Knowledge, Attitude, and Practices Regarding Childhood Tuberculosis Screening and Management among Healthcare Providers in Al-Medinah Al-Munawara, Saudi Arabia

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Abstract

Among infectious illnesses, tuberculosis (TB) has the highest fatality rate. The likelihood of infection spreading from patients to healthcare providers is two times higher than in the general population. The primary risk factor for contracting TB is close proximity to an infected individual prior to diagnosis. The research assessed health workers' knowledge, attitude, and practice of TB infection control in Saudi Arabia. The study used a cross-sectional approach based on an online survey. The research was carried out throughout the months of May to July 2022 in Al Madinah Al-Munawara. The questionnaire included demographic's and work variables, knowledge regarding pediatric TB etiology, transmission, symptoms, lymph node characteristics, and diagnostic criteria. Also, the participants' perspectives and practice patterns on contact investigation, TB diagnostic tools, laboratory services, presumptive TB diagnostic referrals, and TB treatment were evaluated. The study included 558 healthcare workers (HCWs) from various specialists. HCWs exhibited sound knowledge, and positive attitudes in comparison to those with minimal experience in diagnosing TB in children TB as 31.2% had excellent knowledge, 22.6% good, 18.5% mediocre, and 27.8% bad. The majority of responders (49.1%) had a positive attitude, while only 33.2% had correct and full practice routines. Immediate action is required to increase HCW awareness, capacity, and skills to ensure an accurate diagnosis. In the identification of TB cases, certain crucial information gaps were discovered. This study also highlights the significance of clinical experience and frequent interactions with tuberculosis patients in clinical practice as a pathway to competency-based learning by practice.

Keywords: healthcare workers, knowledge, tuberculosis, diagnosis, practice, KSA.

Introduction

Over 600 children worldwide lose their lives to tuberculosis (TB) daily. Among one million children who had active TB in 2019, it is expected that 70% of those cases have been missed by doctors or misdiagnosed [1]. Due to the non-specific symptoms and challenging identification of TB in children under the age of 15, the treatment of this disease remains a problem. Children's TB is difficult to diagnose, despite recent breakthroughs in the field [2]. Diagnostics for pediatric tuberculosis using stool samples and the Xpert MTB/RIF test have been investigated [3]. Diagnoses of children's TB have been made using a variety of processes due to the difficulty of making an accurate diagnosis; however, none of these procedures are now regularly employed [4].

Saudi Arabia is the third-largest nation in the Middle East, occupying most of the Arabian Peninsula. Saudi Arabia, which the WHO classifies as having a moderate TB burden, reported an annual TB incidence rate of 18 per 100,000 people in 2012 [1].

Despite attempts by the Saudi Arabian government to eliminate tuberculosis, public statistics suggest that the illness is not entirely under control in the country. A directly observed therapy (DOTS) programme was launched as part of the national TB control programme (NTP) in the country in 1999, and although treatment success rates reached 62% they remain below the WHO objective (85%) [5]. As a result, the current case detection rate is similarly at 87%. TB mortality rates in Saudi Arabia have fallen from 7.2% to 6.1% in the recent decade, whereas they have remained stable for non-Saudis (5.4%) [6, 7].

Many countries have difficulties in recognizing instances of childhood tuberculosis. According to the WHO, most countries have incorporated contact investigation in their national recommendations for detecting children's TB infections. Despite this, several of these activities have yet to be consistently implemented or expanded [8]. Some studies have shown that healthcare workers' lack of understanding about children's tuberculosis (TB) diagnosis, treatment, and prevention is a problem [9-11]. HCWs working in Hajj have been shown to have inadequate knowledge and attitudes toward infection prevention and control, especially TB control [12]. According to several studies, healthcare workers (HCWs) have a lack of understanding and attitudes about tuberculosis (TB) diagnosis and treatment, as well as poor practices that increase their risk of infection and which have a detrimental effect on patients and the community [13-16]. This study intended to study healthcare workers' knowledge, attitudes, and practice regarding diagnosing and managing tuberculosis (TB) among children. The findings may be used to identify problems, constraints, opportunities for improvement, and allocate resources and efforts to the most effective initiatives.

