Impact of multimodal pre-operative preparation program on children undergoing surgery – A pilot project

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Abstract

Introduction: It has been observed that children undergo a considerable amount of fear and anxiety when waiting for an upcoming surgery. Many non-pharmacological strategies are being used to manage the pre-operative fear and anxiety in children. This study evaluates the effectiveness of multimodal pre-operative preparation program on fear and anxiety of children undergoing surgery. Methods: It was a quasi-experimental study conducted in selected paediatric surgical units. Using purposive sampling technique, 12 children aged 8-12 years undergoing surgery were selected as study participants. They were divided into experimental and control groups — with six participants in each group. The experimental group received multimodal pre-operative preparation program, whereas the control group received routine care. Childs’ fear was measured using FACES fear scale for children and anxiety was measured using Numerical Anxiety Scale, on admission, prior to shifting the child to the operation theatre (OT), 24 hours, and 48 hours after the surgery. Result: The mean fear and anxiety score of children was less in the experimental group compared to the control group after the intervention. A significant change was observed in the experimental group for the mean fear score ($F_{(3)} =17.74$, $p=0.001$) and anxiety score ($F_{(3)} =17.08$, $p=0.001$) of children. The calculated Mann-Whitney test value was significant at the time points between the groups for fear and anxiety score ($p<0.05$). Conclusion: The multimodal pre-operative preparation program has shown to be effective in reducing the fear and anxiety of children undergoing surgery and can be used effectively in paediatric surgical units to support children.

Keywords: Children, Fear, anxiety, multimodal pre-operative preparation program.
The literature reveals that the following pre-operative preparation programs are effective in reducing the pre-operative anxiety among children. Role rehearsals with dolls (Zahr, 1998), puppet shows (LaMontagne, Hepworth, Salisbury & Cohen, 2003), the teaching of coping and relaxation skills (Kain, Mayes & O’Connor, 1996), orientation tours of the operating room (Durst, 1990), educational videos (Margolis et al., 1998), books (Felder et al., 2003 & Broome, Lillis & Smith, 1989).

It is essential to prepare children for surgery based on their developmental age. The school-age children are in concrete operational stage of cognitive development where, they are capable of concrete, logical reasoning and gaining an increased understanding of cause and effect. They have an increased awareness of internal body parts and body function. They are also able to understand a series of actions and therefore benefit from hearing about all steps involved in the procedure (Brewer, Gleditsch, Syblik, Tiitjens & Vacik, 2006). Hence, pre-operative preparation should include teaching them regarding the pre, intra and post-operative events.

Thus in this study the researcher has developed a multimodal pre-operative preparation program (MPPP) for school age children and included a video, theatre tour, medical play, an information pamphlet for parents and interactive session where the researcher attempted to find the impact of this on the fear and anxiety of children undergoing surgery.

Methods & Materials

A quasi-experimental study was conducted in a selected hospital at Mangaluru, India. Ethical approval was obtained from the institutional ethics committee. The study population comprised children aged 8 to 12 years undergoing elective surgery. Using purposive sampling technique, 12 children were assigned to control (n=6) and experimental (n=6) group respectively. The intervention in the study was the multimodal pre-operative preparation program (MPPP). It consisted of a video on pre, intra and post-operative events a child faced when undergoing a surgery, which the child watched along with parent. It also had a theatre tour for the child, medical play, an information pamphlet for parents and interactive sessions. The children in the control group received the routine pre-operative preparation whereas the children in the experimental group received multimodal pre-operative preparation program after admission. Child’s fear (measured using Faces fear scale for children) and anxiety (measured using Numerical anxiety scale) were assessed on admission, prior to shifting the child to OT, 24 hours and 48 hours after surgery respectively.

Result

The study result showed that majority (83.3%) of children in the experimental group and 66.7 percent in the control group were in the age group of 10 to 12 years. Majority (83.3%) were boys. All children in the control group and 66.6 per cent of experimental group underwent general surgery. Majority of the children in the control group (50%) and experimental group (66.7%) was admitted only one day prior to surgery. Majority of the children in the control group (83.3%) and experimental group (66.7%) was not admitted to the hospital prior to current hospitalization.

Data in figure 1 shows that the mean score of fear of children in the experimental group was less on shifting to OT (1.67±0.516) than on admission (3.83±0.40) in comparison with the control group.

Figure 1: Line diagram showing the comparison of fear score of children between the groups at different time interval
However, after 48 hours of surgery, the children in the experimental group experienced no fear but in the control group, the mean fear score was 0.83±0.40. The calculated Friedman test value (table 1) was significant in the experimental group (17.08, p=0.001) and in the control group (14.50, p=0.002).

