented the requests related to the skills in question, modeling Andrew's behavior with the necessary prompt level. During this phase, the experimenter provided descriptive feedback to the mother about the presentation of the requests, the prompt level used, and the consequences. Starting from the raw video, the experimenter edited 3 videos for each of the skills in question: the videos showed the presentation of the request, the correct behavior, and the correct consequence for its delivery provided by the mother. All the prompts used were removed from the final version of the videos used during the training.

All the videos used in this study showed mother and Andrew sitting at the table next to each other. In the videos made to teach Andrew to order the numbers in the sequence 10 flashcards representing the numbers 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 were on the table. The mother introduced the activity, saying, "Now we will put these numbers in order starting from the biggest one." Then she placed a flashcard in front of Andrew and asked: "What comes before 19?"; the video then showed Andrew while emitting the correct answer, i.e., while placing the flashcard representing the correct number next to the one previously placed in front of him. Finally, the mother presented verbal praise (e.g., "Good job!").

In the video made to teach Andrew to correctly position the eyes, ears, nose, and mouth on the oval of the face, a sheet of paper representing a person's face and other pieces of paper representing the components to be positioned was on the table. The mother introduced the activity by saying, "Now we will place all the parts on the face." Afterward, the mother presented the requests related to the task to be performed: "Where does the nose go?"; the video continued showing Andrew positioning the stimulus indicated by the mother. Finally, the mother presented verbal praise. In the video made to teach Andrew to make a textual response, the mother presented Andrew with a flashcard on which was written a flat bi-syllabic word. The mother then presented the request, saying, "What does it say?". The video then continued showing Andrew's correct answer and the verbal praise given by the mother. All videos showed 5 trials, with different target stimuli used from one video to another.

## **Procedure Interview**

During the first parent coaching meeting, the researchers presented a structured interview with parents. The assessment of preferences was aimed at identifying Andrew's favorite activities and showed, among others, preferences for watching videos using the tablet. From the section of the interview that was going to investigate the issue of behavior challenging to manage, it emerged that in the presence of requests related to the performance of schoolwork, Andrew tended to avoid the task, moving away from the workstation. As far as the evaluation of academic skills was concerned, researchers asked the family members in which areas encountered the most significant difficulties during the school activities and enhancement phase. Overall, the main difficulties that emerged were related to the presentation of

academic requests on tasks of great difficulty for Andrew in the areas of mathematical learning, reading, and spatial placement of stimuli.

The information collected was used to design the VSM strategy to be used to improve the performance of Andrew in the academic areas identified as necessary for empowerment intervention. Table 2 shows the items administered that revealed the main critical areas.

### **Preferences assessment**

Which functional items or activities are of interest to the child? Which are the dysfunctional items or activities of interest to the child?

### **Risk assessment**

Does the child exhibit behavior that's difficult to manage? If so, when?

### **Academic Skills Assessment**

#### **Number Skills**

Can the child place the numbers 0 to 20 on the number line?

#### **Spatial placement of stimuli**

Is the child able to place on an oval representing a face all its components?

#### **Reading**

Can the child read flat, bi-syllabic words?

*Table 2.* Extract from the interview used reporting the items that revealed the main areas of concern

### **Baseline**

During the baseline phase, the mother submitted requests for the VDs measured using discrete independent trials; first, she got her son's attention, then presented the request, and if Andrew answered correctly, she reinforced the answer. If Andrew did not give the correct answer, she would not provide any correction and go on to submit the next request. Different target stimuli were used during the baseline and learning verification phases following the VSM procedure than those shown in the videos.

### **Role playing and performance feedback**

Before starting with VSM, the mother was instructed to implement it through few online sessions of role playing and performance feedback. First, the experimenter plays the role of the mother and the mother the role of the boy; then the roles exchanged. At the end of each session of role playing, feedback were

delivered describing exactly what the mother performed correctly and corrective feedback were delivered specifying what was not performed correctly.

## VSM

Vsm sessions were conducted in the home studio. The mother was sitting at the table with Andrew. During the instruction phase, the mother showed the recording of a test of the skill in question. At the end of the vision, she continued with other activities, such as coloring a drawing. After 10 minutes, the learning was verified: the mother presented the task previously observed on the video, using paper material with different stimuli from those shown in the videos previously observed. As for positioning the numbers in the correct order, the mother presented flashcards with various number sequences (e.g., 16-17-18-19-20 or 12-13-14-15-16) and asked her son to order them in decreasing sequence.

