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Knowledge, Attitudes and Self-reported Practices Regarding Special Educational Needs Among Medical Doctors Attending Online Continuing Professional Development Programmes in Sri Lanka: A Cross-Sectional Study

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Research Article

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Abstract

Background

Doctors contribute to recognising and referring children with special educational needs (SEN), but evidence on their preparedness in Sri Lanka is limited. This study assessed knowledge, attitudes, self-reported practices and factors associated with good practice among doctors attending online continuing professional development (CPD) programmes.

Methods

A cross-sectional online survey was conducted among 334 consecutively recruited eligible doctors attending selected CPD programmes in Sri Lanka during August 2026 and 332 were analysed. An expert-reviewed, pretested questionnaire assessed knowledge, attitudes, self-reported practices and perceived barriers. Expert-defined thresholds of ≥ 80% of maximum domain scores classified good knowledge, favourable attitudes and good practice. Multivariable logistic regression with backward elimination examined factors associated with good self-reported practice.

Results

Among participants, 60.2% were female and 88.9% worked in secondary or tertiary hospitals. Good knowledge, favourable attitudes and good self-reported practice were identified in 262(78.9%), 51 (15.4%) and 128 (38.6%) doctors, respectively. Only 21.4% expressed confidence in identifying SEN and 21.1% in counselling parents. Reported barriers included lack of training (66.0%), time constraints (45.8%) and lack of knowledge (42.8%). Good knowledge (adjusted odds ratio [aOR] 1.96; 95% confidence interval [CI] 1.20–3.21) and previous management of a child with SEN (aOR 1.69; 95% CI 1.02–2.78) were associated with higher odds of good practice. Managing > 50 paediatric patients weekly (aOR 0.54; 95% CI 0.30–0.96) and not having received SEN training (aOR 0.60; 95% CI 0.36–0.98) were associated with lower odds.

Conclusion

Among doctors attending selected online CPD programmes, gaps in knowledge, attitudes and self-reported practice accompanied commonly reported training and service barriers. The findings support evaluating practical professional education, clearer referral pathways and supportive clinical workflows. Cross-sectional data and non-probability sampling limit causal interpretation and generalisability.

Background

Special educational needs (SEN) refer to learning difficulties or disabilities requiring educational provision additional to, or different from, (1, 2). The Special Educational Needs and Disability Code of Practice for England identifies four broad areas of need: communication and interaction; cognition and learning; social, emotional and mental health; and sensory and/or physical needs (1). Although SEN is an educational concept rather than a diagnostic category, associated conditions include intellectual disability, autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD), communication disorders and specific learning disorders(3) .Recognising and addressing these needs supports children's right to inclusive education, as established under Article 24 of the United Nations Convention on the Rights of Persons with Disabilities(4).

Childhood disability and developmental difficulties represent an important public health concern because of their implications for education, psychosocial well-being and equitable access to services. UNICEF estimated that almost 240 million children worldwide, approximately one in ten, (5). Meta-analyses have estimated ADHD prevalence at 7.6% among children aged 3–12 years and developmental dyslexia prevalence at 7.1% among primary school children(6, 7). These estimates describe different populations and conditions and should not be interpreted as measures of overall SEN prevalence. Nevertheless, they demonstrate the substantial need for developmental assessment, educational support and coordinated care.

In Sri Lanka, regional studies indicate a burden of developmental and learning difficulties. Autism prevalence was estimated at 1.07% among children aged 18–24 months in a semi-urban community, while ADHD prevalence was 6.5% among primary school children in the Colombo District (8). Another study identified spelling difficulties in 22.5% of children aged ten years attending mainstream schools in a semi-urban area(9). These studies used different measures and populations, limiting comparison and national extrapolation. Comprehensive population-level data on SEN remain limited, making it difficult to quantify unmet needs and plan services. Although Sri Lanka has an established preventive child health system, developmental concerns may remain unrecognised, and some learning difficulties become apparent only after school entry.

Early identification provides opportunities to connect children and families with appropriate assessment and support. Unrecognised difficulties may contribute to poor educational attainment, school disengagement and psychosocial challenges. UNICEF reported that children with disabilities were 42% less likely to acquire foundational reading and numeracy skills and 49% more likely never to have attended school than children without disabilities (5). The Nurturing Care Framework highlights the role of health services in supporting early development and recognising developmental concerns (10). Effective identification therefore requires continuing surveillance, appropriate assessment, communication with families and timely referral, supported by coordination between health, education and social services.

Medical doctors have an important role because families may initially seek medical advice about developmental delays, behavioural concerns, communication difficulties or poor school performance.

Their responsibilities include recognising developmental concerns, identifying co-occurring medical conditions, counselling families, documenting functional difficulties and facilitating multidisciplinary assessment and referral(11, 12). International guidance recommends developmental surveillance during preventive health visits and standardised screening at specified ages (13). Doctors consequently require knowledge of diverse SEN presentations and available referral pathways. Their contribution also depends on attitudes towards professional responsibilities and the practical opportunities to provide appropriate care within their clinical settings.

