Beyond Milestones Online Education Resource for Allied Health Professionals

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Beyond Milestones Online Education Resource for Allied Health Professionals

Abstract
Purpose: The study aimed to evaluate the observed impact of Beyond Milestones online education resource in developing allied health professionals’ knowledge of normal child development and skills in observational assessment. It also aimed to identify the usefulness of the resource and necessary modifications for potential application with allied health professionals working for New South Wales (NSW) Health. While the effectiveness of the resource with medical clinicians has been demonstrated, no evidence was identified regarding the usefulness with allied health professionals. Methods: The study used a crossover repeated measures design to determine the observed impact of Beyond Milestones on developing the knowledge and skills of participating allied health professionals. Quantitative data was analysed manually. Mean differences between the study groups were compared using independent sample t-tests. A significance level of pResults: A total of 30 participants representing Dietetics, Occupational Therapy, Physiotherapy, Psychology, Speech Pathology and Social Work completed all components of the study. Quantitative results indicated that Beyond Milestones was an online resource that provided an effective learning opportunity. The qualitative evaluation identified perceived improvements to the Beyond Milestones online module. Overall, forty one percent (n=12) of respondents identified that Beyond Milestones is adequate as a standalone online resource with 59% (n=17) identifying that there would be benefit to it being part of a broader education program. Conclusions: Although allied health participants demonstrated a significant improvement in performance on allocated observational assessment tasks, this was not attributable to completion of the Beyond Milestones teaching modules. Despite this, study participants perceived the online resource to be an effective learning opportunity. The recommendations regarding modification of the Beyond Milestones resource require consideration and evaluation prior to broader application. Further research regarding the usefulness of this model of educational practice is warranted.

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Acknowledgements

Acknowledgements Dr Arjun Rao MBBS FRACP, Paediatric Emergency Physician, Sydney Children's Hospital, Randwick; Conjoint Lecturer, University of New South Wales.

This manuscript is available in Internet Journal of Allied Health Sciences and Practice: https://nsuworks.nova.edu/ijahsp/vol22/iss2/24
ABSTRACT

Purpose: The study aimed to evaluate the observed impact of Beyond Milestones online education resource in developing allied health professionals' knowledge of normal child development and skills in observational assessment. It also aimed to identify the usefulness of the resource and necessary modifications for potential application with allied health professionals working for New South Wales (NSW) Health. While the effectiveness of the resource with medical clinicians has been demonstrated, no evidence was identified regarding the usefulness with allied health professionals. Methods: The study used a crossover repeated measures design to determine the observed impact of Beyond Milestones on developing the knowledge and skills of participating allied health professionals. Quantitative data was analysed manually. Mean differences between the study groups were compared using independent sample t-tests. A significance level of p<0.05 was used for all analyses. Qualitative data was utilised to further support the usefulness and highlight the limitations of the resource for allied health professionals. Results: A total of 30 participants representing Dietetics, Occupational Therapy, Physiotherapy, Psychology, Speech Pathology and Social Work completed all components of the study. Quantitative results indicated that Beyond Milestones was an online resource that provided an effective learning opportunity. The qualitative evaluation identified perceived improvements to the Beyond Milestones online module. Overall, forty one percent (n=12) of respondents identified that Beyond Milestones is adequate as a standalone online resource with 59% (n=17) identifying that there would be benefit to it being part of a broader education program. Conclusions: Although allied health participants demonstrated a significant improvement in performance on allocated observational assessment tasks, this was not attributable to completion of the Beyond Milestones teaching modules. Despite this, study participants perceived the online resource to be an effective learning opportunity. The recommendations regarding modification of the Beyond Milestones resource require consideration and evaluation prior to broader application. Further research regarding the usefulness of this model of educational practice is warranted.