On the other hand, if the video showed the sequence to correctly place all its components (eyes, nose, mouth, and ears) on a drawn face, then the mother presented her son with photographs of different people representing real stimuli (e.g., child, adult, elderly), asking him to place them in the correct order. Regarding the reading of flat words, the mother presented the reading of flat words different from those shown in the videos. For each type of test, if Andrew answered correctly, then the mother would reinforce the answer by using social praise ("You did great!"), while if the child answered incorrectly or did not answer, then she would not provide any kind of correction and would continue with the planned activities.

## Results And Discussion

Figure 1 shows the results in the baseline and intervention phases for the measured skills. Specifically, the left panel shows the results of the baseline measurements. To (a) order numbers in sequence, (b) place eyes, nose, mouth, and ears on the oval of the face and (c) read flat whisper words, the values are 0 for the 4 measurement sessions conducted for each skill. The right panel of the figure shows instead the results related to the intervention phase: for (a), the response range varies between 4 to 5 correct answers, with a stable trend; for (b), the range varies between 4 to 5, with a stable trend; for (c), the response range varies between 3 and 5, with ascending trend.

The visual analysis of Figure 1 shows that the baseline phase's data points are divided from those of the intervention phase and that their range is mutually exclusive for all experimental conditions. Furthermore, the data points of the intervention phase show higher values than those of the baseline phase. The trends of the response values for the first two measured behaviors are stable, while the third behavior is ascending.

This study wanted to investigate the effects of an intervention conducted in a global health emergency, thus proposing a replicable model of intervention for professionals called to conduct rehabilitation interventions in similar cases. The results obtained support the effectiveness of the procedure used, especially concerning its social validity, corroborating what Cardinal, et al., reported (2017). Parents anecdotally reported that they observed significant changes in Andrew's behavior during work on

academic skills. They also reported that they participated with pleasure in the study. This study contributes to expanding research on the use of VSM to teach academic skills for a new population of students, i.e., adolescents with genetic syndromes. Future research could, therefore, be related to the use of this strategy with students with similar characteristics to Andrew.

We would also emphasize the potential that such an intervention offers: a telehealth intervention could be economically sustainable for families once the health emergency returns; moreover, greater involvement of families could also have positive feedback on the level of personal well-being. Observing children's progress firsthand can give them more positive perceptions about their children and themselves, thus increasing their level of self-esteem.

The procedure used has proven effective for teaching at home: it was part of a more comprehensive intervention program for Andrew. The current health emergency made it necessary to reschedule its activities; the family had also taken over the activities usually carried out at school and during rehabilitation therapies. The interview conducted with the parents during the first online coaching meetings was useful in identifying Andrew's preferences and in evaluating the academic skills measured in this study—the assessment of preferences allowed to identify a functional and practical learning channel for Andrew. The implementation phase of the training shows that Andrew learned the proposed skills using the identified strategy. Moreover, during the training phase through the use of video-modeling, Andrew showed higher levels of compliance than those observed during the baseline phase, as he sat down and watched with interest the videos proposed to him. During the baseline phase, Andrew often moved away from the workstation following instructions and had to be brought back to the workstation. Furthermore, the facial expression indexes observed anecdotally showed various well-being indicators during the training, such as smiles during the presentation of the videos.

A final consideration is related to how the rehabilitation service is provided. This study reports a testimony: researchers used this mode to respond to a family's needs to manage an emergency in an unprecedented historical moment. For family welfare, it was, in fact, useful to deal with problems that would be difficult to deal with in a routine situation.

This study has some limitations. The assessment method used was indirect; the description of Andrew's ability was measured through the description given by the parents and not through direct measurement of the behavior. The baseline measurements were then conducted at the end of the assessment to verify the intervention's actual need. Future studies could, therefore, investigate methods of evaluation that could systematically combine indirect and direct evaluation methods.

Andrew was able to recognize the stimuli presented even before the start of the study. This element weakens the study's internal validity, as we cannot say with certainty that the intervention was effective in teaching Andrew new behaviors due to prior exposure to the stimuli. However, there was a marked improvement in Andrew's performance when comparing baseline and intervention data from a clinical perspective. A further limitation is the evaluation of social validity. The researchers collected anecdotal data. Future studies could use questionnaires or evaluation scales to assess the degree of social validity.