Evidence suggests that professional preparedness may be inadequate. A study of 176 doctors at a tertiary care hospital in Sri Lanka found that 61.9% considered themselves incompetent to identify autism, with additional knowledge gaps concerning diagnostic features and associated conditions (14). However, its focus on one condition and institution limits its applicability to broader SEN-related practice. International evidence also indicates that improved knowledge does not necessarily translate into behavioural change. In a randomised trial involving 148 primary care clinicians, an autism-focused tele-mentoring programme improved knowledge and self-efficacy but did not significantly change autism screening practices(15). These findings support assessing knowledge alongside attitudes, reported practices and contextual barriers.

The knowledge, attitudes and practices (KAP) framework offers a structured approach to examining these dimensions, although their relationships are not necessarily linear and surveys cannot fully explain clinical behaviour (16). Continuing professional development (CPD) provides a potential platform for addressing identified needs. A Cochrane review found that educational meetings and workshops probably improve professional practice, although effects vary (17). Assessing doctors attending online CPD programmes could therefore inform relevant educational content, while recognising that participants may differ from the wider medical workforce.

Sri Lankan evidence has primarily examined individual conditions or other professional groups, leaving limited understanding of doctors' preparedness across the broader spectrum of SEN (14, 18). Evidence on factors associated with good practice is also insufficient. Addressing these gaps could inform targeted professional development and improvements in assessment and referral. Therefore, this study aimed to assess knowledge, attitudes and practices regarding SEN, and factors associated with good self-reported practice, among medical doctors attending online CPD programmes in Sri Lanka.

Methods

Study design and setting

An analytical cross-sectional study was conducted to assess the knowledge, attitudes, and practices (KAP) of medical doctors regarding the identification and management of children with special educational needs (SEN). The study was conducted among doctors attending online continuing professional development (CPD) programmes organised by the Society for Health Research and

Innovations Sri Lanka. These programmes were delivered through Zoom and attended by medical practitioners from different clinical and primary healthcare settings. Data were collected between 1 and 31 August 2026 using a structured, self-administered online questionnaire. The manuscript was prepared with reference to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies.

Study population and eligibility criteria

The study population comprised medical doctors attending selected online CPD programmes during the study period. Doctors engaged in general practice, paediatric wards, outpatient departments, or immunisation clinics at Medical Officer of Health (MOH) level who were involved in the clinical evaluation of children were eligible for inclusion. Doctors undergoing postgraduate training in paediatrics and those who did not provide informed consent were excluded.

Sample size and sampling technique

The sample size was calculated using the single-population proportion formula, assuming a prevalence of 50% because of limited previous evidence regarding doctors' knowledge, attitudes, and practices related to SEN. Using a 95% confidence level and 5% absolute precision, the initial sample size was estimated at 384. The estimated population comprised approximately 1,000 unique eligible doctors attending the selected CPD programmes; doctors attending multiple sessions were counted only once when estimating this population. Finite population correction was applied, yielding an adjusted sample size of approximately 278. This was increased by 20% to allow for potential non-response and unusable responses, yielding a recruitment target of 334 (278 x 1.2) participants.. Consecutive sampling was employed, whereby all eligible doctors attending selected CPD sessions during the study period were invited to participate until recruitment ended..

Study instrument and validation

Data were collected using a structured, self-administered online questionnaire covering sociodemographic characteristics, professional background, and knowledge, attitudes, and practices concerning the identification and management of children requiring additional support in learning. The questionnaire underwent judgemental validation by experts in Paediatrics and Community Medicine, who assessed the relevance, clarity, appropriateness, and content coverage of individual items. Their recommendations were incorporated before pretesting. The revised questionnaire was pretested among 20 doctors attending a separate online CPD programme who were excluded from the main study. Pretesting assessed comprehensibility, questionnaire flow, completion time, technical feasibility, and acceptability. Necessary modifications were made based on the findings.

Data collection

Eligible doctors were invited to participate through WhatsApp or email and received an electronic participant information sheet and consent form. Access to the questionnaire was permitted only after electronic informed consent was obtained. The questionnaire link was distributed through each participant's preferred communication channel. Two reminders were sent to participants who had not completed the questionnaire, at one-week intervals. Participants who remained non-responsive one week after the second reminder were classified as non-respondents. Participant names were collected solely to identify duplicate submissions and were removed before statistical analysis.

Study variables and operational definitions

The primary outcome variables were knowledge, attitudes, and practices related to the identification and management of children with SEN. These were assessed using predefined questionnaire items and classified according to predetermined scoring criteria. Explanatory variables included age, sex, workplace, current designation, years of professional experience, type of clinical practice, exposure to paediatric care, and previous training in child development, learning difficulties, or SEN.

Knowledge, attitude, and practice scores were converted into percentages of the maximum possible scores for their respective domains. Cutoff values were established a priori by an expert panel comprising Consultant Community Physicians and Paediatricians, considering questionnaire content, expected professional competency, and modified Bloom's cutoff criteria. Scores of ≥ 80% were categorised as good knowledge, favourable attitudes, or good practices, while scores below 80% indicated poor knowledge, unfavourable attitudes, or poor practices, respectively (23, 24). Additionally, an attitude score above 60% was used to identify participants demonstrating at least moderate attitudes. These classifications were used in descriptive and analytical assessments.