Methods

1. Study Design, Setting and Sample Size

It is a quantitative cross-sectional study based on an online questionnaire sheet. The study was conducted at Al Madinah Al-Munawwarah from May 2022 to July 2022. The study included healthcare providers with various specialized services. The sample size was calculated using a web calculator as the proportions of questionnaire accuracy is 50%, and a margin of error of 5%, with a confidence interval of 95%; thus, about 378 records were enroled in the study. The Institutional Review Board (IRB) provided written approval regarding the aim of the study (22-051). Also, online consent was taken from the participants in the study.

2. Data Collection and Instrument:

The National Tuberculosis Program (NTP) in February 2020 and other previous studies led to the development of a structured questionnaire [9, 11] to assess the knowledge, attitude and practice (KAP) of healthcare providers regarding TB among children. The questionnaire included four parts. The Social factors included age, gender, education, years of experience, position, and training on pediatric TB. The second part included knowledge regarding pediatric TB as to the causes of TB, transmission pathways, symptoms, features of lymph nodes that indicate TB, and diagnostic criteria for childhood TB. Also, the participants' attitude was measured by studying their views on contact investigation, training on pediatric tuberculosis, TB diagnostic instruments, laboratory services, and human resources for childhood tuberculosis. Contact investigation performance, presumptive TB referrals for diagnostic work-ups, and TB treatment were all included in the information on practices.

3. Data Management and Analysis Plan:

The data was entered into the computer using the latest IBM SPSS software program (24.0) version. The use of numbers and percentages characterized the qualitative data. The Chi-square test was used to examine the degree of similarity between several groups concerning categorical variables. The significance test results are presented in the form of a two-tailed probability. At the 5% level, the significance of the findings was evaluated.

The scores for the KAP responses were determined. According to the most recent research, incorrect, improper, or unclear answers received a score of 0 points, while those that were right and appropriate were granted 1 point. For the multiple-choice questions that included more than one correct option, the score was determined by whether or not HCWs selected the correct response.

Results

Of the 589 collected questionnaires, a total of 558 sheets were completed. The demographics and characteristics of included subjects are shown in Table 1. More than half of the respondents (59.5%) were aged between 25-34 years followed by 26% in the age group of 35-44 years. The majority of respondents worked at hospitals (66.7%) while 33.3% worked at health centres. Additionally, 62% had fewer than 10 years experience and 38% had more than 10 years experience. As for the educational level, 56.8% had a bachelor's degree, 20.1% had a diploma, 14% had a master's degree, and 9.1% had a PhD degree. Physicians (36.2%), nurses, and paramedics (33.7%), followed by pharmacists (13.1%) were the major positions of most of the healthcare workers. Regarding the training on childhood TB status, only 25.1% of respondents had received previous TB training.

Table 1: Demographic and characteristic features of the HCWs.

Demographic and characteristic features of the HCWs	No	%
Age		
25-34	332	59.5
35-44	145	26.0
45-54	52	9.3
>55	29	5.2
Marital status		
Single	225	40.3
Married	302	54.1
Divorced	31	5.6
Experience		
Less than 10 years old	346	62.0
more than 10 years	212	38.0
Workplace		
Health center	186	33.3
Hospital	372	66.7
Have isolation in your work		
No	96	17.2
Yes	462	82.8
Isolation area is		
Ward	62	13.4
Room	400	86.6
Position		
Physician	202	36.2
Physician Dentist	7	1.3
Pharmacist	73	13.1
Nursing/Paramedic	188	33.7
Lab, Radiologist	53	9.5
Non-medical job	35	6.3
Education levels		
Bachelor	317	56.8
Consultant/ PhD	51	9.1
Diploma	112	20.1
Master/ Senior	78	14.0
Training on childhood TB		
No	418	74.9
Yes	140	25.1
Total	**558**	**100.0**

The questions relating to the knowledge of healthcare workers are presented in Table 2. The majority of respondents (62.5%, 65.4%) correctly answered the question that TB is a transmissible disease caused by bacteria, respectively. Also, more than half of healthcare workers had sound knowledge regarding the methods of transmission and the exact length of treatment for reducing transmission. The low level of knowledge was associated with the definition of high-risk groups of children, duration of cough, temperature, general symptoms, and the characteristics of enlarged lymph nodes and screening criteria.

