ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

DEPARTMENT OF PEDIATRICS AND CHILD HEALTH

KNOWLEDGE, ATTITUDE AND PRACTICE OF PEDIATRIC RESIDENTS AND NURSES ON BLOOD CULTURE SAMPLING AT TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDIS ABABA, ETHIOPIA, CROSS SECTIONAL STUDY ,2025

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THESIS SUBMITTED TO ADDIS-ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES, SCHOOL OF MEDICINE, DEPARTMENT OF PEDIATRICS AND CHILD HEALTH IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE SPECIALTY CERTIFICATE IN PEDIATRICS AND CHILD HEALTH.

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Knowledge, Attitude and Practice of Pediatric residents and nurses on blood culture sampling at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, 2025

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Declaration

Assurance of principal investigator I, the undersigned agree to accept responsibility for the scientific, ethical and technical conduct of the research project & for provision of required progress report as per terms and condition of the college of health sciences in effect at the time of grant is forwarded as the result of this application.

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Approval

This thesis proposal has been submitted with the approval of the university advisors

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List of acronyms

AAU:	Addis Ababa University
BSI:	Blood stream infections
CDC:	Center of Disease control
CLSI:	Clinical and Laboratory Standard Institute
IDSA:	Infectious Disease Society of America
KAP:	Knowledge, Attitude and Practice
TASH:	Tikur Anbessa Specialized Hospital
WHO:	World Health Organization

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Abstract

Background: Blood culture is a key test for doctors treating bloodstream infections. Accurate results depend on proper collection, transport, and processing of blood samples. The skills of medical staff, shaped by their knowledge and experience, are crucial for obtaining reliable results. Improper techniques can lead to contamination and affect the outcomes. Currently, there is no published information about practices and Knowledge pertaining to blood culture techniques, in our country especially for those working with children. The purpose of this study was to identify any gap in this field.

Objective: This study sought to evaluate knowledge, Attitude and Practice of Pediatric residents and nurses on blood culture sampling at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia.

Methods: Hospital based cross-sectional study involving 148 Pediatrics residents and Nurses working at Tikur Anbessa Hospital from December 1 2024 to January 8 2025.A structured, self administered questionnaire that was modified from several literary works was used to evaluate Knowledge, Attitude and practice of residents. The software program SPSS version 27 was then used to analyze the data. To determine whether there was a statistically significant difference between the groups with knowledg e and practice levels, descriptive summary statistics and the chi square test were calculated. A 5% level of significance (p value <0.05) was used to determine statistical significance. Lastly, tables, figures, and texts were used to present the findings.

Result: The study included 148 responders in all. Among them, 64.9% and 34.5% demonstrated a moderate and good level of knowledge regarding blood culture respectively. When examining knowledge levels by profession, it was found that more than two-thirds of nurses (60, 69.0%) exhibited a moderate level of knowledge, while just over half of respondents from other professions (36, 59.0%) showed similar knowledge. In terms of attitudes, nearly two-thirds (95, 64.2%) of participants had an unfavorable attitude toward blood culture practices. Regarding practice levels, 19 respondents (12.8%) displayed poor practice, while 15 respondents (10.1%) exhibited an acceptable level of practice.

Conclusion: This research found areas of inadequate understanding, attitudes, and practices regarding blood culture. This will assist in formulating an educational intervention program aimed at addressing identified issue areas in blood culture.

Key words: Blood culture, Knowledge, Attitude, Practice, Pediatrics residents, Nurses, Tikur Anbessa Specialized hospital, Ethiopia

1. Introduction

1.1. Background

Blood culture is a very crucial diagnostic tool for clinician managing blood stream infection (BSI). Claudio Viscoli stated "Blood stream infection are infectious disease defined by the presence of viable bacterial and fungal microorganism in the bloodstream that elicit or have elicited an inflammatory response characterized by an alteration of clinical, laboratory and hemodynamic parameter" on his paper with the title of The peak of the iceberg (1). In approximately 25-30% of cases Blood stream infections may lead to sepsis. Sepsis is a potentially fatal organ failure brought by aberrant host response to infection. (2)

Blood stream infections are one of the leading causes of death. Globally, patients with bloodstream infections have a high rate of morbidity, with an estimated 15–30% crude fatality rate. (3-6).

The secret to a successful outcome is early detection and treatment initiation. Bacteria or fungal isolation from blood remains the gold standard to diagnose BSI. Blood culture not only aids in the detection of the causative microorganisms but also enables to test their susceptibility to a specific antimicrobial drug. Therefore, based on blood culture results, a crucial decision will be made on the antibiotics to be used in the treatment of individuals with bloodstream infections. Thus, collecting sample for blood culture should be done with best practice.

The selection and use of optimal blood specimen collection, transport and processing procedure is the critical to ensuring accurate and timely result reporting. For blood collection, peripheral venipuncture is the recommended method. Sampling can be done from an arterial line or central venous catheter in critical patients when venous access is an issue. In terms of timing and interval, it is recommended to get two sets within minutes of each other from two different sites within 24-hour of the onset. If the patient clinically worsens, two further sets should be taken at different intervals over the 24-hour period. Samples should be obtained prior to the administration of antimicrobial since culture obtained after initiation of therapy may not reveal the causative pathogen. (7, 8 and 9).

One of the most crucial factors in obtaining microorganisms from patients with bloodstream infections is the amount of blood collected for each culture set. (7, 8, and 9). The weight of the

child determines how much blood is best to draw from a pediatric patient. Guidelines for the appropriate volume of blood to draw from children of various sizes are provided by Cumitech and the Clinical and Laboratory Standards Institute (CLSI). For those whose weight is between 3kg to 12kg, 3-5ml is suggested; from 12to <36kg 5-10ml; from 6-50kg, 10-15ml; and for>50kg, 20ml is recommended. (9)

False positive results can rise significantly as a result of blood culture contamination. A positive blood culture with a known pathogen has a high positive predictive value or infection because blood is often a sterile bodily fluid. Contamination of blood cultures is a serious issue, though. According to CLSI and the American Society for Microbiology (ASM), the overall rate of blood culture contamination shouldn't be higher than 3%. Almost all contamination happens during collection, and inadequate skin disinfection and poor collection methods are common reasons. (10, 11) Consequently, appropriate skin antisepsis is necessary prior to blood culture collection.