Bias minimisation and data quality assurance

Several measures were implemented to minimise potential bias and strengthen data quality. Consecutive recruitment of eligible participants was undertaken to reduce selective recruitment within the study population. The expert-validated and pretested questionnaire improved content validity and clarity, while standardised electronic data collection reduced data-entry errors. Automated validation checks were incorporated to minimise missing or inconsistent responses. Reminder messages were used to reduce non-response, and doctors undergoing postgraduate training in paediatrics were excluded to limit the influence of specialised training on the measured outcomes. Data were checked for completeness, consistency, and duplicate submissions before analysis, with participant identifiers removed from the analytical dataset.

Data management and statistical analysis

Data were exported into a spreadsheet and analysed using IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, NY, USA). Sociodemographic and professional characteristics were summarised using descriptive statistics. Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as means with standard deviations or medians with interquartile ranges, according to their distributions. Knowledge, attitude, and practice scores were calculated using the predefined scoring system and categorised using the established cutoff values.

Bivariate associations were examined using chi-square or Fisher's exact tests for categorical variables, while independent-samples t-tests or Mann–Whitney U tests were applied to continuous variables, as appropriate. Variables associated with outcomes at $p < 0.20$ in bivariate analysis, together with variables considered important based on previous evidence or clinical relevance, were included in multivariable logistic regression models to account for potential confounding. Adjusted odds ratios (aORs) with 95% confidence intervals were reported. Multicollinearity was assessed, and model fit was evaluated using the Hosmer–Lemeshow goodness-of-fit test. Statistical significance was defined as $p < 0.05$.

Bivariate associations were examined using chi-square or Fisher’s exact tests for categorical variables, while independent-samples t-tests or Mann–Whitney U tests were applied to continuous variables, as appropriate. Variables associated with good self-reported practice at $p < 0.20$ in bivariate analysis, together with variables selected on the basis of previous evidence or clinical relevance, were entered into the initial multivariable binary logistic regression model. These variables comprised [list all variables initially entered]. Backward elimination using the likelihood-ratio method was performed, with a removal threshold of $p > 0.2$. The model included 332 participants with complete data for all variables entered into the initial model. Adjusted odds ratios (aORs) with 95% confidence intervals were reported. Multicollinearity was assessed using [specify the method], and model fit was evaluated using the Hosmer–Lemeshow goodness-of-fit test. Statistical significance was defined as $p < 0.05$. As variable selection was data-driven, the resulting associations were interpreted as exploratory.

Ethical considerations

Ethical approval

was obtained from the Ethics Review Committee of the National Institute of Health Sciences, Kalutara, Sri Lanka (NIHS/ERC/26/45R; 13 July 2026). Electronic informed consent was obtained from all participants before data collection. Participation was voluntary, and respondents could decline or withdraw without consequences, including any effect on eligibility for future CPD programmes. Participant information sheets and consent forms were provided electronically. Identifying information was collected only to verify and exclude duplicate responses and was removed before analysis. Data were analysed and reported in aggregate form, maintaining participant anonymity and confidentiality. Electronic records were maintained in password-protected databases accessible only to investigators and were scheduled for destruction three years after study completion. The study involved minimal anticipated risk, although participants could experience mild discomfort when responding to questions

regarding their professional knowledge or practices. Participants could skip questions or discontinue participation without consequences. Although no direct benefits were anticipated, the findings may inform future CPD programmes, professional training, and policy development related to the identification and management of children requiring additional learning support.

Results

Out of 334 participants two duplications removed then the analysis included responses from 332 (medical professionals on the main socio-demographic, professional, knowledge, attitude, and practice variables included in the descriptive analysis.

Socio-demographic and professional characteristics

The majority of participants were female (200; 60.2%), and 132 (39.8%) were male. Most participants had more than 10 years of clinical practice (194; 58.4%), followed by 61 (18.4%) with 2–5 years, 57 (17.2%) with 6–10 years and 20 (6.0%) with less than 2 years. Most doctors were attached to secondary or tertiary care hospitals (295; 88.9%), and medical officers formed the largest professional category (307; 92.5%) (Table 1).

Table 1
Socio-demographic and professional characteristics of participants (n = 332)

Characteristic	Category	n	%
Sex	Female	200	60.2
	Male	132	39.8
Years of practice	< 2 years	20	6.0
	2–5 years	61	18.4
	6–10 years	57	17.2
	> 10 years	194	58.4
Type of institution	University/academic	3	0.9
	Preventive sector	8	2.4
	Primary health care centre	14	4.2
	Private hospital	12	3.6
	Secondary/tertiary care hospital	295	88.9
Professional designation	Intern medical officer	8	2.4
	Medical officer	307	92.5
	Registrar	12	3.6
	Senior registrar	3	0.9
	Consultant	2	0.6

Clinical exposure, training and service-related factors

Just over half of the doctors (169; 50.9%) had previously managed a child with suspected special educational needs (SEN). Only 71 (21.4%) had received training on SEN, while 278 (83.7%) had not attended an SEN-related CPD programme during the previous two years. More than half (193; 58.1%) rated their training as very inadequate or inadequate. Screening tools for SEN were reported as available by only 68 (20.5%), while 141 (42.5%) were not sure about their availability (Table 2).