The attitude of healthcare workers regarding TB diagnosis is illustrated in Table 3. The diagnostic criteria and laboratory services of childhood TB were evaluated as adequate among 57.6% of the participants. More than half of healthcare workers had a positive attitude toward the provision of proper training (62.9%), sufficient staff (52.9%), and sufficient drugs (51.4%). On the other hand, the negative attitudes were related to bringing close contact to smear + PTB to HF for TB screening and referring suspected TB cases to diagnostic workup.

The practice pattern for children's TB screening was improper among most participants, as only 25.4% always asked index TB patients to bring their close contacts to health facilities for TB screening, while 19.7% did this often. About 29.6% and 26% will always and often perform contact investigations in the community. Less than 50% of the respondents would always and often treat childhood TB. As for the protective measures, only 23.5% will always wear personal protective equipment before contact with children with TB or presumptive TB (Table 4).
Table (4): Practice pattern of TB diagnosis and screening.

Table 2: Questions related to HCWs' knowledge

Knowledge	Frequency	Percentage
TB is caused by bacteria		
Yes	351	62.9
No	207	37.1
TB is a transmissible disease		
Yes	365	65.4
No	193	34.6
TB is spread through expectorated droplet		
Yes	290	52.0
No	268	48.0
Transmission is reduced after a smear-positive PTB received treatment for two weeks		
Yes	305	54.7
No	253	45.3
Knew at least two out of three groups of children at high risk of developing TB below		
Age lessthan 1-year-old	205	36.7
Living with smear-positive PTB	165	29.6
Living with HIV	188	33.7
Knew at least four out of eight childhood TB symptoms/signs below		
Chronic cough	298	53.4
Persistent fever	214	38.4
Weight loss or no weight gain	102	18.3
Night sweats	144	25.8
Bone deformity	95	17.0
Enlarged lymph nodes	88	15.8
Arthralgia	98	17.6
Asthenia	80	14.3
Knew duration of cough that implies TB (≥2 weeks):		
1 week	240	43.0
2 weeks	166	29.7
More than 2 weeks	182	32.6
Knew level of fever that implies TB (>38.0 °C)		
37	201	36.0
38	196	35.1
More than 38	191	34.2
Knew at least three out of six characteristics of enlarged lymph nodes implying TB below		
Enlarged ≥2 cm	149	26.7
Painless	144	25.8
Asymmetric	136	24.4
Firm, matted or discreet	152	27.2
Persistent (>2 weeks)	121	21.7
Unresponsive to other treatments (such as antibiotics)	109	19.5
Knew at least four out of seven screening criteria for childhood TB below		
Enlarged lymph nodes	112	20.1
Persistent cough	298	53.4
Persistent wheezing	201	36.0
Weight loss or not gaining weight	142	25.4
Fever	214	38.4

Table 3: Distribution of the studied group regarding their attitude

	Strongly agree		Agree		Disagree		Strongly disagree	
	No.	%	No.	%	No.	%	No.	%
Diagnostic tools are adequate for diagnosis of childhood TB	165	29.6	156	28.0	85	15.2	152	27.2
Laboratory services are adequate for the diagnosis of childhood TB	204	36.6	142	25.4	95	17.0	117	21.0
Majority of staff in charge of TB have adequate training on childhood TB	241	43.2	110	19.7	103	18.5	104	18.6
Sufficient staff to treat childhood TB	165	29.6	130	23.3	122	21.9	141	25.3
Always sufficient drugs to treat childhood TB	145	26.0	142	25.4	110	19.7	161	28.9
Would ask to bring close contact to smear + PTB to HF for TB screening	149	26.7	122	21.9	163	29.2	124	22.2
Would refer children who might have TB for TB diagnostic workup	136	24.4	106	19.0	133	23.8	183	32.8

Table 4: Practice pattern of TB diagnosis and screening.

Practice	Frequency	Percentage
Ask index TB patients to bring their close contacts to health facilities for TB screening		
Always	142	25.4
Often	110	19.7
Sometimes	114	20.4
Never	192	34.4
Perform contact investigation in the community		
Always	165	29.6
Often	145	26.0
Sometimes	117	21.0
Never	131	23.5
Treat childhood TB		
Always	127	22.8
Often	149	26.7
Sometimes	132	23.7
Never	150	26.9
Do you wear personal protective equipment before contact with children with TB or presumptive TB?		
Always	131	23.5
Often	98	17.6
Sometimes	124	22.2
Never	205	36.7

Table 5 presents the KAP level of HCWs. The level of knowledge was excellent among 31.2%, good among 22.6%, fair among 18.5%, and poor among 27.8%. The attitude score was positive among the majority of respondents (49.1%) and the practice score was right and complete among 33.2% while about half had wrong practice patterns.

