International Journal of Community Medicine and Public Health
Sathiyamoorthi S et al. Int J Community Med Public Health. 2025 Apr;12(4):1676-1681
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20250735

Original Research Article

Impact of online training for capacity building on adolescent health among health care providers of residential schools: a quasi-experimental study

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Received: 27 February 2025
Revised: 06 March 2025
Accepted: 12 March 2025

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ABSTRACT

Background: Adolescence is a critical period of growth and development. Despite the increasing focus on adolescent health, gaps in knowledge and skills among healthcare providers in residential schools can hinder effective adolescent healthcare delivery. To evaluate the impact of an online training program on capacity building for adolescent health among healthcare providers in residential schools using a pretest-posttest design.
Methods: A six-week structured online training program covering key aspects of adolescent health, including management of dermatological, reproductive, ear nose throat, the common mental health issues were conducted by subject experts among healthcare providers from residential schools. A pretest-posttest study design was employed to assess the effectiveness of online training. Paired t-tests were used to compare pretest and post-test scores, and Cohen's D was calculated for measuring effect size.
Results: About 214 healthcare providers attended the training program, out of which 82 (38.3%) were males and 134 (62.7%) were females. In dermatology, the mean pretest score was 4.214, which increased to 6.524 in the post-test, reflecting a 54.82% improvement. The highest percentage improvement was observed in ENT (64.71%). The paired t-test analysis revealed a statistically significant improvement in knowledge across all domains following the online training program. Effect size calculations (Cohen's d) demonstrated a very large effect for dermatology (d=2.66), psychiatry (d=2.58), and mental health (d=2.46), suggesting a strong impact of the training on these topics.
Conclusion: The findings suggest that online training is an effective tool for enhancing the knowledge and skills of healthcare providers in residential schools.

Keywords: Extension for community healthcare outcomes, Online training, Capacity building, Adolescent health

INTRODUCTION

Adolescence is a transitional phase between childhood and adulthood, marked by significant physical, emotional, and psychological development. Ensuring the health and well-being of adolescents requires healthcare providers and school authorities who are well-informed and trained to identify the specific needs of this population. In residential schools, where students spend the majority of their time under the supervision of school authorities, structured health education is crucial. Periodic training sessions and refresher programs for health supervisors

and community health workers are essential for the early and accurate identification of adolescent health needs and for timely referrals when necessary.[1]

The unprecedented pandemic of coronavirus disease of 2019 (COVID-19), with its lockdowns, travel restrictions, and social distancing measures, disrupted traditional face-to-face training programs for healthcare professionals. Medical education and professional training were significantly impacted, accelerating a global shift toward online learning in the healthcare sector.[2]

Online training offers a structured and accessible way for residential school staff to stay updated on key adolescent health topics, including nutrition, mental health, and reproductive health. Moreover, it eliminates logistical and financial barriers associated with traditional in-person workshops and seminars.[3]

Residential schools, particularly those in remote areas, often face challenges in providing regular health training due to budget constraints and the unavailability of expert trainers. Online platforms provide a cost-effective solution, ensuring that all school staff, regardless of location, can receive high-quality training on adolescent health.[4] Extension for community healthcare outcomes (iECHO) is a cloud-based digital platform developed by Project ECHO to enhance the management and scalability of ECHO programs worldwide.

It serves as a centralized hub for program management, community building, and impact amplification within the ECHO movement. Through iECHO, healthcare professionals can access a range of online training resources, including virtual mentorship, case-based learning, and interactive workshops.

The platform's design facilitates seamless collaboration between experts and practitioners, enabling the rapid dissemination of medical knowledge to underserved areas. By leveraging iECHO, organizations can efficiently launch and manage ECHO programs, track participation, and measure outcomes, thereby contributing to improved healthcare delivery and education.

Objectives

To train the health care providers of residential schools on adolescent health through online mode. To evaluate the impact of online training program for capacity building on adolescent health among healthcare providers

METHODS

This is a quasi-experimental study (pretest-posttest design) conducted at iECHO Hub at the Department of Community and Family Medicine, All India Institute of Medical Sciences (AIIMS) Mangalagiri, Andhra Pradesh for a period of six months. Participants were health supervisors/staff nurses of Andhra Pradesh social welfare residential educational institutions society (APSWREIS). The society has a total of 193 residential schools spread across four zones with approximately 50 schools per zone across the state of Andhra Pradesh. The study was conducted from September 2023 to February 2024. An exclusive Structured Six Week Online on Adolescent Health was created with expert faculty from the Departments of Psychiatry, Obstetrics & Gynecology, ENT, Community & Family Medicine, AIIMS Mangalagiri, with input from the APSWREIS team also, based on their needs.