Table 2
Clinical exposure, training and service-related factors (n = 332)

Variable	Category	n	%
Paediatric patients seen per week	< 10	105	31.6
	10–25	99	29.8
	26–50	48	14.5
	> 50	80	24.1
Ever managed a child with suspected SEN	No	163	49.1
	Yes	169	50.9
Received training on SEN	No	261	78.6
	Yes	71	21.4
Attended SEN-related CPD in last 2 years	No	278	83.7
	Yes	54	16.3
Self-rated adequacy of SEN training	Very inadequate	67	20.2
	Inadequate	126	38.0
	Neutral	99	29.8
	Adequate	30	9.0
	Very adequate	10	3.0
Screening tools for SEN available	No	123	37.0
	Yes	68	20.5
	Not sure	141	42.5

Knowledge of SEN

Knowledge of selected SEN-related statements was generally high. Most participants correctly identified that SEN refers to children needing additional support for learning (302; 91.0%). A high proportion alsorecognised that early identification improves outcomes (317; 95.5%), that doctors have a role in identifying SEN (319; 96.1%) and that SEN requires multidisciplinary management (315; 94.9%). Knowledge was comparatively lower for specific learning difficulties: 241 (72.6%) correctly identified that dyslexia mainly affects reading, 267 (80.4%) correctly rejected the statement that children with learning disabilities always have low intelligence, and 269 (81.0%) correctly identified that dyscalculia affects mathematics (Table 3).

Table 3
Knowledge of doctors regarding special educational needs (n = 332)

Knowledge item	Correct response, n (%)	Incorrect response, n (%)	Don't know, n (%)
SEN refers to children needing additional support for learning	302 (91.0)	6 (1.8)	24 (7.2)
Dyslexia mainly affects reading	241 (72.6)	52 (15.7)	39 (11.7)
Dyscalculia affects mathematics	269 (81.0)	14 (4.2)	49 (14.8)
Children with learning disabilities always have low intelligence (false statement)	267 (80.4)	41 (12.3)	24 (7.2)
Poor school performance can be an early sign of SEN	281 (84.6)	26 (7.8)	25 (7.5)
Attention problems may coexist with learning difficulties	304 (91.6)	11 (3.3)	17 (5.1)
Early identification improves outcomes	317 (95.5)	8 (2.4)	7 (2.1)
Doctors have a role in identifying SEN	319 (96.1)	5 (1.5)	8 (2.4)
SEN requires multidisciplinary management	315 (94.9)	6 (1.8)	11 (3.3)
Language delay may be linked to learning difficulties	291 (87.7)	21 (6.3)	20 (6.0)

Attitudes towards SEN

Regarding attitudes, 120 doctors (36.1%) agreed that doctors should identify children with special educational needs (SEN), while 119 (35.8%) agreed that managing SEN was part of their professional responsibility. Only 99 (29.8%) and 94 (28.3%) agreed on the importance of early referral and multidisciplinary care, respectively. Only 71 doctors (21.4%) expressed confidence in identifying SEN, and 70 (21.1%) expressed confidence in counselling parents. Neutral responses were most frequent for these two statements, reported by 142 (42.8%) and 137 (41.3%), respectively. A further 115 doctors (34.6%) agreed that they needed more training on SEN. For the negatively worded statement that children with poor academic performance are lazy, 213 doctors (64.2%) disagreed or strongly disagreed, indicating a favourable attitude towards this item; 78 (23.5%) were neutral, and 41 (12.3%) agreed (Table 4).

Table 4
Attitudes of doctors towards SEN (n = 332)

Attitude statement	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)
Doctors should identify children with SEN	159 (47.9)	8 (2.4)	45 (13.6)	120 (36.1)
Early referral is important	192 (57.8)	9 (2.7)	32 (9.6)	99 (29.8)
Managing SEN is part of my responsibility	137 (41.3)	10 (3.0)	66 (19.9)	119 (35.8)
I feel confident identifying SEN	48 (14.5)	71 (21.4)	142 (42.8)	71 (21.4)
I feel confident counselling parents	56 (16.9)	69 (20.8)	137 (41.3)	70 (21.1)
Multidisciplinary care is important	192 (57.8)	12 (3.6)	34 (10.2)	94 (28.3)
I need more training on SEN	164 (49.4)	8 (2.4)	45 (13.6)	115 (34.6)
Children with poor academic performance are lazy	85 (25.6)	128 (38.6)	78 (23.5)	41 (12.3)

Practices related to SEN identification and management

Routine practice related to SEN was moderate.In total, 200 (60.2%) participants often or always asked about school performance, 190 (57.2%) asked about reading or writing difficulties, 202 (60.8%) assessed developmental concerns, 202 (60.8%) identified children needing referral and 201 (60.5%) referred suspected SEN cases. Counselling, documentation and communication with other professionals were less frequent: 178 (53.6%) often or always counselled parents, 182 (54.8%) documented concerns and 181 (54.5%) communicated with relevant professionals (Table 5).