Table 5: KAP level of HCWs

KAP	No	%
Knowledge		
Excellent	174	31.2
Good	126	22.6
Fair	103	18.5
Poor	155	27.8
Attitude		
Positive	274	49.1
Neutral	152	27.2
Negative	132	23.7
Practice		
Right and complete	185	33.2
Right but not complete	92	16.5
Wrong	281	50.4

Table 6 showed the variables predicting good knowledge as physicians, educational levels, previous TB training, and having an isolation ward in the hospital were significantly associated with better knowledge scores

Table 6: Factors associated with HCWs' knowledge of childhood tuberculosis.

	Level of knowledge								Total	X^2 P value
	Excellent "n=174"		Good "n=126"		Faire "n=103"		Poor "n=155"			
Age	No.	%	No.	%	No.	%	No.	%		
25-34	105	60.3	88	69.8	52	50.5	87	56.1	332	
35-44	45	25.9	20	15.9	32	31.1	48	31.0	145	15.9
45-54	15	8.6	10	7.9	15	14.6	12	7.7	52	0.06N.S
>55	9	5.2	8	6.3	4	3.9	8	5.2	29	
Experience										
Less than 10 years old	102	58.6	85	67.5	65	63.1	94	60.6	346	2.61
More than 10 years	72	41.4	41	32.5	38	36.9	61	39.4	212	0.45N.S
Workplace										
Health center	62	35.6	44	34.9	36	35.0	44	28.4	186	2.38
Hospital	112	64.4	82	65.1	67	65.0	111	71.6	372	0.49N.S
Have isolation ward in your work										112.8
No	10	5.7	8	6.3	9	8.7	69	44.5	96	0.001*
Yes	164	94.3	118	93.7	94	91.3	86	55.5	462	
Position										
Physician	152	87.4	50	39.7	0	0.0	0	0.0	202	
Physician Dentist	2	1.1	5	4.0	0	0.0	0	0.0	7	
Pharmacist	10	5.7	32	25.4	20	19.4	11	7.1	73	407.8
Nursing/Paramedic	10	5.7	38	30.2	70	68.0	70	45.2	188	0.001*
Lab, Radiologist	0	0.0	1	0.8	12	11.7	40	25.8	53	
Non-medical job	0	0.0	0	0.0	1	1.0	34	21.9	35	
Education levels										
Bachelor	51	29.3	108	85.7	86	83.5	72	46.5	317	
Consultant/ PhD	51	29.3	0	0.0	0	0.0	0	0.0	51	414.7
Diploma	0	0.0	12	9.5	17	16.5	83	53.5	112	0.001*
Master/ Senior	72	41.4	6	4.8	0	0.0	0	0.0	78	
Training on childhood TB										341.6
No	42	24.1	118	93.7	103	100.0	155	100.0	418	0.001*
Yes	132	75.9	8	6.3	0	0.0	0	0.0	140	

The positive attitude was related to having an isolation room at hospital, being a younger age, being physicians, working at hospitals, having higher educational levels, and having received TB training (Table 7). The level of practice showed a significant correlation with younger age, physician, working at hospitals, higher educational levels, and TB

Table 7: Relation between basic demographic and characteristic feature of HCWs group with the level of attitude.