Table 1: Mean, SD and Friedman test value of fear and anxiety score of children in experimental and control groups at different time interval (n=12)

<table>
<thead>
<tr>
<th>Group</th>
<th>Timing</th>
<th>Fear score</th>
<th>Anxiety score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ±SD</td>
<td>Friedman test value</td>
<td>p value</td>
</tr>
<tr>
<td>Experimental</td>
<td>On admission</td>
<td>3.83±0.40</td>
<td>17.08* .001 HS</td>
</tr>
<tr>
<td></td>
<td>Prior to shifting to OT</td>
<td>1.67±0.51</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Twenty four hours after surgery</td>
<td>1.00±0.63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Forty eight hours after surgery</td>
<td>0.00±0.00</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>On admission</td>
<td>3.00±1.26</td>
<td>14.50* .002 HS</td>
</tr>
<tr>
<td></td>
<td>Prior to shifting to OT</td>
<td>4.00±0.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Twenty four hours after surgery</td>
<td>1.67±0.51</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Forty eight hours after surgery</td>
<td>0.83±0.40</td>
<td></td>
</tr>
</tbody>
</table>

Further, the pair wise comparison done by Wilcoxon signed rank test showed that in the experimental group, reduction of fear score was significant prior to shifting to OT (p=0.020). Subsequently it showed a significant reduction in 24 hours and 48 hours after surgery (p<0.05) respectively. Whereas in the control group reduction of fear score was significant only after 48 hours after surgery (p<0.05). In order to compare the fear score between the groups (Table 2) the computed Mann-Whitney test value was significant at different time points. The different time points were from admission to prior to shifting to OT (p=0.003), from admission to 24 hours after surgery (p=0.016), from prior to shifting the child to OT to 24 hours after surgery (p=0.016) and from prior to shifting to OT to 48 hours after surgery (p=0.002).

Table 2: Comparison of fear score between experimental and control group (n=12)

<table>
<thead>
<tr>
<th>Time change</th>
<th>Groups</th>
<th>Mean Change ± SD</th>
<th>Change (%)</th>
<th>Mann-Whitney Z value</th>
<th>p value</th>
<th>Mean Difference</th>
<th>Std error Difference</th>
<th>95% Confidence Interval of the difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change-Admission to prior to shifting to OT</td>
<td>Experimental</td>
<td>2.16±.40</td>
<td>66.67</td>
<td>3.01* 0.003</td>
<td>3.16</td>
<td>0.54</td>
<td>1.95</td>
<td>4.37</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>-1.00±1.26</td>
<td>300.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change-Admission to 24 hours after surgery</td>
<td>Experimental</td>
<td>2.83±1.75</td>
<td>100.00</td>
<td>2.41* 0.016</td>
<td>1.50</td>
<td>0.58</td>
<td>0.20</td>
<td>2.79</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>1.33±1.21</td>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change-Admission to 48 hours after surgery</td>
<td>Experimental</td>
<td>3.83±1.40</td>
<td>100.00</td>
<td>2.33 0.020</td>
<td>1.66</td>
<td>0.62</td>
<td>0.27</td>
<td>3.05</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>2.16±1.47</td>
<td>100.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change prior to shifting to OT to 24 hours after surgery</td>
<td>Experimental</td>
<td>0.66±.81</td>
<td>100.00</td>
<td>2.69* 0.007</td>
<td>-1.66</td>
<td>0.39</td>
<td>-2.54</td>
<td>-0.78</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>2.33±1.51</td>
<td>75.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change prior to shifting to OT to 48 hours after surgery</td>
<td>Experimental</td>
<td>1.66±.51</td>
<td>100.00</td>
<td>3.05* 0.002</td>
<td>-1.50</td>
<td>0.26</td>
<td>-2.09</td>
<td>-0.90</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>3.16±.40</td>
<td>100.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change 24 hours after surgery to 48 hours after surgery</td>
<td>Experimental</td>
<td>1.00±.63</td>
<td>0.00</td>
<td>0.45 0.652</td>
<td>0.16</td>
<td>0.40</td>
<td>-0.72</td>
<td>1.06</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>0.83±1.75</td>
<td>100.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Similarly, data in figure 2 shows that the mean anxiety score of children in the experimental group was less on shifting to OT (3.33±.51) than on admission (8.17±1.47) in comparison with the control group. However, after 48 hours of surgery the mean anxiety score in the experimental group was 0.17±.40 and 2.17±.40 in the control group.

The calculated Friedman test value (table 1) was significant in the experimental group (17.74, p=0.001) and in the control group (12.53, p=0.006).

Further, the pair wise comparison done by Wilcoxon signed rank test showed that in the experimental group, reduction of anxiety score was significant prior to shifting to OT (p=.02). Subsequently, it showed significant reduction after 24 and 48 hours after surgery (p<0.05). Whereas in the control group reduction in anxiety score was significant only after 24 and 48 hours after surgery (p<0.05). Further, to compare the anxiety score between the groups (Table 3), the computed Mann-Whitney test value was significant at different time points. The time points were from admission to prior to shifting to OT (p=0.004), from admission to 24 hours after surgery (p=0.034), from prior to shifting the child to OT to 24 hours after surgery (p=0.009) and from prior to shifting to OT to 48 hours after surgery (p=0.026).