Table 5
Practices related to SEN identification and management (n = 332)

Practice item	Never n (%)	Rarely n (%)	Sometimes n (%)	Often n (%)	Always n (%)
Ask about school performance	14 (4.2)	26 (7.8)	92 (27.7)	94 (28.3)	106 (31.9)
Ask about reading/writing difficulties	17 (5.1)	35 (10.5)	90 (27.1)	76 (22.9)	114 (34.3)
Assess developmental concerns	12 (3.6)	28 (8.4)	90 (27.1)	83 (25.0)	119 (35.8)
Counsel parents regarding learning issues	17 (5.1)	31 (9.3)	106 (31.9)	79 (23.8)	99 (29.8)
Refer suspected SEN cases	23 (6.9)	32 (9.6)	76 (22.9)	74 (22.3)	127 (38.3)
Document concerns in records	27 (8.1)	35 (10.5)	88 (26.5)	70 (21.1)	112 (33.7)
Communicate with other professionals	29 (8.7)	38 (11.4)	84 (25.3)	88 (26.5)	93 (28.0)
Identify children needing referral	15 (4.5)	33 (9.9)	82 (24.7)	82 (24.7)	120 (36.1)

Overall levels of knowledge, attitudes and practices

Attitudes

Using the modified Bloom's cut-off, an attitude score of 80% or above was considered indicative of a good attitude. With a maximum possible attitude score of 24, the 80% cut-off corresponded to 19.2; therefore, participants scoring 19.2 or above were classified as having good attitudes. Under this criterion, only 51 doctors (15.4%) had good attitudes toward identifying and managing children with SEN.

Knowledge

Using the same 80% cut-off, 262 (78.9%) doctors had good knowledge of SEN.

Practices

Doctors who obtained 80% or more of the total practice score were considered to have good practices. Based on this cut-off, 128 doctors (38.6%) had good practices related to the identification and management of children with special educational needs.

Barriers

The most frequently reported barrier was lack of training, reported by 219 (66.0%) participants. Time constraints were also common, reported by 152 (45.8%), followed by lack of knowledge, reported by 142

(42.8%). Lack of referral pathways and limited access to specialists (87; 26.2% and 38; 11.4%, respectively) were reported less frequently (Table 6).

Table 6
Barriers to SEN identification and management (n = 332; multiple responses permitted)

Barrier	Reported, n	% of total sample
Lack of training	219	66.0
Time constraints	152	45.8
Lack of knowledge	142	42.8
Lack of referral pathways	87	26.2
Limited access to specialists	38	11.4
Other barriers	12	3.6

Factors associated with good practice

In the bivariate analysis, previous management of a child with suspected special educational needs (SEN) and good knowledge were significantly associated with good self-reported practice. Doctors who had previously managed a child with suspected SEN had higher odds of good practice than those without such experience (OR]1.57; p = 0.046). Similarly, doctors with good knowledge had higher odds of good practice than those without (OR 2.78; p = 0.001). No statistically significant associations were observed for sex (p = 0.175), age category (p = 0.740), type of institution (p = 0.090), receipt of SEN training (p = 0.077), duration of SEN training (p = 0.345), average consultation time (p = 0.068), weekly paediatric patient volume (p = 0.071), or self-rated training adequacy (p = 0.236). These findings represent unadjusted associations (Table 7).

Table 7
Bivariate analysis of factors associated with good practice

Associated factor	Category	Poor practice n (%)	Good practice n (%)	Total	OR	p value
Sex	Female	117 (58.5)	83 (41.5)	200	1.00	—
	Male	87 (65.9)	45 (34.1)	132	0.73	0.175
Age category	< 40 years	91 (62.3)	55 (37.7)	146	1.00	—
	≥ 40 years	112 (60.5)	73 (39.5)	185	1.08	0.740
Type of institution	Other institutions	18 (48.6)	19 (51.4)	37	1.00	—
	Secondary/tertiary hospitals	186 (63.1)	109 (36.9)	295	0.56	0.090
Ever managed a child with suspected SEN	No	109 (66.9)	54 (33.1)	163	1.00	—
	Yes	95 (56.2)	74 (43.8)	169	1.57	**0.046**
Good knowledge	No	55 (78.6)	15 (21.4)	70	1.00	—
	Yes	149 (56.9)	113 (43.1)	262	2.78	**0.001**
SEN training not received	No	38 (53.5)	33 (46.5)	71	1.00	—
	Yes	166(63.6)	95 (36.4)	261	0.66	0.122
Duration of SEN training[2]	None or one day	165 (62.7)	98 (37.3)	263	1.00	—
	>1 day	39 (56.5)	30 (43.5)	69	1.30	0.345
Average consultation time	< 10 minutes	160 (64.3)	89 (35.7)	249	1.00	—
	≥ 10 minutes	44 (53.0)	39 (47.0)	83	1.60	0.068
Average paediatric patients managed[3]	≤ 50 per week	148 (58.7)	104 (41.3)	252	1.00	—
	> 50 per week	56 (70.0)	24 (30.0)	80	0.61	0.071
Training adequacy	Very inadequate/	176 (60.3)	116 (39.7)	292	1.00	—
	Adequate	28 (70.0)	12 (30.0)	40	0.65	0.236
Attitudes	Not good	170 (60.5)	111 (39.5)	281	1.00	0.405
	Good	34 (66.7)	17 (33.3)	51	0.77	

Multivariable logistic regression

Independent variables were assessed for their unadjusted associations with good self-reported practice. Variables with $p < 0.20$ were considered candidates for the multivariable binary logistic regression model. Based on Table 7, these comprised sex, type of institution, previous management of a child with suspected SEN, good knowledge, receipt of SEN training, average consultation time, and weekly paediatric patient volume. The model was fitted using backward elimination. No evidence of problematic multicollinearity was identified, with all variance inflation factors < 5 and tolerance values > 0.1. The Hosmer–Lemeshow test did not indicate evidence of poor model fit ($p = 0.984$). However, the Nagelkerke pseudo-R^2 of 0.083 indicated limited explanatory performance.