Keywords: child development; developmental assessment; developmental milestone; allied health education.
INTRODUCTION

Beyond Milestones is an interactive teaching resource, originally developed to instruct paediatric medical trainees in a systematic approach to critical and quality observation of normal child development. The free online resource is available at http://learnpaediatrics.org/beyondmilestones. Research has demonstrated the effectiveness of the Beyond Milestones online resource with medical clinicians. It was reported to improve knowledge, increase confidence, and provide a structured approach to developmental assessment applicable to every paediatric consultation. Connolly et al identified the potential for use by a wider audience, including allied health working with children. A literature search failed to identify any studies regarding the effectiveness of the Beyond Milestones resource, or other equivalent online resources, with allied health professionals.

Allied health professionals working with children provide services to enhance and maintain functions of their clients within a range of settings. When working with children and young people the focus is on a child’s function, specifically the physical, psychological, cognitive and social domains. Developmental assessments are completed when concerns exist that the child may have a developmental delay. The early identification of developmental conditions that emerge in early childhood can facilitate children reaching their full developmental potential.

Across allied health professions, the procedures for assessing children generally comprise both standardised and non-standardised methods. Play-based observational assessment is increasingly considered an effective and efficient means of assessing a child's functioning across developmental domains due to its ecological validity and alignment with context based interventions. This assessment method requires competence and confidence related to normal child development and the developmental course of play. Allied health professionals working with children come from a range of tertiary education backgrounds and clinical experiences. For the purpose of this study the allied health professionals working with children included are listed in Table 1. While child development is a component of most allied health undergraduate degrees, practicing clinicians have reported a need for additional training in terms of assessment.

The aim of this study was to evaluate the observed impact of the resource in developing allied health professionals' knowledge of normal child development and skills in observational assessment. It also aimed to identify the usefulness of the resource and necessary modifications for potential application with allied health professionals working for New South Wales (NSW) Health. Specifically, the research question is: Does the Beyond Milestones online resource assist to develop knowledge of normal child development and skills in observational assessment for allied health professionals?

METHODS

Teaching Resource

The Beyond Milestones resource compromises three components – pre-teaching assessment, teaching, and post-teaching assessment:

- The pre-teaching assessment includes a video, during which the expert developmental paediatrician (DP) performs an assessment of a child aged approximately 36 months. Participants are asked to complete a pre-teaching assessment worksheet and then compare responses to the model answers provided.
- The three teaching modules include an introduction video during which the DP discusses the assessment approach and advises on the choice of age-appropriate materials. This is followed by seven teaching videos, showing children aged between ten and 52 months of age during free play and in interaction with the DP and their caregiver. The DP demonstrates how to elicit key skills in language, fine motor, gross motor, cognition/problem solving and social domains. These assessments were performed in a routine clinical setting. At the end of each assessment, skills are reviewed and summarised according to domain. An additional teaching video outlines developmental sequences for children aged nine to 12 months. The teaching videos are supplemented by a Summary of Development handout highlighting the markers of development for each child.
- The post-teaching assessment includes an assessment video, worksheet, and model answers consistent with the pre-teaching assessment. The post-teaching assessment focuses on a child aged approximately 36 months.

Ethics

The evaluation study was approved by the Human Research Ethics Committee. Site specific authorisation was obtained from the 14 participating NSW Health Local Health Districts and Specialty Networks (LHD/SN).

Study Design

The study used a crossover repeated measures design utilising within (pre-assessment, post-assessments 1 and 2) and between (intervention, control) group measures to determine the effect of the Beyond Milestones modules on the knowledge and

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skills of participating allied health professionals. Participants were randomly allocated to the two study sub-groups and assigned a participant code which was applied to all corresponding data collected. This ensured that data could be correlated while maintaining anonymity of participants. Use of the crossover repeated measures design ensured that all participants received access to the Beyond Milestones module across the course of the study. The impact of practice and fatigue effects were the same for both groups. The design was appropriate for the number of subjects available for this study. Participants were asked to undertake the tasks for each component of the study design, as outlined in

![Figure 1. Study Design and Procedures](image)

**Recruitment and Participants**

Eligible participants included employees of participating NSW Health LHD/SN who were either eligible for Australian Health Practitioner Regulation Agency (AHPRA) registration or membership of their respective professional association. Eligibility was limited to the professions of Dietetics, Occupational Therapy, Physiotherapy, Psychology, Speech Pathology and Social Work. Allied health professionals were deemed ineligible if they were working in a non-clinical role or on extended leave (long service leave, maternity) during the period of the study.

