RESEARCH PAPER

The Effect of Multi-source Feedback on Core Competencies of Pediatric Residents

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Objective: The study was conducted to evaluate impact of multisource feedback in pediatric residency training. **Methods**: A crossover study of pediatric residents at Wadia Children's Hospital was conducted with assessment of core competencies like knowledge, practice-based learning, system-based practice, professionalism, communication skills and interpersonal interaction. After randomization both groups (A and B) were given MSF and traditional feedback, respectively and later the groups were crossed over to other method of feedback. Control faculty assessed both groups at three points – Pre-intervention, after first and after second intervention. **Results**: There were 16 residents in each group (13,7,7 in first, second and third year of residency, respectively). Both groups had comparable scores in all six competencies at entry point. Group A after MSF showed significant improvement in all six competencies (all $P<0.01$). No significant improvement was observed in group B after traditional feedback. After cross-over to MSF, group B showed statistically significant improvement in all core competencies. Traditional feedback to group A after crossover showed statistically significant improvement only in knowledge, professionalism and system based practice. **Outcome**: MSF was beneficial in improving competency based performance scores in pediatric residents.

Keywords: *Feedback, Formative assessment, 360^0 evaluation.*

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Competency has been defined as "the ability to do something successfully and efficiently" [1]. In Miller framework of clinical competence, workplace-based methods of assessment target the highest level of the pyramid about performance in everyday work [2]. Thus, if learning objective is to develop professional identity of trainees, then we need an evaluation method which emphasizes on core competencies along with knowledge [3]. Formative assessments, like Multi-source feedback (MSF), are beneficial in checking and improving professional competency in residency training [4].

MSF, a questionnaire-based assessment, gathers perspectives from multiple stakeholders within a learner's sphere of influence, thus giving a vertical and horizontal collage of one's competencies. Feedback, an integral part of these assessments, helps in significant improvement in performance [5]. A systematic review [6] concluded that MSF is reliable, feasible and a valid way to assess competencies in pediatricians. Another study of anesthesiology residents [7] showed an improvement in performance in many core competencies with early exposure to MSF. Although popular in Western countries, studies of MSF in pediatric residency training from India are limited. We aimed to find out the effect of MSF on the performance of pediatric residents, when compared to traditional feedback.

METHODS

A prospective cross-over study was conducted in our pediatric super-speciality teaching institute in Mumbai, over a period of one year (2018-2019). Institutional ethics clearance was obtained prior to commencement of the study. Pediatric residents who were into at least three months of pediatric residency training were included, after an informed consent.

Six core competencies (patient care, knowledge and skills, communication skills, system-based practice, practice-based learning and professionalism) were pre-decided for assessment, in a focussed group discussion of faculty members. For MSF, questionnaires were prepared and validated for various raters. The questionnaires were simple, self-explanatory and permitted written comments in addition to the five-point Likert scale responses. Each resident was evaluated by eight raters (faculty - 1, peers - 2, nurses -2, parents-2, and self-assessment).

After giving unique identification numbers, pediatric residents were divided into two groups using EpiInfo randomization software. Group A received MSF and Group B was given traditional feedback first, and after cross over, group A got traditional feedback and group B-MSF. Three faculty members (control faculty) assessed the core competencies of the residents on a scale of 100 at three time intervals – pre (T0), after first intervention (T1) and after second intervention (T2) (**Fig. 1**). They were blinded to the group to which the residents belonged and assessed them at work without knowledge of the students.

MSF and traditional feedback were in structured format and were given by one faculty member each, separately. The feedback technique was a sandwich technique and was outcome oriented, one-on-one, confidential, descriptive, with clear learning objectives and plans for improvement [8]. One month was given to both groups to adapt to the feedback, and then they were subjected to intermediate assessment by control faculty (T1). After cross-over, Group B received MSF and Group A got traditional feedback followed by a month for assimilation and adaptation of respective feedbacks. This was followed by final assessment by control faculty (Time 2). The perception about MSF was obtained from students and faculty on a pre-designed feedback form and analyzed.