In the final multivariable logistic regression model, good knowledge of SEN was associated with higher odds of good self-reported practice (AOR 1.96; 95% CI 1.20–3.21; $p = 0.008$). Previous management of a child with SEN was also associated with higher odds of good practice (AOR 1.69; 95% CI 1.02–2.78; $p = 0.041$). Conversely, managing more than 50 pediatric patients per week was associated with lower odds of good practice than managing 50 or fewer patients (AOR 0.54; 95% CI 0.30–0.96; $p = 0.036$). Doctors who had not received SEN training had lower odds of good practice than those who had received training (AOR 0.60; 95% CI 0.36–0.98; $p = 0.043$). These estimates were mutually adjusted for the other variables retained in the final model. (Table 8).

Table 8
Multivariable logistic regression of factors associated with good practice

	B	S.E.	Sig.	Exp(B)	95% C.I.for EXP(B)	
					Lower	Upper
Good knowledge of SEN Management	.671	.252	.008	1.957	1.195	3.206
Ever managed a child with SEN	.523	.255	.041	1.687	1.022	2.783
More than 50patients per week	− .626	.299	.036	.535	.298	.961
Not received SEN training	− .518	.255	.043	.596	.361	.983
Constant	− .733	.251	.003	.480		

Discussion

This study identified gaps in preparedness among doctors attending selected online continuing professional development (CPD) programs in Sri Lanka to identify and support children with special educational needs (SEN). Although recognition of several general principles was high, 78.9% met the study-defined threshold for good knowledge, and 38.6% met the threshold for good self-reported practice. Only 15,4% met the threshold for favorable attitudes, while approximately one-fifth expressed confidence in identifying SEN or counseling parents. In the final adjusted model, good knowledge and prior management of a child with SEN were associated with higher odds of good practice. Managing more than 50 pediatric patients per week and, as labeled in the reported model, not having received SEN

training were associated with lower odds. These findings indicate that knowledge, clinical exposure, and service conditions warrant consideration together when examining SEN-related practice.

The knowledge findings suggest that recognition of the importance of SEN care was more widespread than knowledge of specific learning difficulties. Approximately 95% recognised the benefits of early identification, doctors' identification role and the need for multidisciplinary management, whereas fewer correctly identified the principal difficulty associated with dyslexia. This distinction matters because recognising a general responsibility does not establish competence in assessing a child's functional difficulties or deciding when further assessment is required. Educational content should therefore connect general principles with practical recognition, communication and referral tasks.

Good knowledge was associated with higher adjusted odds of good practice (AOR 1.96; 95% CI 1.20–3.21), suggesting that knowledge may support the identification and management of children with SEN. This finding aligns with a Sri Lankan study reporting that doctors with poor knowledge of autism perceived themselves as less competent in identifying the condition [16]. However, the present study's cross-sectional design prevents determining the direction of this relationship, as doctors may also acquire knowledge through managing children with SEN. Furthermore, a randomized ECHO Autism trial found improvements in clinician knowledge and self-efficacy without a statistically significant improvement in measured clinical practice [16]. This finding suggests that increasing knowledge alone may be insufficient to change practice and supports combining education with opportunities for practical application and clinical support.

Previous management of a child with SEN was associated with higher adjusted odds of good practice (AOR 1.69; 95% CI 1.02–2.78). Clinical exposure may provide opportunities to develop skills in recognising developmental and learning concerns, counselling families, and navigating referral pathways. However, reverse causation is also plausible: doctors with better practices may be more likely to identify children with suspected SEN and consequently report previous management. The cross-sectional design precludes establishing the temporal sequence of this association or concluding that clinical exposure improves practice. Related evidence showed that healthcare professionals with experience working with children with autism reported greater clinical self-efficacy than those without such experience [reference]. Although self-efficacy reflects confidence rather than practice, this finding provides indirect support for the potential relevance of clinical exposure to SEN-related care(19) .

In the reported model, doctors labelled as not having received SEN training had lower odds of good practice (AOR 0.60; 95% CI 0.36–0.98). Subject to confirmation of the exposure coding, this association is compatible with a role for training in professional preparedness. However, motivation, clinical responsibilities and access to educational opportunities could influence both training participation and practice. The association therefore does not establish training effectiveness or identify the most useful content, duration or delivery method. A Cochrane review of 215 studies found that educational meetings and workshop training probably slightly improve professional practice compared with no intervention, with smaller effects on patient outcomes, which is consistent with our findings. (17) .