As a diagnostic test that is heavily dependent on the user, the yield of blood culture results is not solely determined by the underlying infectious process but, more significantly, by the health professional's years of experience, training, and level of knowledge who are responsible in collecting the sample. (12,13).

Blood culture sample collection from hospitalized children is mostly carried out by pediatric and residents and nurses in many teaching hospitals in Ethiopia. This research aimed to study knowledge, attitude and practice of blood culture sampling in both professional groups in our institution, Tikur Anbessa specialized hospital (TASH).

1.2 Statement of the problem

Globally sepsis affects 31.5milllion people leading to 5.3million death annually (14). Every year, 1.2 million children and 3 million newborns are affected by sepsis. (15)

In Africa Blood stream infection has case fatality rate of 18.1(16). In eastern African Countries According to preceding researches, the range of blood stream infections is 11-28%. (17, 18, 19) In Ethiopia it is around 25-39 % (18, 20, 21, and 22) with children being affected in about 27.9%. (20) With more prevalence in under one year of age.

One of the main factors influencing the yield of blood culture results and a possible cause of blood culture contamination is poor technique used by individuals acquiring blood cultures. Blood culture with contaminant growth represents around 13-56% of all positive blood culture with an overall contamination rate of 0.5-12.5% (23, 24, 25).

Blood culture contamination will lead to extended hospital length of stay, increased antibiotics exposure with its associated risk of allergic reaction, drug-drug interaction, antibiotics resistance emergence and disruption of host microbe. Additionally, Blood culture contamination results in increased in work load of laboratory technologists and diverting their effort away from critical samples. The other is its negative its impact financially on laboratories with an increase of costs by 47-150% (26). In pediatric population additional charge attributed to contaminated blood culture is estimated to be an average of $928-27,722 per patient in the developed countries (27, 28 and 29). Even though, there is no adequate data this might be higher in developing countries like Ethiopia.

1.3Significance of the study

In our country, no publication exists addressing the current knowledge, attitude and practice toward blood culture technique especially in those practicing in pediatric age group. And hence, this study could help to identify the existing gap, and be an input for beneficiaries who would like to enhance the yield of blood culture result. Additionally, this study can be a bridge for further prospective studies.

2. Literature Review

2.1 Impact of educational intervention on reducing blood culture contamination

In a prospectively controlled study conducted at Perking Union Medical College Hospital in China between May 2006 and September 2007, the test group's blood contamination rate was significantly lower when blood was collected by trained nurses using a strict blood culture procedure than when blood was collected by residents, students, and nurses using a common blood collection method. Overall contamination in this trial was 0.88%, with the test group and control group experiencing 0.16% and 1.25% contamination, respectively.. (30)

A prospective cohort study done from 2009-2013 in tertiary care teaching hospitals, Republic of Korea, on Medical interns who are responsible for blood culture sample collection showed that those who received institutional educational program on sampling have reduced contamination rate which is 1% compared to those who hasn't received ,1.3% (31)

In order to determine the difference in contamination rate between before and after a hospital-wide multi-approach educational intervention on blood culture technique, including disinfection application and volume of blood to be obtained, 503 nurses, including those who work in the pediatric intensive care unit, participated in a study conducted at Qatif Central Hospital, a general hospital in Saudi Arabia, between July 2011 and October 2012. The study found that the pre-intervention contamination rate was 8.1%, while the post-intervention contamination rate was approximately 5.2%, representing a 36% decrease. (32)

2.2 Knowledge, practice and attitude on blood culture collection

A survey carried out by Beth Israel Deaconess hospital on urban tertiary care facilities, USA from July- October 2004 on employees including nurses, physicians and laboratory technicians who are qualified to take blood culture, on appropriate amount of volume that should be collected for blood culture in one bottle, 79% of the respondents were found to be unaware of the ideal blood volume that is advised for collection. (33)

A multicenter cross sectional study at tertiary care academic centers in Arizona state, USA evaluating knowledge , attitude and practice of blood culture collection and collection done on

laboratory technicians, nursing staff, phlebotomies, patient care assistants showed only 50% of them knew the proper amount of blood volume that should be collected. (34) In similar study held in Turkey in 5 different hospitals on pediatric resident from June 2019 - September 2019, Concerning the amount of blood needed around 75.8% of the resident were able to provide the accurate answers specific to pediatric age group. In the later study, median score was 65% and it appeared to rise as the number of culture collected and year of residency increase (35)

Between October 2012 and December 2012, a cross-sectional study was carried out at Dr. Hasan Sadkin Hospital in Bandurg, to evaluate the knowledge of nurses in charge of blood culture. It found that approximately 675 nurses were aware of its benefits and the requirements for blood culture collection. (36)

A cross-sectional research on doctors providing inpatient care in 11 German federal states was carried out between 2015 and 2016; Of the 706 involved 95% of the participants considered blood culture as an important diagnostic tool. The guideline advice that blood culture sample should comprise at least two blood culture sets from two different injection sites was not followed by 74% of the participants. (37)

A descriptive study conducted in the department of pediatric and child health at pelonomi and universitals hospitals, which are tertiary level hospitals in south Africa, with a study period of May 1 – August 2019 , on blood culture sampling knowledge and practice on indication, recommended volume to be taken, how and what antiseptic to use, any preceding lecture among pediatric clinicians who are responsible for sampling revealed that blood collection guidelines were unknown to over 68% of practitioners, and even from those who did know, noncompliance was reported. Only 2.9% of the participant showed complete compliance on standard sampling technique. (38)

Physicians working at Uyo Teaching Hospital in the south-south region of Nigeria, of whom 27% were pediatricians, participated in a cross-sectional study on blood culture knowledge, attitudes, and practices. The results showed that 54.5% were well-versed in blood culture, with knowledge level varying by department and year of experience. Overall, practice and attitude were regarded favorably. (39)