All potential participants were contacted by email using existing distribution lists that comprised allied health professionals who work with children across targeted LHD/SN. Written informed consent was obtained from all participants prior to their enrolment in the investigation. Demographic data regarding participants was collected using a brief online survey.

**Outcome Measures**

The primary outcome measures for the study related to knowledge and usefulness. Measures of knowledge related to normal child development and its application in an observational assessment. Knowledge was assessed using open-ended questions from the online Beyond Milestones pre-assessment and post-assessments 1 and 2. The tools used in the study by Connolly et al were modified for use with the allied health professional sample groups.\(^1\) It was intended that participant responses for pre-assessment and post-assessments 1 and 2 would be marked independently by two investigators against model answers and an average recorded as the final score.

Usefulness of the current Beyond Milestones online resource and suggestions for improvement was measured using an online questionnaire completed on SurveyMonkey. The questionnaire was comprised of two components. The first component was the Instructional Materials Motivational Survey (IMMS) utilised to assess the motivational characteristics of instructional materials.
with reference to the four domains of attention, relevance, confidence, and satisfaction. The IMMS five-point Likert-type scale has been validated with a range of student populations as an assessment measure of motivation with the goal of enhancing the effectiveness of learning activities. The second component was comprised of qualitative evaluation questions used to measure participant's perceptions of the Beyond Milestones resource and recommendations for use or modification. These questions were developed by the researchers and tested on a small representative sample of allied health professionals.

Pre- and post-module completion data was analysed for each participant to identify changes in knowledge and usefulness. Qualitative data was compared between subgroups with summary statistics reported as frequency and percentages. Thematic analysis was used to identify themes within open ended questions. This analysis was completed using the six-phase guide.

RESULTS

Participants

Allied health professionals registered their interest in participating, with 66 responses received. Of those allied health professionals applying to participate in the study, there were representatives from 11 of the 14 targeted NSW Health LHD/SN. According to the study criteria outlined in Table 2, four allied health professionals were deemed ineligible because they were not employed in a participating LHD/SN (n=2) or were working in a non-clinical role (n=2). Six eligible allied health professionals did not provide consent and one withdrew their expression of interest prior to commencement of the study. A total of 55 allied health professionals were deemed eligible to participate in the study. Of these, 30 participants graduated by completing all data sets. The demographics of the applicants and participants are detailed in Table 1.