Statistical analysis: SPSS 21.0 was used for statistical analysis. For internal consistency of the instrument, Cronbach alpha was calculated for all the three time-points (Time 0, 1 and 2).The change in scores by the control faculty in both groups were calculated and compared. *P* values of ≥0.01 were considered significant. Comparison between pre, inter and post-intervention was done by Friedman test. Wilcoxon signed rank test was performed using different combinations of related groups.

RESULTS

Thirty two pediatric residents (20 males) spread over three years of training were enrolled. One student from group B dropped out of the study for medical reasons.

The control faculty evaluation form had a good inter-rater reliability with Cronbach alpha (95% CI) of 0.975 (0.96 - 0.986), 0.983 (0.978 - 0.991) and 0.985 (0.975-0.992) for the pre-intervention, intermediate intervention and post intervention phases, respectively. A Total of 249 (97.26%) questionnaires were collected which took 5 minutes for filling by each rater. The median scores for all six core competencies of both groups at T0 were comparable

Group A showed statistically significant change in all the six core competencies after MSF (all $P<0.01$); whereas, when they were crossed over to traditional feedback, only medical knowledge, system-based practice and professionalism had significant improvements (**Table I**). Group B did not show significant improvement in any core competency after traditional feedback, but when they were crossed over to MSF all the six core competencies

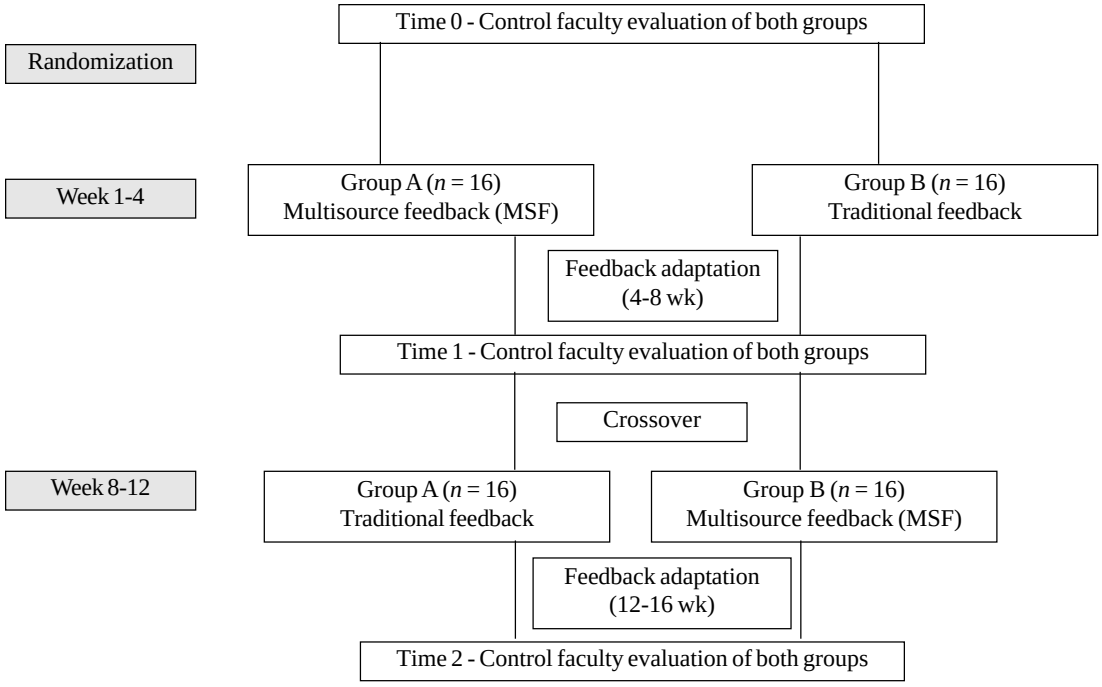

Fig. 1 Study flow chart.

exhibited significant change (**Table I**).

Second year residents among group A showed statistically significant change in their scores at T1, whereas among group B, year 1 and year 3 residents showed significant change at T1.