2.3. Conceptual framework

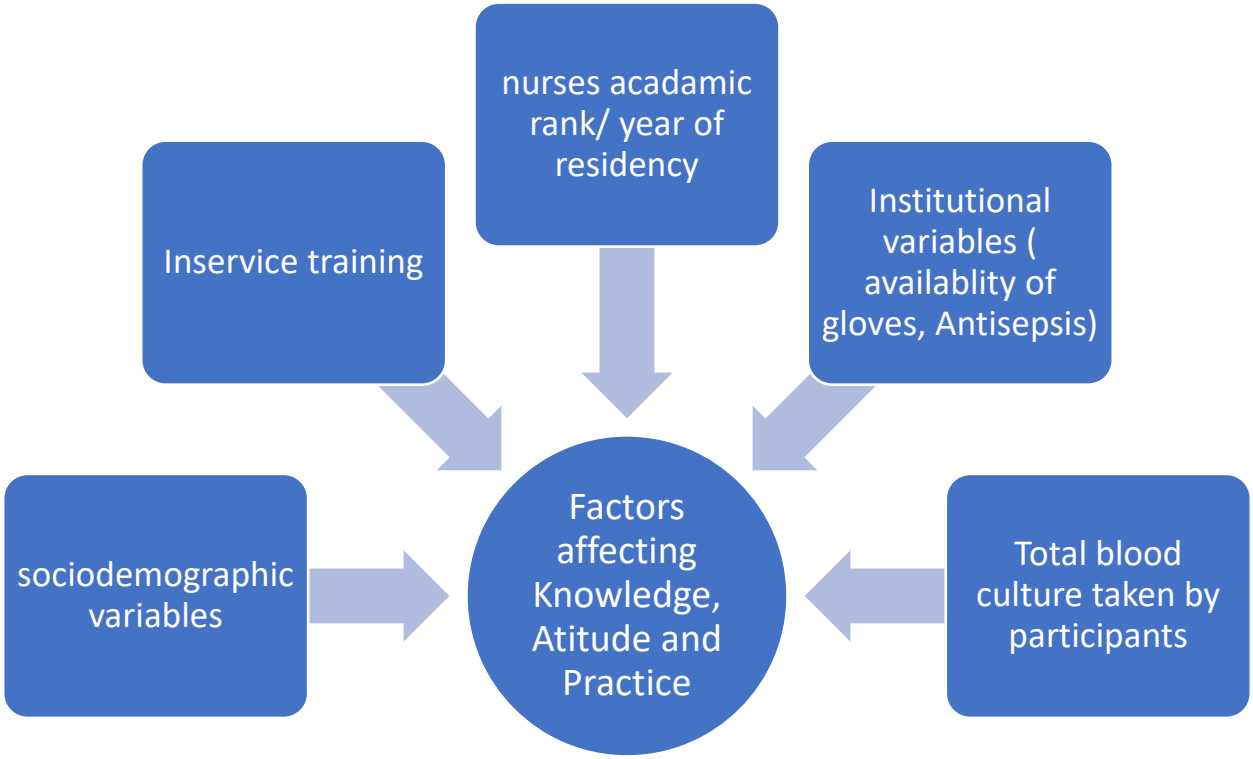

Fig 1 conceptual frame of factors affecting knowledge attiutde and practice toward blood culture sample based on literature review(35,37,39)

3. Objective

3.1. General objective

- To asses knowledge, Attitude and Practice of Pediatric residents and nurses on blood culture sampling at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia

3.2. Specific objectives

- To determine knowledge of pediatric residents and nurses towards blood culture sampling.
- To determine attitude of pediatric residents and nurses towards blood culture sampling
- To determine practice of pediatric residents and nurses towards blood culture sampling

4. Method and Materials

4.1. Study area

The study took place at Tikur Anbessa Specialized Hospital, Addis, Ethiopia. Founded in 1974, serving as a critical healthcare hub and is administered by Addis Ababa University. Within this esteemed institution, the Pediatrics and Child Health department is a vital component of the School of Medicine, where a dedicated team of approximately 47 pediatricians practice across a wide array of subspecialties. These include emergency and critical care, gastroenterology, cardiology, endocrinology, neonatology, pulmonary and critical care unit, rheumatology, neurology, nephrology, pediatric infectious diseases unit and pediatric hemato-oncology. Each pediatrician brings unique expertise, contributing to comprehensive care for children and their specific health needs.

The department is also home to a robust postgraduate teaching program that currently accommodates 99 residents, who are immersed in a rigorous training curriculum designed to cultivate the next generation of pediatric specialists. Within the hospital, the department is structured into three wards, a neonatology unit for the delicate care of newborns, an intensive care unit designed to support critically ill children, and an emergency department ready to respond to urgent medical situations. Together, these facilities offer a total of 181 beds, ensuring ample space for patient care. Furthermore, the hospital boasts approximately 11 specialty clinics that provide targeted services, enhancing the comprehensive pediatric care available to the community.

4.2. Study design and period

- This study is institutional based cross-sectional study which was carried out between December 1 2024 and January 8 2025.

4.3. Population

4.3.1. Source population.

- All pediatric residents and nurses in Tikur Anbessa specialized hospital.

4.3.2. Study population

- Pediatric residents and nurses in TASH, working in pediatric inpatient unit

4.4. Inclusion and exclusion criteria

4.4.1 Inclusion criteria

- All pediatric residents
- All nurses practicing at all inpatient pediatric wards

4.4.2 Exclusion criteria

- Nurses solely working at pediatric outpatient clinic
- Pediatrics residents and nurses
    - Those who were unwilling to participate
    - Maternity leave recipients at the time of data collection.

4.5 Sample size calculation

A single population proportion calculation was used to calculate the necessary sample size of qualified study participants;

Sample size: $n=\frac{Z^2P(1-P)}{d^2}=\frac{1.96^2 * 0.5*(1-0.5)}{0.05^2}=$ 381

Where: n= the minimum sample size

p=the expected knowledge level, 50% P value is used in this formula

d= the level of precision (margin of error)

z= the value at 95% confidence level

Despite the calculated sample size is 381; there are only 99 residents and 140 nurses working in the department fulfilling the criteria. Therefore, using Correctional formula n'= n/ (1+n/N) ,

Where n'= Corrected sample size

n= initial estimated sample size

N= Size of population of interest

The corrected sample size will be 148, from which 87 were nurses and 61 were residents.

Using the formula

nn=(n/N)Nn, and nr=(n/N)Nr

Where nn =proportion of the nurses that should be included from the calculated sample size

nr = proportion of the residents that should be included from the calculated sample size

n= corrected sample size

N= total number of residents and nurses fulfilling the criteria

Nn= total number of nurses

Nr= total number of residents

4.6 Sampling Technique

- Individuals were selected applying random sampling method.