Table 1. Applicant and Participant Demographics

<table>
<thead>
<tr>
<th>Profession</th>
<th>Expressed interest (N=66)</th>
<th>Eligible to participate (n=55)</th>
<th>Graduated (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
</tr>
<tr>
<td>Speech Pathology</td>
<td>23</td>
<td>34.8%</td>
<td>18</td>
</tr>
<tr>
<td>Social Work</td>
<td>7</td>
<td>10.6%</td>
<td>6</td>
</tr>
<tr>
<td>Psychology</td>
<td>5</td>
<td>7.6%</td>
<td>4</td>
</tr>
<tr>
<td>Physiotherapy</td>
<td>14</td>
<td>21.2%</td>
<td>13</td>
</tr>
<tr>
<td>Occupational Therapy</td>
<td>12</td>
<td>18.2%</td>
<td>10</td>
</tr>
<tr>
<td>Dietetics</td>
<td>5</td>
<td>7.6%</td>
<td>4</td>
</tr>
<tr>
<td>Age Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 years or older</td>
<td>3</td>
<td>4.5%</td>
<td>1</td>
</tr>
<tr>
<td>50 - 59 years</td>
<td>8</td>
<td>12.1%</td>
<td>6</td>
</tr>
<tr>
<td>40 - 49 years</td>
<td>15</td>
<td>22.7%</td>
<td>10</td>
</tr>
<tr>
<td>30 - 39 years</td>
<td>23</td>
<td>34.8%</td>
<td>22</td>
</tr>
<tr>
<td>21 - 29 years</td>
<td>15</td>
<td>22.7%</td>
<td>15</td>
</tr>
<tr>
<td>No response</td>
<td>2</td>
<td>3.0%</td>
<td>1</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>62</td>
<td>93.9%</td>
<td>52</td>
</tr>
<tr>
<td>Male</td>
<td>3</td>
<td>4.5%</td>
<td>3</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
<td>1.5%</td>
<td>0</td>
</tr>
<tr>
<td>Highest level of education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor</td>
<td>42</td>
<td>63.6%</td>
<td>36</td>
</tr>
<tr>
<td>Masters</td>
<td>19</td>
<td>28.8%</td>
<td>15</td>
</tr>
<tr>
<td>Doctorate</td>
<td>1</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>3.0%</td>
<td>2</td>
</tr>
<tr>
<td>No response</td>
<td>2</td>
<td>3.0%</td>
<td>1</td>
</tr>
<tr>
<td>Working with children/young people as component of current clinical caseload</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>64</td>
<td>97.0%</td>
<td>54</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
<td>1.5%</td>
<td>0</td>
</tr>
</tbody>
</table>
A number of eligible allied health professionals withdrew from the study due to work/time commitments (n=4), changed caseload (n=2) and leave (n=1). The remaining eligible participants (n=18) did not return complete data sets and were unable to be contacted by investigators. The number of participants who completed each component of the study protocol are detailed in Table 2.

The two study groups were randomly allocated and comprised allied health professionals of varying professions and demographics. The pre-assessment scores did not indicate any significant difference in performance between the groups.

### Table 2. Study Components Completed

<table>
<thead>
<tr>
<th>Study component completed</th>
<th>Group 1 (Intervention first)</th>
<th>Group 2 (Control first)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible and consent provided</td>
<td>n=28</td>
<td>n=27</td>
<td>n=55</td>
</tr>
<tr>
<td>Study component completed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-assessment</td>
<td>24</td>
<td>85.7%</td>
<td>23</td>
</tr>
<tr>
<td>Post-assessment 1</td>
<td>19</td>
<td>67.9%</td>
<td>18</td>
</tr>
<tr>
<td>Post-assessment 2</td>
<td>17</td>
<td>60.7%</td>
<td>13</td>
</tr>
<tr>
<td>IMMS</td>
<td>17</td>
<td>60.7%</td>
<td>12</td>
</tr>
<tr>
<td>Qualitative Evaluation</td>
<td>18</td>
<td>64.3%</td>
<td>11</td>
</tr>
</tbody>
</table>

The primary outcome measures for the study related to knowledge and usefulness.

**Knowledge**

Pre-assessment and post-assessment 1 and 2 scores were calculated for each study participant. Only data from the 30 participants who completed the full data set was analysed. The mean (M) scores of each group at each stage of the study is detailed in Figure 2.

![Changes in Knowledge](image)

Mean differences between the study groups were compared manually using independent sample t-tests. A significance level of p<0.05 was used for all analyses. No significant difference between the mean scores of 17 participants in Group 1 and 13 participants in Group 2 was noted at the pre-assessment stage. This trend continued with no significant difference noted.
between groups at either post-assessment 1 (intervention completed by Group 1 only) or post-assessment 2 (intervention completed by Groups 1 and 2).