	Level of attitude						Total	X^2 P value
	Positive "n=274"		Neutral "n=152"		Negative "n=132"			
Age	No.	%	No.	%	No.	%		
25-34	178	65.0	112	73.7	42	31.8	332	60.3 0.001*
35-44	65	23.7	24	15.8	56	42.4	145	
45-54	20	7.3	12	7.9	20	15.2	52	
>55	11	4.0	4	2.6	14	10.6	29	
Experience								
Less than 10 years old	185	67.5	98	64.5	63	47.7	346	15.4 0.001*
more than 10 years	89	32.5	54	35.5	69	52.3	212	
Workplace								
Health center	60	21.9	40	26.3	86	65.2	186	79.6 0.001*
Hospital	214	78.1	112	73.7	46	34.8	372	
Have isolation in your work								
No	10	3.6	15	9.9	71	53.8	96	165.1 0.001*
Yes	264	96.4	137	90.1	61	46.2	462	
Position								
Physician	167	60.9	32	21.1	3	2.3	202	230.7 0.001*
Physician Dentist	4	1.5	3	2.0	0	0.0	7	
Pharmacist	36	13.1	28	18.4	9	6.8	73	
Nursing/Paramedic	62	22.6	66	43.4	60	45.5	188	
Lab, Radiologist	4	1.5	18	11.8	31	23.5	53	
Non-medical job	1	0.4	5	3.3	29	22.0	35	
Education levels								
Bachelor	210	76.6	65	42.8	42	31.8	317	279.9 0.001*
Consultant/ PhD	45	16.4	6	3.9	0	0.0	51	
Diploma	1	0.4	75	49.3	36	27.3	112	
Master/ Senior	18	6.6	6	3.9	54	40.9	78	
Training on childhood TB								
No	136	49.6	150	98.7	132	100.0	418	180.1 0.001*
Yes	138	50.4	2	1.3	0	0.0	140	

Table 8: Relation between characteristics of HCWs with the level of practice.

	Level of practice						Total	X^2 P value
	Right complete "n=185"		Right incomplete "n=92"		Wrong "n=281"			
Age	No.	%	No.	%	No.	%		
25-34	132	71.4	44	47.8	156	55.5	332	
35-44	42	22.7	26	28.3	77	27.4	145	133.5
45-54	10	5.4	20	21.7	22	7.8	52	0.001*
>55	1	0.5	2	2.2	26	9.3	29	
Experience								
Less than 10 years old	122	65.9	65	70.7	159	56.6	346	7.6
more than 10 years	63	34.1	27	29.3	122	43.4	212	0.021*
Workplace								
Health center	30	16.2	42	45.7	114	40.6	186	37.295
Hospital	155	83.8	50	54.3	167	59.4	372	0.001*
Have isolation in your work								
No	32	17.3	21	22.8	43	15.3	96	2.75
Yes	153	82.7	71	77.2	238	84.7	462	0.25N.S
Position								
Physician	171	92.4	31	33.7	0	0.0	202	
Physician Dentist	4	2.2	3	3.3	0	0.0	7	
Pharmacist	0	0.0	25	27.2	48	17.1	73	442.8
Nursing/Paramedic	10	5.4	25	27.2	153	54.4	188	0.001*
Lab, Radiologist	0	0.0	8	8.7	45	16.0	53	
Non-medical job	0	0.0	0	0.0	35	12.5	35	
Education levels								
Bachelor	48	25.9	56	60.9	213	75.8	317	
Consultant/ PhD	49	26.5	2	2.2	0	0.0	51	308.6
Diploma	12	6.5	32	34.8	68	24.2	112	0.001*
Master/ Senior	76	41.1	2	2.2	0	0.0	78	
Training on childhood TB								
No	52	28.1	86	93.5	280	99.6	418	323.9
Yes	133	71.9	6	6.5	1	0.4	140	0.001*

The association between knowledge score with attitude and practice is presented in Table 9. The better the knowledge score, the more significant impact on positive attitude and correct and complete practice.

Table 9: Relation between level of knowledge and both attitude and practice among health care workers.

	Level of knowledge								Total	X^2 P value
	Excellent "n=174"		Good "n=126"		Fair "n=103"		Poor "n=155"			
	No.	%	No.	%	No.	%	No.	%		
Attitude										
Positive	142	81.6	85	67.5	42	40.8	5	3.2	274	488.5
Neutral	30	17.2	40	31.7	61	59.2	21	13.5	152	0.001*
Negative	2	1.1	1	0.8	0	0.0	129	83.2	132	
Practice										
Right and complete	154	88.5	31	24.6	0	0.0	0	0.0	185	583.4
Right but not complete	20	11.5	65	51.6	7	6.8	0	0.0	92	0.001*
Wrong	0	0.0	30	23.8	96	93.2	155	100.0	281	

Discussion

The primary findings of the present study were that HCWs had proper knowledge of TB patient characteristics, diagnosis, and treatment. There was a positive attitude regarding diagnosis and screening while practice competencies were limited.