4.7 Data collection methods and producer

Data was obtained from residents and nurses through a structured self-administered questionnaire, after obtaining informed consent. The questionnaire was adapted from various literatures with some modifications. Then pilot study was conducted and further modifications were done.

The questioner had four components first section focusing on socio demographic data. Second section assessed knowledge with 16 questions, where correct answers earned 2 points and incorrect or neutral answers received 0 points. Knowledge scores were categorized as poor (0-30%), moderate (31-75%), and good (above 75%).The third part evaluated attitudes based on positive or negative responses, awarding a score of 1 for positive answers and 0 for negative ones. The overall attitude score indicated whether the participant held a positive or negative outlook. The fourth part assessed practice through 10 questions, with responses ranging from "Never" (0 points) to "Always" (4 points). Practice score have been placed into four groups those who got above 75% labeled as very good, those who got between 51 and 75% as good, those who scored between 26 and 50% as acceptable and those who scored below 25% as poor This system provided a comprehensive way to assess participants' knowledge, attitudes, and practices. Participants received the questionnaire which was in English via Telegram accounts.

4.8. Data processing and analysis

Following gathering data through Google form, each data was verified for accuracy before being converted to SPSS format on version 27 for analysis. Descriptive summary statistics, including frequencies, proportions, the mean, median, and standard deviation, were applied to present the findings. To determine whether there was a statistically significant difference between the

institution and the residence year, a chi square test was calculated. A 5% level of significance (p value <0.05) was used to determine statistical significance.

4.9. Study Variables

4.9.1. Outcome variable

- Knowledge, attitude and practice towards blood culture sampling

4.9.2. Explanatory variables

- Socio demographic data,
- Year of experience
- Academic rank
- Year of residency
- Presence of In-service training
- Average number of blood culture collected in the preceding 1 year
- Institutional variables- availability of tourniquet, needle, glove and antisepsis

4.10. Operational Definition

Criterion for scoring;

Those who answer knowledge related questions with a mean score

- **75% or higher** considered as **Good Knowledge**
- **Between 31and 75%** considered as **Moderate Knowledge**
- **Below 30%** considered as **Poor Knowledge**

Those who answer attitude related questions with a mean score

- **75% or higher** considered as **Good Attitude**
- **Between 50 and 75%** considered as **Moderate Attitude**
- **Below 50%** considered as **Poor Attitude**

Those who answer practice related questions with a mean score

- **75% or higher** considered as **Very Good Practice**
- **Between 51 and 75%** considered as **Good Practice**
- **Between 25-50% considered as Moderate Practice**
- **Below 25%** considered as **Poor Practice**

4.11. Ethical consideration

An official letter and ethical clearance were acquired from Addis Ababa University's Department of Pediatric and Child Health's Department of Research and Publication Committee. Then data collection was done after obtaining verbal consent from respondents. Confidentiality was upheld throughout the whole study, and the data gathering process was anonymous, excluding participant names and other personal identifiers.

4.12 Dissemination of the result

The study's findings will be submitted to Addis Ababa University, College of medicine and Health Sciences department of pediatrics and child health. The study abstract will be presented for concerned bodies and the summary of the thesis will be forwarded to on peer reviewed journal for publication.

5. Results

5.1 Socio-demographic characteristic

The research was conducted at Tikur Anbessa Specialized Hospital (TASH), with a total of 148 respondents participating, resulting in a 100% response rate. Of these, 87 (58.8%) were nurses,

and 61 (41.2%) were residents. Among the 61 residents, 20 (32.8%) were RI, 20 (32.8%) were RII, and 21 (34.4%) were RIII.

The majority of the respondents were female (93, 62.8%) and relatively young, with 73 participants (49.3%) aged between 25 and 30 years. with varying levels of work experience, with the largest group having 2-5 years of experience (63, 42.6%). A significant portion of respondents (64, 43.2%) reported having collected cultures more than 20 times, although 41 individuals (27.7%) had no experience in culture collection. Almost all participants (147, 99.3%) held a degree, while only one person (0.7%) had a master's degree. Additionally, a notable majority (119, 80.4%) had not received any formal training. The socio-demographic variables of the respondents are shown in table.

Table 1: Socio-demographic characteristics of pediatric residents and nurses in Tikur Anbessa specialized hospital, December 1 2024 to January 8 2025

Variable		Frequency	Percent
Sex	Male	55	37.2
	Female	93	62.8
	Total	148	100.0

Age	25 to 30 Year	73	49.3
	31 to 35 Years	48	32.4
	>35 Years	27	18.2
	Total	148	100.0
Profession	Nurse	87	58.8
	Resident	61	41.2
	Total	148	100.0
Year of Residency	I	20	32.8
	II	20	32.8
	III	21	34.4
	Total	61	100.0
Academic rank	Degree	147	99.3
	Masters	1	0.7
	Total	148	100.0
Work Experience	2-5 years	63	42.6
	5-10 years	55	37.2
	Above 10 years	21	14.2
	Below 2 years	9	6.1
	Total	148	100.0
Culture Collection Frequency	1-10 times	18	12.2
	11-20 times	25	16.9
	More than 20 times	64	43.2
	No experience	41	27.7
	Total	148	100.0
Training	No	119	80.4
	Yes	29	19.6
	Total	148	100.0
Training Frequency	One time	22	75.9
	two/more	7	24.1
	Total	29	100.0

5.2 Knowledge, attitude, and practice towards blood culture

5.2.1 Knowledge towards blood culture sampling

The cumulative score of 32 was used to gauge knowledge regarding blood culture sample. All participants had a mean ± SD knowledge score of 22.8 (±4.1). Whereas knowledge scores of residents and nurses were 23.9 ±3.4 and 22.1 ± 4.3 respectively. In terms of average knowledge score by residency year, the highest mean score was 25 ± 2.9 for year three residents, followed by Year one 23.4 ±3.1and years two 23.1± 3.9(table 2).