Managing more than 50 paediatric patients per week was associated with lower odds of good practice (AOR 0.54; 95% CI 0.30–0.96). This association is consistent with, but does not prove, a possible contribution of workload to the opportunities available for developmental assessment, counselling and documentation. Weekly patient volume is an indirect measure that does not capture consultation length, case complexity, staffing or other duties. These findings were consistent with a retrospective longitudinal study which was done in the NHS in England, which found that lower turnover rates for nurses and senior doctors were associated with better health outcomes for patients with emergency hospital admissions (20)

In the bivariate analysis, 64% of doctors with consultation durations of less than 10 minutes reported poor self-reported practice, compared with 53% of those with longer consultations. Shorter consultations were associated with higher unadjusted odds of poor practice (OR 1.60), but the association did not reach statistical significance ($p = 0.075$). This finding does not establish that consultation duration is unimportant; rather, the evidence was insufficient to conclude that an association existed in this sample. Evidence directly examining consultation duration and SEN-related practice among doctors is limited. Related research reported an association between longer consultations and more accurate identification of psychological problems (21) However, differences in patient populations and outcomes limit direct comparison with the present study. Broader context is provided by a systematic review by Irving et al., covering more than 28 million primary care consultations across 67 countries. The authors raised concerns that very short consultations may adversely affect patient care and physician workload and stress. These concerns highlight the potential relevance of consultation duration, although the review does not directly confirm an association with SEN-related practice (22).

The attitude findings indicate gaps in doctors' perceived preparedness and in their endorsement of their professional responsibilities in SEN-related care. Only 15.4% met the study-defined threshold for favorable attitudes, and about one-fifth expressed confidence in identifying SEN or counseling parents. This low confidence aligns with earlier Sri Lankan evidence: Rohanachandra et al. reported that 61.9% of doctors at a tertiary care hospital considered themselves incompetent in identifying autism (14). Although their study focused specifically on autism, it provides contextual support for concerns about doctors' perceived preparedness to recognise developmental conditions. Limited endorsement of early referral, multidisciplinary care and management responsibilities in the present study suggests that educational initiatives should address professional roles alongside practical competencies. Shah et al. identified discrepancies between paediatricians' perceived responsibilities and their reported involvement in special education, with insufficient training among the principal barriers to care(23). However, their findings concerned a gap between recognised responsibilities and reported practice, whereas the present study also identified limited endorsement of those responsibilities.

Interpretation of the overall attitude classification requires caution because the measure combined professional beliefs, confidence and perceived training needs. These represent related but distinct dimensions. The favourable response of 64.2% to the negatively worded statement concerning laziness

demonstrates that low overall scores should not be interpreted as uniformly negative attitudes towards children with SEN. Furthermore, only 34.6% expressed a need for additional training despite low confidence across the sample. These aggregate percentages cannot establish whether participants with low confidence were the same individuals who did not perceive a training need. Differences between knowledge and attitude responses may reflect distinctions between factual awareness, personal responsibility and perceived capability, although item wording and coding also warrant review.

Together, these findings support evaluating educational approaches that address professional responsibilities, confidence, and practical skills. Case-based learning, supervised clinical exposure, and parental counseling practice are potential approaches for evaluation. However, improved confidence should not be assumed to reflect improved clinical performance. In a randomized trial of ECHO Autism, clinician knowledge and self-efficacy improved without significant improvements in measured clinical practice (15). Future evaluations should therefore assess observed practice and referral outcomes alongside confidence and attitude scores. Differences in populations, clinical conditions, and measurement instruments limit direct comparisons across studies, while the cross-sectional design of the present study prevents conclusions about the direction of relationships among attitudes, training, clinical experience, and practice.(15)

In this study, the main barriers to good practices in managing children with SEN were lack of training (reported by 219 doctors, 66.0%), followed by time constraints (152, 45.8%) and lack of knowledge (142, 42.8%). This suggests that although doctors may encounter children with developmental, learning, or behavioural difficulties in routine clinical practice, many may not feel adequately prepared to identify, assess, counsel, or refer them appropriately.

In a national survey of 1,000 randomly selected paediatricians and paediatric residents in the United States, 87% of participants did not feel that paediatricians had sufficient knowledge of special education (24).

Similarly, Coker et al. identified difficulty prioritising time as a barrier to early childhood screening, including developmental delay and maternal depression. This finding is consistent with the present study, in which time constraints were reported as a barrier to effective practices in identifying and managing children with special educational needs(25) and the same article reported that lack of knowledge regarding referral options following positive screens was a perceived barrier to screening for developmental delay (11.4%) and maternal depression (39.8%). In the present study, 42.8% of doctors identified insufficient knowledge of special educational needs as a barrier to care. Although these measures addressed different aspects of knowledge, both studies highlight knowledge gaps that may hinder identification and referral(25) .

Shah et al. also reported that insufficient training was a major barrier to paediatricians' ability to support children with educational difficulties and special education needs(26). Similarly, Morelli et al. found that a lack of training, limited time, and workflow challenges were significant barriers to developmental screening in primary care settings (23). Lipkin et al. also noted that although developmental screening

and referral practices have improved over time, further strengthening of clinician capacity, referral systems, and practice support is needed(27) .