The level of knowledge was excellent and good among 53.8% of participants. This was also found in the results of investigations conducted in major African centres [16, 17]. This result is similar to the 52% median International Standards for Tuberculosis Care (ISTC) score seen among medical professionals during the 2016 Hajj [17], which is lower than the 67.3% shown in Lima, Peru [18], but higher than the 14 % seen in India and the 10.5 to 48 % seen in Pakistan [19, 20]. However, this conclusion contradicts the low levels of TB knowledge across all occupational groups [14].

The results of the knowledge portion showed that, as was to be expected, doctors had the greatest overall knowledge scores, while nurses and pharmacists had lower overall knowledge scores. Naidoo et al. also identified a knowledge gap amongst occupations. Since doctors create care plans that nurses follow, it is crucial that nurses have a firm grasp of the fundamentals underlying clinical decisions [21].

On the other hand, healthcare professionals in trials involving public hospitals or clinicians who merged public and private practices seemed to have higher knowledge ratings, maybe as a result of their greater exposure to training materials in the public sector. As was previously found [19], this shows that public physicians at hospitals have a deeper understanding of TB than their private counterparts.

Aside from Côte d'Ivoire, all nations scored somewhat higher than average on global knowledge. Results improved dramatically when HCWs provided direct care for tuberculosis [22]. These results are consistent with previous research showing that frontline HCWs (physicians, nurses) know more about tuberculosis than other HCWs [17, 23].

The majority of responders (49.1%) had a positive attitude, while only 33.2% had correct and full practice routines. It is consistent with the results of a recent study Surveying the Knowledge and Practices of Health Professionals in China, India, Iran, and Mexico on Treating Tuberculosis [15] that found some problematic behaviours among HCWs. However, HCWs globally had generally positive attitudes; a good indicator that they were ready and able to identify and treat pediatric tuberculosis [22]. Also, the overall mean score for practice was greater than the scores for knowledge and attitude [14, 24]. Of the HCWs, almost 62% were given passing marks for their overall practice, while only 1% were given failing marks. In this study, we found that HCWs' TB knowledge increased with age, employment in hospitals, years of experience, and experience with TB patients. Similar factors affecting TB awareness among HCWs were observed across global studies [14, 18, 24]. Attitude ratings were substantially correlated with both age and profession. Researchers in Peru discovered that healthcare workers' attitudes regarding tuberculosis varied by the position of HCW [13], while in Thailand, researchers found that HCWs age was substantially correlated to their attitude toward the disease [25]. There was a statistically significant difference in practice scores according to education level, and there were also significant differences relating to the length of work experience and by occupation. Mozambican research indicated that HCWs TB practice ratings were significantly correlated to their educational attainment, profession, and years of experience caring for TB patients [14, 16]. However, work experience with TB, TB training, and education level were found to be independent predictors of excellent TB infection control practice among HCWs in Ethiopia [24]. There was a favourable association between knowledge and attitude, as well as between attitude and practice [17]. Nonetheless, the connection was tenuous, nd results on either the knowledge or practice quizzes did not show any statistically significant correlation among previous studies. There is no straightforward correlation between HCWs' knowledge, attitudes, and behaviors in regards to TB management, as suggested by reports in the literature [14, 16, 24].

There were some limitations in this survey. In the context of a prospective project launch and group KAP questionnaire-filling sessions, social desirability may influence results. Some participants may have answered questions as if they were factual or policy-based. Good practices among HCWs may have been overstated since they were self-reported and not observed.

This study has several strength factors including a proper sample size that could provide a base for the KAP of HCWs in KSA. Also, the survey results reveal the essential next stages in the decentralization of child TB diagnosis, including the continuous improvement of HCW capabilities and skills to identify, diagnose, and treat TB in children; and the improvement of availability of simple, rapid, and effective diagnostic equipment.

Conclusion

Overall, HCWs exhibited proper knowledge and positive attitudes in comparison with minimal experience in diagnosing children TB. Immediate action is required to increase HCW awareness, capacity, and skills, as well as access to an accurate diagnosis. In the fields of TB case identification and management, certain crucial information gaps were discovered. This study also highlights the significance of clinical experience and frequent interactions with tuberculosis patients in clinical practice as a pathway to competency-based learning by practice.

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