Table 2 Knowledge score of Residents and nurses towards blood culture sampling, in Tikur Anbessa specialized hospital, December 1 2024 to January 8 2025

Knowledge Score	N	Mean	Std. Deviation	Range	Minimum	Maximum	Percentiles		
							25	50	75
Total participants	148	22.9	4.1	22	8	30	20.00	24.00	26.00
Nurse	87	22.1	4.4	20	8	28	20.00	22.00	26.00
Resident	61	23.90	3.4	16	14	30	22.00	24.00	26.00
Year I	20	23.40	3.2	10	18	28	20.50	22.00	26.00
Year II	23	23.10	3.9	14	14	28	20.50	24.00	26.00
Year II	21	25.1	2.9	10	20	30	24.00	26.00	28.00

Nearly two third 96(64.9%) of participant had moderate knowledge level towards blood culture sampling whereas more than one third 51(34.5) had good knowledge level towards blood culture

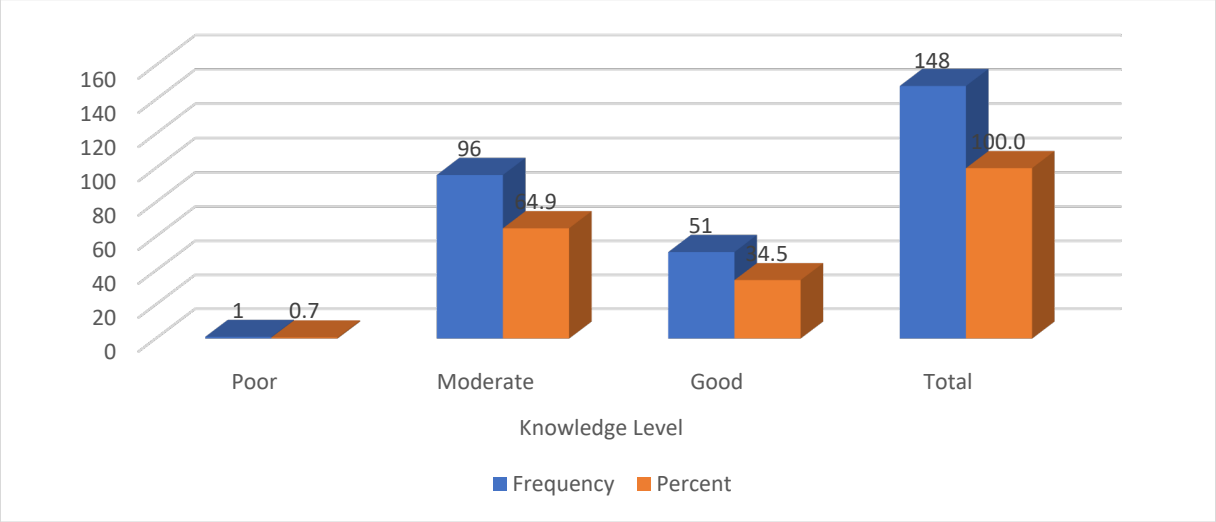

Fig 2 .knowledge level of pediatric Residents and nurses towards blood culture sampling, in Tikur Anbessa specialized hospital, December 1 2024 to January 8 2025

Regarding knowledge levels towards blood culture by profession, more than two third 60 (69.0%) of nurses with moderate knowledge, more than a quarter 26 (29.9%) have good knowledge, while 1 (1.1%) has poor knowledge. In comparison, residents have 25 (41.0%) with good knowledge, 36 (59.0%) with moderate knowledge, and none (0.0%) with poor knowledge.

When examining knowledge levels by year of residency, nearly two third 13(65%) and of year I and II residents had moderate knowledge and more than one third 7(25%) had good knowledge towards blood culture sampling whereas more than half 11(52.4%) of year III resident had good knowledge and nearly half 10(47.6%) had moderate knowledge towards blood culture

There were no significant differences in knowledge levels, with P-values of 0.28 for profession (nurses vs. residents) and 0.42 for year of residency (I, II, III), suggesting that knowledge levels do not significantly differ based on profession or the year of residency.

Table 3 Knowledge levels of Residents and nurses towards blood culture sampling, in Tikur Anbessa specialized hospital, December 1 2024 to January 8 2025

Group	Knowledge Level	Poor (Frequency)	Moderate (Frequency)	Good (Frequency)	P-Value
Profession	Nurse	1 (1.1%)	60 (69.0%)	26 (29.9%)	0.28
	Resident	0 (0.0%)	36 (59.0%)	25 (41.0%)	
Year of Residency	I	0 (0.0%)	13 (65.0%)	7 (35.0%)	0.42
	II	0 (0.0%)	13 (65.0%)	7 (35.0%)	
	III	0 (0.0%)	10 (47.6%)	11 (52.4%)	

5.2.2 Attitude towards blood culture sampling

To asses attitude towards blood culture sampling technique, five question were designed with a total score of 5. The overall respondents' mean ± SD attitude score was 2.2 (±1.4). In contrast, attitude score between nurses and residents, the mean ± SD attitude score was 1.94±1.3 and 2.56 ±1.36 respectively. Regarding attitude score between residency years; Year one residents, year two residents and year three residents the mean ± SD attitude score were 2.25±1.4, 2.5±1.24 and

2.9±1.41 respectively (Table 4). More nearly two third 95(64.2) of participant had unfavorable attitude. (fig 3).

Table 4; Attitude of pediatric Residents and Nurses towards blood culture sampling, in Tikur Anbessa specialized hospital, December 1 2024 to January 8 2025

Attitude score	N	Mean	Std. Deviation	Range	Minimum	Maximum	Percentiles		
							25	50	75
Total population	148	2.20	1.40	5.00	0.00	5.00	1.00	2.00	3.00
Nurse	87	1.94	1.38	5.00	0.00	5.00	1.00	2.00	3.00
Resident	61	2.56	1.36	5.00	0.00	5.00	1.50	2.00	4.00
RI	20	2.25	1.41	4.00	1.00	5.00	1.00	2.00	3.75
RII	20	2.50	1.24	4.00	1.00	5.00	2.00	2.00	3.00
RIII	21	2.90	1.41	5.00	0.00	5.00	2.00	3.00	4.00