Perception about MSF was assessed from faculty members (*n*=8) and residents (*n*=31). All faculty members were satisfied by MSF, and a 6-monthly assessment was suggested by 62.5% of the faculty. MSF was considered very good by 96.7% (*n*=30) residents, and 6-monthly MSF was suggested by 58.1% (*n*=18). While 3-monthly evaluations were suggested by 22.6% (*n*=7) residents.

DISCUSSION

In this single-center study of pediatric residents, comparing MSF with traditional feedback, both groups showed significant improvement in all core competencies scores after MSF as against traditional feedback. Year-wise benefit could not be demonstrated uniformly.

Brinkman, et al. [9] showed that 360-degree feedback had a positive effect on communication skills and professional behavior among pediatric residents. MSF was found to be valid, feasible, reliable and useful method to evaluate pediatricians [6]. The best assessed competencies were communication, interpersonal skills, collegiality and medical expertise. The utility of MSF was also shown in few studies from other medical specialties [5,10]. Joshi, et al. [11] found 360-degree evaluation reliable and useful for assessment of residents' interpersonal and communication skills in field of obstetrics and gynecology. However, a non-comparative action based study by Archer, et al. [12] found that MSF in the form of Sheffield Peer Review Assessment Tool (SPRAT) did not provide enough data on trainees, and more assessments were suggested. Unlike our study, Tariq, et al. [13] showed improvement in communication and interpersonal skills in third year residents after MSF, but year-wise differences were not significant.

MSF has potential to be a useful tool, but current evidence suggests improvement in its administration [14]. Time constraint of busy clinical workload was possible reason of its under-utilization, as previously shown [15].

This can be overcome by preparing a competency based post graduate curriculum, year-wise segregation of the competencies and at-least one multisource feedback during residency training.

The brief study period for the residents to assimilate the feedback and show any kind of change in their competencies was the main limitation of the study. The crossover nature of our study design allowed residents to serve as their own control and thus minimized influence of confounding variables, but still there was a possibility of carry-over effects.

Significant improvement in core competencies after MSF depicted its usefulness in residency training thus suggesting its inclusion in the assessment modalities of Indian pediatric residency training programs.

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Table I Scores of Core Competencies in Pediatric Residents After Multi-source Feedback

Core competencies	*Pre-intervention*	*Intermediate intervention*	*Post- intervention*
Group A			
Patient care[a,e]	47.5 (36.3, 58.8)	60.0 (50, 68.8)	67.5 (56.3, 70)
Medical knowledge[a,c]	40.0 (40, 62.5)	56.5 (45, 73.8)	65.0 (51.3, 75)
Practice based learning and improvement[a]	42.5 (36.3, 63.8)	60.0 (45, 75)	65.0 (55.8, 75)
Interpersonal and communication skills[b,e]	50.0 (40, 60)	62.5 (51.3, 68.8)	63.5 (60, 73.8)
System based practice[b,d]	50.0 (40, 67.5)	62.5 (51.3, 73.8)	65.0 (56.3, 78.8)
Professionalism[a,d]	50.0 (40, 63.8)	65.0 (47.5, 78.8)	68.5 (56.3, 78.8)
Group B			
Patient care[c]	50.0 (40, 55)	55.0 (35, 62.5)	65.0 (52.5, 75)
Medical knowledge[c]	45.0 (40, 50)	55.0 (35, 60)	60.0 (52.5, 70)
Practice based learning and improvement[c]	45.0 (40, 50)	50.0 (35, 57.5)	65.0 (55,75)
Interpersonal and communication skills[d]	50.0 (40, 60)	60.0 (35, 67.5)	68.0 (55, 75)
System based practice[c]	45.0 (40, 50)	55.0 (40, 60)	65.0 (55, 70)
Professionalism[c]	45.0 (40, 57)	50.0 (40, 60)	65.0 (55, 75)

Data presented as median (IQR). For intermediate intervention - pre intervention, [a]P=0.001 and [b]P<0.01; For post intervention - intermediate intervention, [c]P=0.001, [d]P<0.01 and [e]P<0.05.

Ethics clearance: Institutional Ethics Committee, Bai Jerbai Wadia Hospital for Children; No. IEC- BJWHC/97/2018, dated August 30, 2018.
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