Inclusion criteria

Health Supervisors of all Residential schools under APSWREIS who had access to Internet connection and online Training.

Exclusion criteria

Participants who did not give consent and who could not attend the online training.

Intervention

A six-week online training module on Adolescent Health was given to all the healthcare supervisors/Staff nurses of residential schools in a phased manner. Participants from zone one and three were trained in the initial six weeks with sessions on Tuesdays for zone one and Fridays for zone three. Participants from zone two and four were trained subsequently for next weeks with sessions on Tuesdays for zone two and Fridays for zone four.

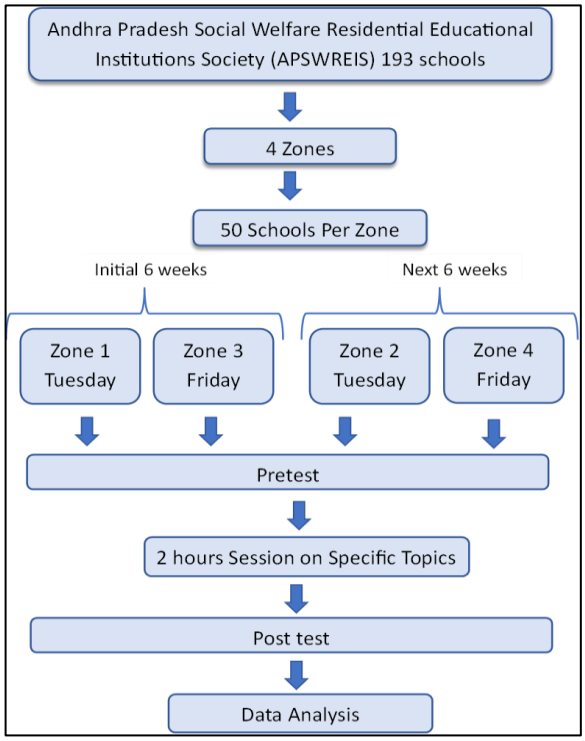

Figure 1: Flow chart for methodology.

Every week, a two-hour session on the module was conducted by respective expert faculty on topics such as screening and management of common illnesses in dermatology, nutrition, menstrual hygiene, ENT, mental health and psychiatry. The study was approved by the Institute Ethics Committee AIIMS, Mangalagiri. The sessions were conducted by respective subject experts on iECHO online platform (Figure 1).

Data collection

Socio demographic details of the participants were collected using a structured online questionnaire. Online forms were sent to participants before the session to assess the baseline knowledge (pre-test). After the session, participants were requested to fill in the post-test evaluation. The pre-test and post-test evaluation consisted of 10 questions each on the respective module of the week.

Statistical analysis

Data were entered and analyzed using statistical package for the social sciences (SPSS Inc., Released 2007, SPSS for Windows, version 16.0., Chicago, IL, USA). Descriptive data were presented as proportions. The continuous variables of pretest and posttest scores are expressed as Mean±SD and Median & IQR. The paired sample t-test/Wilcoxon signed rank test was applied to determine the mean and median significant differences between pre & posttest scores. P value <0.05 was considered statistically significant. The effect size was measured using Cohen's d.

RESULTS

About 214 health care providers attended the training program, out of which 82 (38.3%) were males and 134 (62.7%) were females. The mean age of the participants was 43.53±13.26 with minimum age being 27 years and maximum being 53 years of age. Sociodemographic details are shown in Table 1.

Table 1: Demographic profile of the participants (n=214).

Demographic profile	Frequency/Mean	%/SD
Gender		
Female	134	62.7
Male	82	38.3
Age (in years)	43.53	±13.26
Age category (in years)		
21-30	64	30
31-40	54	25
Above 40	96	45
Professional experience (in years)		
Less than 5	86	40
5-10	75	35
More than 10	53	25

Responses received for both pre-test and post-test varied between each domain. About 42 responses were received for dermatology, 58 responses for nutrition, 122 responses for ENT, 114 responses in psychiatry, 214 responses for menstrual hygiene and 112 responses for mental health.

The pre-test and post-test scores across six domains dermatology, nutrition, ENT, menstrual hygiene, psychiatry, and mental health along with the overall total score is presented as minimum and maximum scores, mean scores, standard deviation, and percentage improvement.