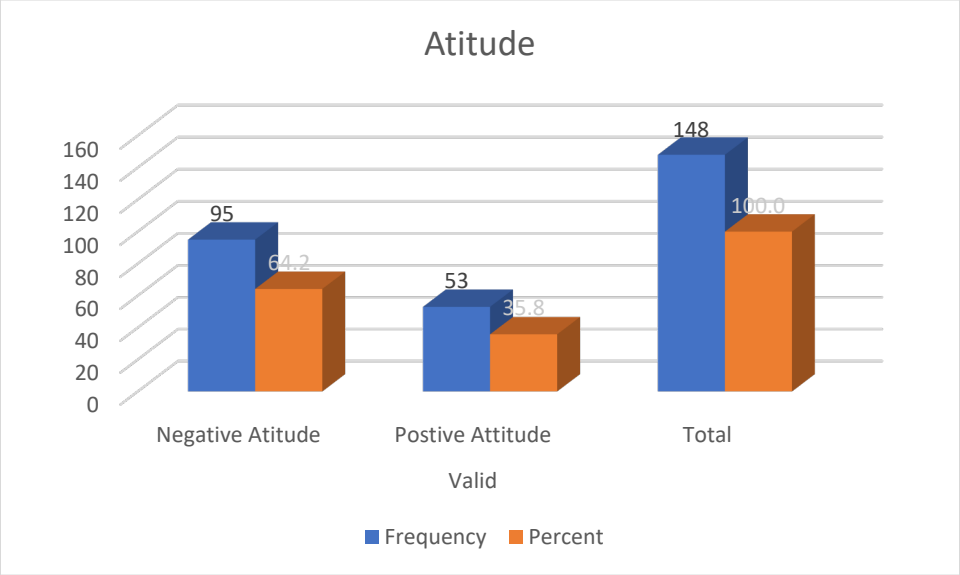

Fig 3 Attitude level of pediatric Residents and nurses towards blood culture sampling, in Tikur Anbessa specialized hospital, December 1 2024 to January 8 2025

Regarding attitudes towards blood culture sampling by profession and year of residency, among nurses, more than two third 60 (69.0%) had an unfavorable attitude, while 27 (31.0%) had a favorable attitude. In comparison, residents had 35 (57.4%) with an unfavorable attitude and 26 (42.6%) with a favorable attitude.

When examining attitudes by year of residency, more than two third 14 (70.0%) Year I residents had unfavorable attitudes, nearly two third 12 (60.0%) of Year II, nearly half 9 (42.9%) Year III displaying unfavorable attitudes towards blood culture sampling. There were no significant differences in attitudes, with P-values of 0.147 for profession (nurse vs. resident) and 0.23 for year of residency (I, II, III).

Table 5 Attitude score of pediatric Residents and nurses towards blood culture sampling, in Tikur Anbessa specialized hospital, December 1 2024 to January 8 2025

Group	Attitude	Unfavorable Attitude (Frequency)	Favorable Attitude (Frequency)	P-Value
Profession	**Nurse**	60 (69.0%)	27 (31.0%)	0.147
	Resident	35 (57.4%)	26 (42.6%)	
Year of Residency	**I**	14 (70.0%)	6 (30.0%)	0.23
	II	12 (60.0%)	8 (40.0%)	
	III	9 (42.9%)	12 (57.1%)	

5.2.3 Practice towards blood culture sampling

Questions on practice of blood culture sampling were out of 10. For the entire population, the mean ± SD practice score was 25.86 ± 10.32. When comparing practice scores between

professions, nurses had a higher mean score of 25.99 ± 11.8, while residents had a mean score of 25.00 ± 2.84. Year II residents got the highest mean score (26.1 ± 8.22) when comparing the average practice scores by year of residency, followed by Year I residents with a mean score of 25.55 ± 8.20, and Year III residents with a mean score of 25.3 ± 6.89 (Table 6).

Table 6 Practice score of pediatric Residents and nurses towards blood culture sampling, in Tikur Anbessa specialized hospital, December 1 2024 to January 8 2025

Practice score	N	Mean	Std. Deviation	Range	Minimum	Maximum	Percentiles		
							25	50	75
Total population	148	25.9	10.3	38.00	2.00	40.00	21.00	28.00	33.75
Nurse	87	26	11.9	38.00	2.00	40.00	17.00	31.00	35.00
Resident	61	25.7	7.7	32.00	8.00	40.00	21.50	26.00	30.50
RI	20	25.6	8.2	29.00	9.00	38.00	19.00	26.00	32.75
RII	20	26.10	8.2	32.00	8.00	40.00	21.25	25.00	32.50
RIII	21	25.4	6.9	31.00	9.00	40.00	21.50	23.00	29.50

Regarding practice level, 19 (12.8%) had poor practice, while 15 (10.1%) exhibited acceptable practice. A larger portion of the population, 55 (37.2%), demonstrated good practice, and the highest percentage, 59 (39.9%), had very good practice. These results indicate that a significant majority of participants (77.1%) displayed good or very good practices, suggesting a generally high level of competence in blood culture sampling.

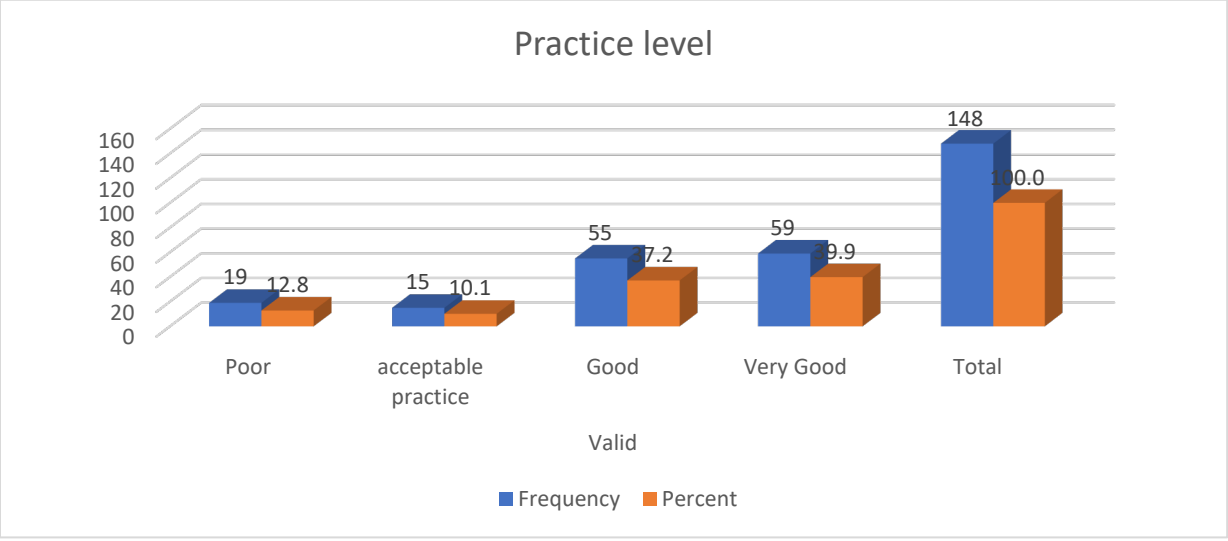

Fig 4. Practice level of pediatric Residents and nurses towards blood culture sampling, in Tikur Anbessa specialized hospital, December 1 2024 to January 8 2025