The findings from Sri Lanka align with previous studies, showing that training gaps, lack of knowledge, and time constraints remain key obstacles to effective SEN-related practice. This underscores the need to introduce structured in-service training, practical screening tools, clear referral pathways, and clinic-based guidance for doctors managing children with suspected SEN.

Strengths and limitations

A strength of this study was its comprehensive assessment of knowledge, attitudes, practices, and perceived service barriers among the same group of clinically active medical professionals. Expert review for judgemental validation and subsequent pretesting supported the questionnaire's relevance, clarity, and appropriateness for the study population. The use of a sample size determined through a formal calculation further strengthened the study's methodological rigour. In addition, multivariable logistic regression assessed factors associated with good practices in managing children with special educational needs while adjusting for potential confounding by other measured variables in the model.

This study has several limitations. Consecutive recruitment from selected online continuing professional development (CPD) programmes produced a non-probability sample and may have introduced selection bias, as CPD participants may differ from non-participants in knowledge, motivation, and clinical practices. The cross-sectional design prevents assessing temporal relationships and making causal inferences. Practices were self-reported and may therefore be affected by recall and social desirability bias. We did not independently verify clinical performance through direct observation or record review. Measuring explanatory variables and practices with the same questionnaire may also have introduced common-method bias. Although expert review and pretesting supported the questionnaire's relevance and clarity, these procedures alone do not establish its reliability, factor structure, or predictive validity. Furthermore, dichotomising knowledge, attitude, and practice scores reduced information, and the proportions classified into each category depended on the selected thresholds. In addition, the findings may not be generalizable to doctors who do not attend online CPD programs and the recruitment was restricted to doctors attending selected online CPD sessions who volunteered to participate. Selection and volunteer bias may therefore limit the generalisability of the findings to other doctors in Sri Lanka.

Implications for practice and research

The findings suggest that SEN-related professional development should address practical competencies, confidence and professional responsibilities alongside factual knowledge. Undergraduate education and CPD programs could incorporate case-based learning, supervised clinical exposure and practice in recognizing learning difficulties, counseling parents, documenting concerns and making appropriate referrals. These approaches should be evaluated rather than assumed to improve clinical practice.

Healthcare institutions should consider providing locally appropriate assessment tools, clear referral criteria, and up-to-date information on available educational and specialist services. Collaboration among doctors, teachers, and allied health professionals could support coordinated assessment and follow-up. Service improvement initiatives should also examine staffing, consultation workflows, and workload to identify opportunities to incorporate developmental and learning concerns into routine care.

Further research should include more representative samples across primary care, preventive services, hospitals, and private practice. Psychometric evaluation of the questionnaire should assess knowledge, professional attitudes, and confidence as distinct constructs. Reported practices should be verified through clinical observation or record review. Prospective, controlled intervention studies are needed to determine whether educational and service improvements enhance referral appropriateness, referral completion, family experience, and child outcomes.

Conclusion

Among doctors attending selected online CPD programmes in Sri Lanka, awareness of general SEN principles coexisted with gaps in confidence and consistent self-reported practice. More than three-quarters demonstrated good knowledge, fewer than two-fifths reported good practice, and only 15.4% met the study-defined threshold for favorable attitudes. Good knowledge and previous SEN-related clinical exposure were associated with higher adjusted odds of good practice, while higher weekly pediatric patient volume and not receiving SEN training were associated with lower odds. Training gaps, time constraints and insufficient knowledge were commonly reported barriers. These findings support evaluating practical professional education alongside clearer referral pathways and supportive clinical workflows. The cross-sectional design and non-probability sampling limit causal interpretation and generalisability.

Abbreviations

ADHD: attention-deficit/hyperactivity disorder;

AOR: adjusted odds ratio; ASD: autism spectrum disorder;

CI: confidence interval;

CPD: continuing professional development;

KAP: knowledge, attitudes and practices;

MOH: Medical Officer of Health;

OPD: Outpatient Department;

OR: odds ratio;

SEN: special educational needs;

SPSS: Statistical Package for the Social Sciences;

STROBE: Strengthening the Reporting of Observational Studies in Epidemiology.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Ethics Review Committee of the National Institute of Health Sciences, Kalutara, Sri Lanka (Ref. No. NIHS/ERC/26/45R; 13 July 2026). Electronic informed consent was obtained from all participants. The study was conducted in accordance with the Declaration of Helsinki.

Consent for publication
Not applicable.

Competing interests

The authors declare that they have no competing interests.

Clinical trial number

Not applicable.

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Authors' contributions

J.M.S. Dineshan Ranasinghe and Anuruddha Padeniya conceptualised the study. J.M.S.Dineshan Ranasinghe developed the methodology, coordinated data collection, performed the statistical analysis, and drafted the manuscript. Udayi Gunawardana, Manthi T. Katulanda, Anuruddha Padeniya, D.R. Dulanjali Ratnayake, and Sivarajah Agilan contributed to the study design, interpretation of findings, and critical revision of the manuscript for important intellectual content. All authors read and approved the final manuscript and agreed to be accountable for all aspects of the work.

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Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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