A paired-sample t-test was used to compare the results of the two groups at each stage of the study, where the result is significant at $p \leq 0.05$. A significant difference was noted between the pre-assessment and post-assessment 1 scores of both Group 1 ($p \leq 0.05, M=9.88$) and Group 2 ($p \leq 0.05, M=8.38$) participants. However, no significant difference was identified between the post-assessment 1 and 2 scores of either Group 1 ($p \geq 0.05, M=-0.76$) or Group 2 ($p \geq 0.05, M=0.73$). Overall, both Group 1 ($p \leq 0.05, M=9.12$) and Group 2 ($p \leq 0.05, M=11.08$) participants demonstrated a significant improvement between their pre-assessment and post-assessment 2 scores.

**Usefulness**

Mean ratings for IMMS subscale items were in the moderately true (item score of 3) or mostly true (item score of 4) range, reflecting generally positive learning attitudes towards the Beyond Milestones resource (Table 3). Mean total scores relating to the domains of Attention (interest in material), Relevance (to learner’s goals and needs) and Confidence (in ability to succeed in completing the material) were significantly higher than those for Satisfaction (with their learning). There was no significant difference between the mean total scores of Group 1 compared with Group 2 across domains.

**Table 3. IMMS Subscale Scores**

<table>
<thead>
<tr>
<th>IMMS Subscale</th>
<th>Group 1 (Intervention first)</th>
<th>Group 2 (Control first)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean item rating</td>
<td>Mean subscale total (SD)</td>
<td>Mean item rating</td>
</tr>
<tr>
<td>Attention</td>
<td>3.28</td>
<td>36.1 (12.3)</td>
<td>3.55</td>
</tr>
<tr>
<td>Relevance</td>
<td>3.64</td>
<td>36.4 (8.3)</td>
<td>3.86</td>
</tr>
<tr>
<td>Confidence</td>
<td>3.90</td>
<td>34.2 (6.1)</td>
<td>4.07</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>3.15</td>
<td>18.9 (6.5)</td>
<td>3.42</td>
</tr>
</tbody>
</table>

All participants in the Beyond Milestones investigation were asked to complete four qualitative evaluation questions. Twenty nine responses were received from the 30 participants who returned complete data sets.

Beyond Milestones was identified as an online resource that provided an effective learning opportunity. The use of video was identified as being the most valued aspect. Respondents indicated that the videos of real cases were further enhanced by the expert voice over provided by the DP and access to supporting resources. The flexibility for the learner to complete the modules in their own time was highly valued. Respondents reported that the focus on overall child development, comprising both normal development and red flags, also contributed to the usefulness of the learning.

Participants were asked to reflect upon knowledge and skills gained through completion of the module. The ability to assess and be aware of overall development was the most frequently identified area of change. In addition, respondents reported development in their ability to make appropriate referrals, undertake observational assessment and select appropriate toys and materials.

The qualitative evaluation explored perceived improvements to the Beyond Milestones online module. Suggested improvements included the provision of normal development guidelines, as well as updated documentation and instructions to support the online module. Improvements to the videos, including additional video examples, reduction in the length of the videos and updated filming and narration were identified. Respondents reflected that the provision of immediate, interactive feedback would be highly regarded.

Forty one percent (n=12) of respondents identified that Beyond Milestones is adequate as a standalone online resource with 59% (n=17) identifying that there would be benefit to it being part of a broader education program. The main themes highlighted for enhancing this online resource included: improved online interaction; combining the online modules with face to face workshops or other educational methods; more comprehensive videos; and more engaging handouts.

**DISCUSSION**
This study explored the observed impact of the resource in developing allied health professionals’ knowledge of normal child development and skills in observational assessment. It also identified the usefulness of the resource and necessary modifications for potential application with allied health professionals working for New South Wales (NSW) Health.