Regarding practice levels for blood culture sampling across different professions and years of residency. Among nurses, 15 (17.2%) demonstrated poor practice, 8 (9.2%) had acceptable practice, 20 (23.0%) exhibited good practice, and 44 (50.6%) had very good practice. In comparison, residents showed 4 (6.6%) with poor practice, 7 (11.5%) with acceptable practice, 35 (57.4%) with good practice, and 15 (24.6%) with very good practice.

When examining practice levels by year of residency, Year I residents had 2 (10.0%) with poor practice, 3 (15.0%) with acceptable practice, 9 (45.0%) with good practice, and 6 (30.0%) with very good practice. Year II residents showed 1 (5.0%) with poor practice, 3 (15.0%) with acceptable practice, 10 (50.0%) with good practice, and 6 (30.0%) with very good practice. Finally, Year III residents demonstrated 1 (4.8%) with poor practice, 1 (4.8%) with acceptable practice, 16 (76.2%) with good practice, and 3 (14.3%) with very good practice.

There was a significant difference in practice levels between nurses and residents, with a P-value of 0.0001 for profession, indicating that nurses and residents differ significantly in their practice levels. However, for year of residency, there was no significant difference, with a P-value of 0.51, suggesting that practice levels do not differ significantly across the different years of residency (I, II, III).

Table 7 Practice level of pediatric Residents and nurses towards blood culture sampling, in Tikur Anbessa specialized hospital, December 1 2024 to January 8 2025

Group	Practice Level	Poor (Frequency)	Acceptable Practice (Frequency)	Good (Frequency)	Very Good (Frequency)	P-Value
Profession	**Nurse**	15 (17.2%)	8 (9.2%)	20 (23.0%)	44 (50.6%)	0.0001
	Resident	4 (6.6%)	7 (11.5%)	35 (57.4%)	15 (24.6%)	
Year of Residency	**I**	2 (10.0%)	3 (15.0%)	9 (45.0%)	6 (30.0%)	0.51
	II	1 (5.0%)	3 (15.0%)	10 (50.0%)	6 (30.0%)	

	III	1 (4.8%)	1 (4.8%)	16 (76.2%)	3 (14.3%)	

6. Discussion

In our country specifically in teaching hospitals like Tikur Anbessa Specialized hospital, Blood culture sampling is undertaken by nurses and Residents. Additionally, Residents are the one who are also responsible for requesting blood culture. Through consistent exposure and practice, both groups are expected to have good Knowledge. However, in this study only 34.5% had demonstrated good knowledge of blood culture.

Routine blood cultures are warranted for individuals who have symptoms, radiologic evidence or laboratory test results suggesting the presence of syndromes associated with high like hood of bacteremia. Most importantly the sample ought to be obtained before beginning antimicrobial treatment. (7, 8, and 9). In this study most study participants (more than 80%) are aware of indication for blood culture sampling based on the two clinical constructed scenarios and 85.6% of the participant agreed that antibiotics use before sampling affects the yield.

Blood culture results that are contaminated are frequent. Careful consideration should be given to cleansing the skin before venipuncture in order to reduce the possibility of blood culture contamination by local skin flora. Based on evidence that blood drawn this way is less likely to be contaminated than blood drawn via an intravascular catheter or other device, consensus recommendations suggest peripheral venipuncture as a suggested approach for drawing blood for culture. (40). In this study about 76% of the participant preferred venipuncture for collecting blood for culture.

Although more than 95% of the participant believed strict antisepsis method is necessary during sampling; however, 18.2% of the participant preferred 2% alcoholic chlorhexidine as antiseptic of choice and 75% of the participants chose Providine Iodine Preparation without alcohol. One of the principle of blood culture to decrease the contamination rate is the venipuncture site should be disinfected with 2% alcoholic chlorhexidine. It is not recommended to use Povidione iodine preparations without alcohol. (40). Additionally, 12.2% were unaware that they needed to wait 30 to 60 seconds for the antisepsis agent to air out before taking a sample..

The amount of blood that should be obtained for culture is another particular area of information about blood culture where less than anticipated outcome was noted, 95% of participants thought that the blood volume had an impact on the outcome and most (more than 70%) agreed that amount of blood drawn is dependent on the indication for sampling and weight in pediatric age group. In spite of that, only 7 respondents (0.05%) correctly stated the amount range recommended based on the weight.

In terms of attitudes, nearly two-thirds (64.2%) of participants had an unfavorable attitude toward blood culture practices. Almost 80% of the participant agreed that blood culture is an important diagnostic tool; however, 72.3% of them recommended the practice of blood culture needs improvement in their institution. And only 37.8% of the participants were satisfied from the result of blood culture that is sent. The most three reasons stated by the respondents for the unsatisfactory results, listed in order are delayed release of results, the culture usually growing contaminant and results often don't go with the

clinical signs. It is to note that only 47% of the respondents believe that blood culture is their responsibility. Given that phlebotomists perform blood culture in other settings, it may be uncommon for pediatric residents and nurses to be in charge of this task as well. .

Based on this study, nurses who took samples most frequently as demonstrated on the study has a practice which has significant difference as compared to Residents (73.6 vs. 82%). 12.8% of participants have poor practice and while 10.1% exhibited acceptable practice. Regarding, the septa of blood culture bottle it is recommended to clean with 70% isopropyl alcohol and to wait for the skin disinfectant and the alcohol used to disinfect the blood culture bottles to dry 30-60minute (42). In this study those who clean the septa of the bottle and who wait for the bottle to dry are 54.1 % and 48% respectively.