The results indicate a significant increase in post-test scores across all domains. The highest percentage improvement was observed in ENT (64.71%), followed by dermatology (54.81%), psychiatry (47.48%), menstrual hygiene (35.99%), mental health (27.98%), and nutrition (25.05%). The total score for each participant was calculated by taking the average of the responded scores from the domains in which they had valid scores.

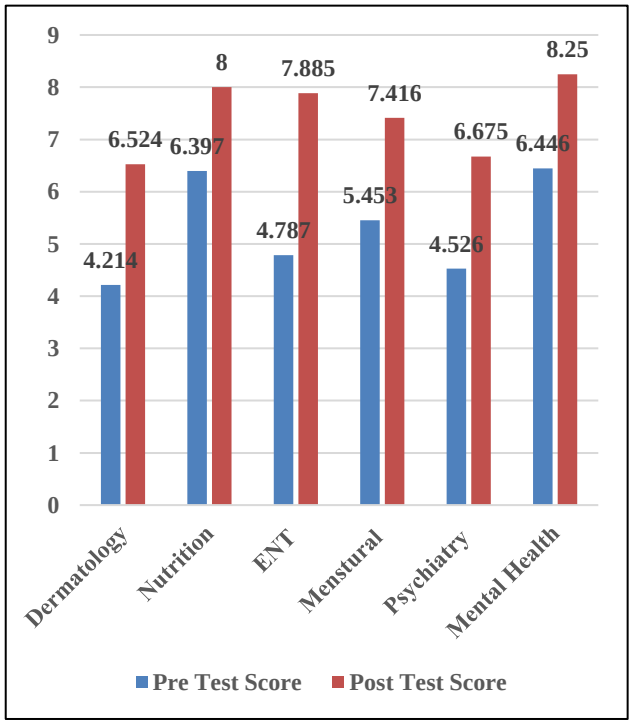

Figure 2: Comparison of pretest and posttest mean scores across six domains.

The total score showed an overall improvement of 25.54%, indicating a substantial gain in knowledge after the intervention.

The reduction in standard deviation in post-test scores suggests reduced variability, implying that participants' knowledge levels became more consistent after training. These findings highlight the effectiveness of the training program in enhancing knowledge across multiple health-related domains (Table 2).

Table 2: Percentage improvement in score between pre and post-test.

Domains	N	Minimum	Maximum	Mean	Std. Deviation	Percentage difference
Dermatology						
Pre-test	42	1.0	7.0	4.214	1.4573	
Post-test	42	4.0	9.0	6.524	1.1943	54.81
Nutrition						
Pre-test	58	4.0	9.0	6.397	1.0419	
Post-test	58	7.0	10.0	8.000	.7009	25.05
ENT						
Pre-test	122	1.0	9.0	4.787	1.5966	
Post-test	122	3.0	10.0	7.835	1.1599	64.71
Menstrual hygiene						
Pre-test	214	1.0	9.0	5.453	1.5610	
Post-test	214	3.0	10.0	7.416	1.3108	35.99
Psychiatry						
Pre-test	114	1.0	7.0	4.526	1.3450	
Post-test	114	4.0	9.0	6.675	1.2515	47.48
Mental health						
Pre-test	112	4.0	9.0	6.446	1.0384	
Post-test	112	6.0	10.0	8.250	.8436	27.98
Total score						
Pre-test	214	3.0	9.0	5.745	1.0942	
Post-test	214	4.0	9.5	7.212	1.0349	25.54

Table 3: Paired differences in knowledge scores: pre-test vs post-test analysis using t-test.

Domains		Paired differences					T test	P value	Cohen's d
		Mean	Std. deviation	Std. Error mean	95% confidence interval of the difference				
					Lower	Upper			
Pair 1	Dermatology post-test - dermatology pretest	2.3095	0.8692	0.1341	2.5804	2.0387	17.22	<0.0001	2.66
Pair 2	Nutrition post-test-nutrition pretest	1.6034	0.771	0.1012	1.8062	1.4007	15.839	<0.0001	2.08
Pair 3	Ent posttest-ENT pretest	3.0984	1.9259	0.1744	3.4436	2.7532	17.769	<0.0001	1.61
Pair 4	Menstrual hygiene post test-menstrual hygiene pretest	1.9626	2.2284	0.1523	2.2629	1.6623	12.884	<0.0001	0.88
Pair 5	Psychiatry posttest-psychiatry pretest	2.1491	0.8333	0.078	2.3037	1.9945	27.537	<0.0001	2.58
Pair 6	Mental health posttest-mental health pretest	1.8036	0.7332	0.0693	1.9409	1.6663	26.031	<0.0001	2.46
Pair 7	Total posttest - total pretest	1.4669	1.6575	0.1133	1.6902	1.2436	12.947	<0.0001	0.89

The paired t-test analysis revealed a statistically significant improvement in knowledge across all domains following the online training program ($p<0.0001$ for all comparisons).