In conclusion, despite the limitations reported, this modality of evaluation and intervention in close synergy with the family can increase the effectiveness of the proposed interventions. Therefore, future research could deepen the skills assessment and risk analysis modalities through a remote supervision system. Such analyses and considerations could also be useful in fostering knowledge and dissemination of ABA on the national territory.

## Declarations

### Compliance with Ethical Standards

**Conflict of Interest.** No authors have a conflict.

**Ethical Approval.** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

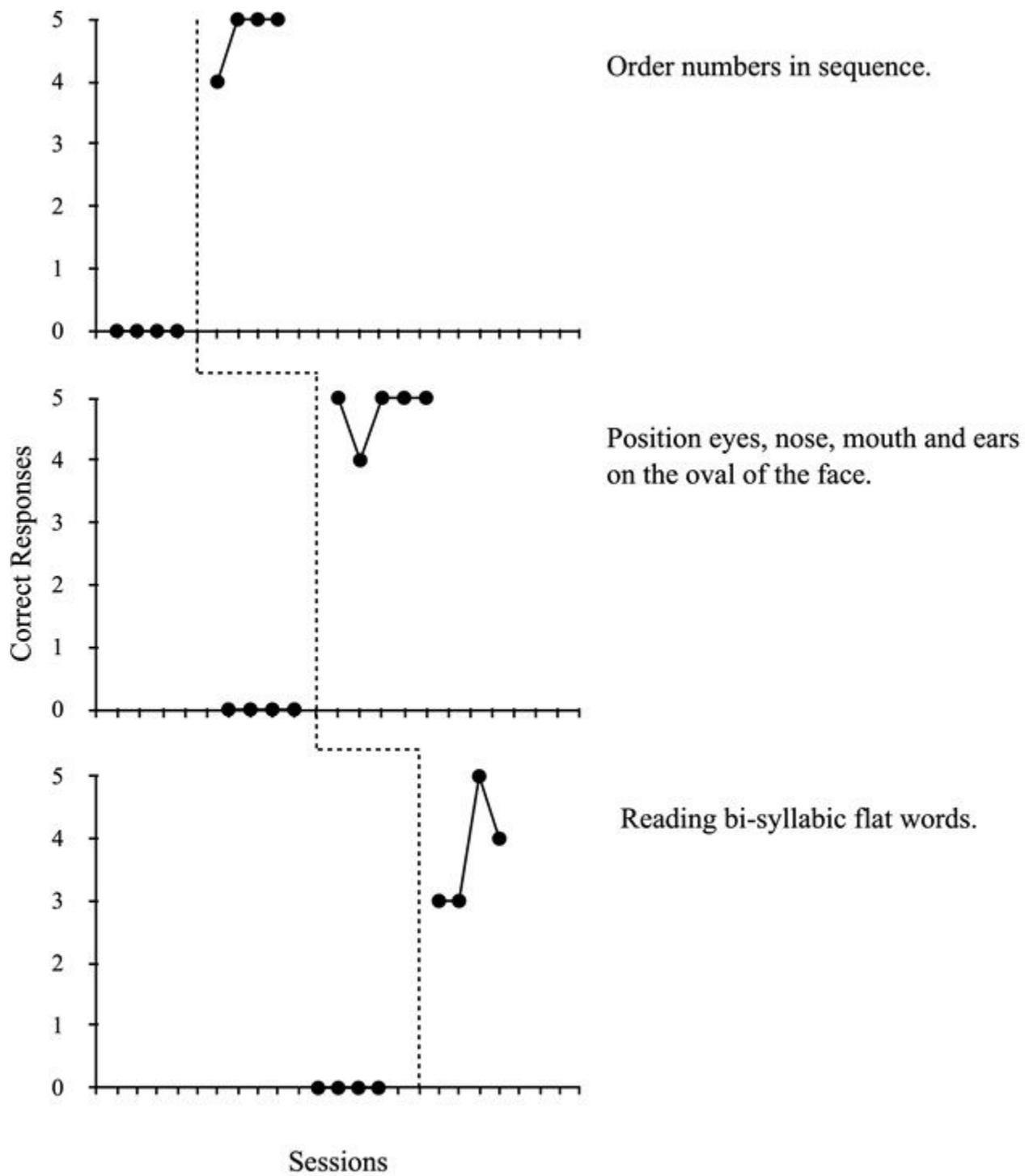
**Informed Consent.** Informed consent was obtained from all individual participants in the study.

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## Figures



**Figure 1**

Results in the baseline and intervention phases for the measured skills.