7. Strength and Limitations of the study

As this research is the first study aimed at investigating knowledge, attitude and practice pediatric nurses and residents towards blood culture sampling method in this hospital or country, we consider this work to be significant. The completion of the questionnaire online enhances accessibility. However, Participants may have consulted literary sources or medical texts, thereby influencing their responses.

For this study it was not able to use a standard tool because of unavailability and this can be seen as a limitation.

8. Conclusion

This study found areas of inadequate understanding, attitude, and practice about blood culture. This will assist in the development of educational intervention programs aimed at resolving identified issues in blood culture. The fact that nurses who had significant difference in the level of practice with residents were performing majority of procedure, this area should be addressed.

9. Recommendations

In light of our study's findings, we propose the following recommendations for the relevant entities:

For the department and health care administrators

In light of the aforementioned conclusions, we advocate for both theoretical and practical interventions like in service training should be considered in the area of blood culture sampling method as it is a basic tool for patient’s management.

The department should also consider formulating institution based blood culture sampling guideline which can be easily accessed and implemented by the health professionals.

Researchers:

In this study it is shown that there is unsatisfactory knowledge and unfavorable attitude toward blood culture sampling therefore we recommend to consider other studies to be conducted to look for factors attributing for this results. And also we recommend considering researches on the effect of interventions on improving the existing gap.

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ANNEX I

TITLE- Knowledge, Attitude and Practice of Pediatric Residents and Nurses, in Tikur Anbessa Specialized Hospital

Part- I Socio Demographic Data

1. Sex:

☐Male

☐Female

2. Age _____

3. Year of Residency for the residents

☐ I

☐II

☐III

4. Academic Rank

☐Diploma

☐Degree

☐Masters

5. Year of experience

☐ Below 2 years

☐ 2-5

☐5-10

☐Above 10 years

6. How many times have you collected Blood culture on average in the preceding one year

☐ Null

☐1-10 times

☐10-20 times

☐above 20 times

7. Have you ever received in service training on how to collect blood culture?

☐ yes

☐ No

8.If Yes how many times ____

Part II Knowledge assessment

1. A 7 hour old male neonate born to Para I mother who had rupture of membrane more than 18hour, presented to you with failure to suck, fever and respiratory distress, It is necessary to send blood culture

☐Agree

☐Disagree

☐Indifferent

2. A 5 year old known cardiac patient (VSD), presented with easily fatigability, fever and hematuria, Blood culture is important in diagnosing this child

☐Agree

☐Disagree

☐Indifferent

3. A set of blood culture comprises of two blood culture bottles

☐Agree

☐Disagree

☐Indifferent

4. A set of Blood culture support the growth of both aerobic and anaerobic organisms

☐Agree

☐Disagree

☐Indifferent

5. Standard Blood culture should compromises of 2-3 sets of blood culture bottles

☐Agree

☐Disagree

☐Indifferent

6. If your answer is “Agree” in question number “5’ what is the recommended time period to collect the 2-3 sets of blood cultures

☐ 24hour

☐48hour

☐ I don’t know

7. What is the preferred site prefer for collection

☐ Vascular catheter

☐Venipuncture

☐I don’t know

8. Strict asepsis use is necessary during sampling

☐Agree

☐Disagree

☐Indifferent

9. Which antiseptic do is preferred?

☐2% alcoholic chlorhexidine

☐Povidone iodine preparation without alcohol

☐ I don't know

10. Disinfecting the septa of bottles is necessary

☐Agree

☐Disagree

☐Indifferent

11. How many period is the recommended period for the skin to dry after application of disinfectant

☐ No need to wait

☐ 30-60sec

☐Indifferent

12. Antibiotics use before sampling affects organisms yield

☐Agree

☐Disagree

☐Indifferent

13. Volume of blood sample affects quality of result

☐Agree

☐Disagree

☐Indifferent

14. Amount of blood volume is dependent on indication of sampling

☐Agree

☐Disagree

☐Indifferent

15. Amount of blood volume obtained is different by weight in pediatric age group

☐Agree

☐Disagree

☐Indifferent

16. If your answer is “Agree” in question “15” , what is the recommended amount excluding in cases with an indication of Infective endocarditis if:

A. weight 3kg to-<12 kg …….

B. weight 12kg- 36kg ……..

C. weight 36kg- 50 kg ……..

D weight above 50kg ……

Part III Attitude Assessment

1. Do you believe Blood culture is an important diagnostic tool

☐strongly agree

☐Disagree

☐Neither

☐Agree

☐ strongly agree

2. Do you believe Blood culture is your responsibility

☐strongly agree

☐Disagree

☐Neither

☐Agree

☐ strongly agree

3. Do you believe the practice of blood culture practice in your institution needs improvement?

☐strongly agree

☐Disagree

☐Neither

☐Agree

☐ strongly agree

4. Are you satisfied with the results you get from blood culture

☐strongly agree

☐Disagree

☐Neither

☐Agree

☐ strongly agree

5. If your answer is “NO” for the above question what is your reason

(You can choose more than 1 answer)

☐Results usually delayed

☐ Results often negative

☐ Always growing contaminates

☐ Don’t isolate anaerobes

☐Results often not agreeing with clinical signs

☐Most patients on antibiotics prior to culture

Part IV Practice assessment

	Never	Rarely	Sometimes	Often	Always
1. I collect blood culture before antibiotics initiation	☐	☐	☐	☐	☐
2. I usually send at least 2 set of blood culture	☐	☐	☐	☐	☐
3. I collect Blood culture from more than one Sites	☐	☐	☐	☐	☐
4. I obtain sample from venipuncture	☐	☐	☐	☐	☐
5. I practice hand washing or hand disinfection Before taking sample	☐	☐	☐	☐	☐
6. If further vein palpation is necessary after skin Preparation I would wear a sterile glove	☐	☐	☐	☐	☐
7. I use antiseptic before obtaining sample	☐	☐	☐	☐	☐
8. I clean the septa of blood culture bottle	☐	☐	☐	☐	☐
9. I would wait both the skin and Blood culture bottle to dry	☐	☐	☐	☐	☐
10. When collecting sample for other bottle I use another needle	☐	☐	☐	☐	☐