Results achieved did not indicate any significant difference in performance between the groups. At post-assessment 1, only Group 1 had completed the Beyond Milestones teaching modules. Despite this, a significant improvement in performance across both groups was noted at post-assessment 1. Likewise, following completion of the teaching modules, the Group 2 scores at post-assessment 2 indicated no significant increase. There are several possible reasons for this result. Initially, this could suggest that the Beyond Milestones teaching modules did not significantly contribute to the development of knowledge of normal child development and skills in observational assessment for this group of allied health professionals. It is possible that exposure of both groups to the tasks required for pre-assessment may have impacted on the performance of both Group 1 and 2 at post-assessment 1. Alternatively, the study methodology may have been underpowered to detect meaningful differences.

During the data analysis of post-assessment 2, investigators anecdotally noted a decrease in both the quantity and quality of the free text assessment responses. The significant drop-out rate of participants as the study protocol progressed would appear to be further evidence of participant fatigue.

Participant responses were initially marked by two investigators. Following the identification of poor inter-rater reliability for numerous participant scores, all responses were marked by three investigators and an average obtained. The model answers developed as a marking rubric did not reflect the depth and range of responses provided by study participants. It is postulated that this negatively impacted on inter-rater reliability and the rigor of the study results. Research indicates that play-based assessments that provide clearer definitions of terms and scoring for raters have higher inter-rater reliability.

Participants reflected moderately positive learning attitudes towards the Beyond Milestones resource with reference to their attention and interest in the learning materials, relevance to their goals and needs, and confidence in their ability to successfully complete the material. Ratings relating to participant’s satisfaction with their learning were also moderately positive, although noted to be significantly lower than the other attitudinal domains. This may reflect the equivocal quantitative results relating to knowledge development.

Despite the absence of significant outcomes from the quantitative measures of knowledge, the qualitative measures of usefulness were predominantly positive. Overall, Beyond Milestones was identified by participants as an online resource that provided an effective learning opportunity. An apparent contradiction exists between the outcomes relating to knowledge compared with those relating to usefulness. This may reflect participant’s generally positive attitudes to Beyond Milestones, due to the paucity of available educational resources. The numerous recommendations for how the modules could be improved, may indicate participant perceptions of the potential for Beyond Milestones to be enhanced as a more effective learning resource.

Future Research and Limitations
During the data analysis of post-assessment 2, investigators anecdotally noted a decrease in both the quantity and quality of the free text assessment responses. The significant drop-out rate of participants as the study protocol progressed would appear to be further evidence of participant fatigue. Both these factors may have been impacted upon the results of the study.

Further research regarding the usefulness and effectiveness of video-based online resources, such as Beyond Milestones may be warranted. The study identified recommendations for modifications to the tool which would also require further research prior to use.

CONCLUSIONS AND RECOMMENDATIONS
The Beyond Milestones research study evaluated the observed impact of the resource in developing the knowledge of normal child development and skills in observational assessment with allied health professionals. The quantitative study results indicated that exposure to components of the Beyond Milestones resource resulted in a significant improvement in participant’s performance on allocated observational assessment tasks. However, completion of the teaching modules did not significantly contribute to the development of knowledge of normal child development and skills in observational assessment for allied health professionals. This contrasts with the demonstrated effectiveness of the Beyond Milestones online resource with medical clinicians. Despite this, participants perceived Beyond Milestones to be an online resource that provided an effective learning opportunity.
The study also identified necessary modifications for potential application with allied health professionals working for New South Wales (NSW) Health. Study participants provided numerous recommendations for how the Beyond Milestones resource could be improved. These recommendations require consideration and evaluation prior to broader application with allied health professionals. Modifications should build on the aspects of the resource identified as being most valuable.

References

Lessons for practice
• Allied health professionals may perceive video-based online resources, such as Beyond Milestones, to be an effective learning opportunity.
• Further research regarding the usefulness and effectiveness of video-based online resources is warranted.

Acknowledgements
Dr Arjun Rao MBBS FRACP, Paediatric Emergency Physician, Sydney Children’s Hospital, Randwick; Conjoint Lecturer, University of New South Wales.