### Table 3: Mean difference, mean change and Mann-Whitney Z value for anxiety score at different time points between the groups (n=12)

<table>
<thead>
<tr>
<th>Timings</th>
<th>Group</th>
<th>Mean change ±SD</th>
<th>Change (%)</th>
<th>Mann-Whitney Z value</th>
<th>p value</th>
<th>Mean Difference</th>
<th>Std error Difference</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change-Admission to prior to shifting to OT</td>
<td>Experimental</td>
<td>4.83±1.47</td>
<td>59.18</td>
<td>2.91</td>
<td>0.004</td>
<td>6.00</td>
<td>1.33</td>
<td>3.01-8.98</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>-1.16±2.92</td>
<td>17.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change-Admission to 24 hours after surgery</td>
<td>Experimental</td>
<td>6.83±1.32</td>
<td>83.67</td>
<td>2.12</td>
<td>0.034</td>
<td>3.50</td>
<td>1.55</td>
<td>0.04-6.95</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>3.33±3.55</td>
<td>50.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change- Admission to 48 hours after surgery</td>
<td>Experimental</td>
<td>8.00±1.26</td>
<td>97.96</td>
<td>1.79</td>
<td>0.074</td>
<td>3.50</td>
<td>1.66</td>
<td>-0.21-7.21</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>4.50±3.88</td>
<td>67.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change prior to shifting to OT to 24 hours after surgery</td>
<td>Experimental</td>
<td>2.00±0.89</td>
<td>60.00</td>
<td>2.62</td>
<td>0.009</td>
<td>-2.50</td>
<td>0.76</td>
<td>-4.20-0.79</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>4.50±1.64</td>
<td>57.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change prior to shifting to OT to 48 hours after surgery</td>
<td>Experimental</td>
<td>3.16±0.75</td>
<td>95.00</td>
<td>2.22</td>
<td>0.026</td>
<td>-2.50</td>
<td>0.89</td>
<td>-4.49-0.50</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>5.66±2.06</td>
<td>72.34</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change 24 hours after surgery to 48 hours after surgery</td>
<td>Experimental</td>
<td>1.16±0.75</td>
<td>87.50</td>
<td>0.00</td>
<td>1.00</td>
<td>0.00</td>
<td>0.43</td>
<td>-0.96-0.96</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>1.16±0.75</td>
<td>35.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Discussion

It is essential to manage the pre-operative fear and anxiety of children. This study evaluated that the multimodal pre-operative preparation program is effective in reducing the fear and anxiety of children, thereby preparing them effectively for surgery. Similar studies (Ho Cheung, Violeta & Tin, 2007 & Javed et al., 2008) conducted previously also support the current study findings where these studies evaluated that child life intervention, pre-operative therapeutic play and play interventions being effective in reducing the pre-operative anxiety of children. The main component of the
multimodal pre-operative preparation programme was the video film. Studies have tested that video
distraction (Kim, Jung, & Yu, Park, 2015), internet
preparation program (O’Conner-Von, 2008), Video
glass distraction (Beklen et al., 2013) and surgery
virtual tour were effective in minimizing the anxiety
of children and preparing them well for the surgery.
The current study findings are also supported by a
study, which showed that orientation tours of the
operating room were effective in reducing the pre-
operative anxiety among children (Kain, Mayes &
O’Connor. 1996 & Hatava, Olsson & Lagerkranser,
2000). Another study which showed that educational
videos were effective in preparing children for
surgery supports the study findings as well (Durst,
1990). These study findings are also supported by
a study where it was shown that the parents who
received an educational pamphlet and viewed a video
regarding the induction of anaesthesia helped their
children in minimizing their anxiety (Ronald &
Kimberly, 2001).

Conclusion
Preparing children for surgery is an essential
responsibility of health care professionals. The
pre-operative fear and anxiety can negatively
affect the post-operative recovery of children. The
pre-operative preparation of children should be
according to their level of understanding. When
the children received the multimodal pre-operative
preparation program the knowledge gained
regarding the pre, intra and post-operative events,
enabled the school age children to prepare well for
their upcoming surgery. Hence, the multimodal pre-
operative preparation programme is effective and can
be successively implemented in paediatric surgery
units to minimize the pre-operative fear and anxiety
of children. Further studies can be done to develop
and implement other interventions, which can help
children to cope with their surgery. Health care
facilities can develop this kind of program within
their policy and protocol. It is a onetime investment
for the hospital, but admitting all the children to the
hospital for surgery can be benefitted a lot. Nurses
can use this as an effective tool to prepare the
children for surgery as it is an audio-visual device,
which will enlighten them in a better manner.

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