The mean difference between pretest and posttest scores was highest in the ENT domain (3.10±1.93), followed by dermatology (2.31±0.87) and psychiatry (2.15±0.83), indicating substantial learning gains in these areas. The smallest mean difference was observed in menstrual hygiene (1.96±2.23) which still showed significant improvement. The mean difference for the total score (1.47±1.66) also showed significant improvement (Table 2).

Effect size calculations are done by Cohen's d which is a standardized effect size for measuring the difference between two group means. It is calculated by taking the difference between two means and dividing by the data's standard deviation. This measure reports the size of the mean difference by comparing it to the data's variability. Cohen's d of 0.2 to 0.49 is interpreted as having a small effect size, Cohen's d of 0.5 to 0.78 as having a medium effect, and Cohen's d of 0.8 and more is interpreted as having large effect size. In this study Cohen's d demonstrated a very large effect for dermatology (d=2.66), psychiatry (d=2.58), and mental health (d=2.46), suggesting a strong impact of the training on these topics.

The effect size for ENT (d=1.61) was also large, while menstrual hygiene (d=0.88) was comparatively low. The overall impact of the online training was significant with a (d=0.89) for total score that is indicated by the large effect size (Table 3).

DISCUSSION

The study shows that online training programs are effective in enhancing knowledge and capacity building in adolescent health among healthcare providers. A significant improvement in post-test scores suggests that participants benefited from the training, reinforcing the potential of online learning and its accessibility as a mode of education. This is similar to previous research that highlights the effectiveness of e-learning in health education and professional development.[5] One of the key advantages of online training is its flexibility, it allows healthcare workers to learn at their own pace without geographical constraints. In this study, the convenience of digital learning likely contributed to high engagement and improved learning outcomes. Similar findings have been reported in studies evaluating online training for healthcare professionals, emphasizing its role in continuous medical education.[6]

Similarly, improvements in knowledge have been documented in various healthcare training programs. A study conducted in India reported that the online training for medical officers and community health officers significantly improved their knowledge on adolescent health, with the majority of participants demonstrating improved post-test scores.[7] A study by Kumar et al. highlighted the role of digital literacy in influencing the effectiveness of online training among rural healthcare workers.[8] However, despite its advantages, online training has certain challenges. One challenge observed in this study was the varying numbers of participation in the evaluation for pretest-posttest during each week of the session. Also, some of the participants reported connectivity issues during the sessions. This might have affected the score improvement in different domains among healthcare workers. Similar challenges have been documented in previous studies, suggesting that adequate technical support and user-friendly platforms are essential for maximizing the effectiveness of online training.[9]

Additionally, while knowledge scores improved significantly, the long-term retention of knowledge and its application in real-world settings remain concerns. Studies indicate that periodic reinforcement and blended learning approaches may be needed to sustain knowledge gains over time. Future research should focus on longitudinal follow-ups to assess knowledge retention and behavioral changes in professional practice among healthcare workers.

Though Online training has shown a high impact in the immediate knowledge gain, the impact on the long-term retention of the knowledge needs to be studied. Technical barriers like lack of internet connectivity or lack of familiarity among digital platforms among few participants hindered the learning experience.

CONCLUSION

Overall, this study highlights the effectiveness of online training for capacity building in adolescent health among healthcare workers, particularly in residential schools. Interactive elements such as case-based learning, quizzes, and real-world application scenarios can be embedded in the training. Leveraging digital platforms to standardize and enhance training programs to stay updated with evidence-based guidelines and best practices, would increase their confidence and competence. Resource-limited settings can adopt periodic online training for capacity building.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Sathiyamoorthi S, Aravindakshan R, Avula VCR, Sharmila V, Naidu NK, Dhinakaran H. Impact of online training for capacity building on adolescent health among health care providers of residential schools: a quasi-experimental study. Int J Community Med Public Health 2025;12:1676-81.