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Vaccines against SARS-CoV-2

Microbes Found on Mobile Phones

Highlights

Vulnerable Internal Migrants

Risk Factor Profile of Blood Culture

Discovering Thoughts, Inventing Future

VOLUME 21 ISSUE 2 VERSION 1.0

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Comparison of the Contamination Rate and Risk Factor Profile of Blood Culture Done in Emergency Department and MHDU/MICUs

By Dr. Pankaj Kumar Singh, Dr. Pranav Kumar, Dr. Mandeep Joshi, Dr. Shreya Verma, Dr. Shoily Nath, Dr. Shilpi Pawar & Dr. Arpan Roy Dutta

Abstract- *Aims and objectives:* To determine the risk factors of blood culture contamination done in ED and those done in the MHDU/MICU among patients admitted with medical illness.

Material and Methods: This is a two months' prospective observational study comparing blood culture contamination rate and risk factors associated with contamination between ED and MICU/MHDU. A total of 998 patients were included in the study who underwent blood culture in ED and MICU/MHDU. 570 in ED and 428 in MICU/MHDU were included after meeting exclusion and inclusion criteria.

Results: Blood culture growths were higher in ED (19%). Most common growth was CoNS (4%). The overall contamination rate in this study was (4.8%) The contamination rate was lower in ED (4.4%) when compared to MICU/MHDU (5.4%).

Keywords: *blood culture; medical intensive care unit (MICU); medical high dependency unit (MHDU); emergency departments (EDs).*

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Comparison of the Contamination Rate and Risk Factor Profile of Blood Culture Done in Emergency Department and MHDU/MICUs

Dr. Pankaj Kumar Singh [α], Dr. Pranav Kumar [σ], Dr. Mandeep Joshi [ρ], Dr. Shreya Verma [ω], Dr. Shoily Nath [¥], Dr. Shilpi Pawar [§] & Dr. Arpan Roy Dutta [x]

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Results: Blood culture growths were higher in ED (19%). Most common growth was CoNS (4%). The overall contamination rate in this study was (4.8%) The contamination rate was lower in ED (4.4%) when compared to MICU/MHDU (5.4%). The Most common contaminant CoNS. The site with the least contamination rate was the dorsum of the hand (1.28%) in ED and the most common site with contamination was femoral (22%) in ED.

Conclusion: Emergency departments are systems particularly susceptible to a high burden of contaminated blood cultures due to high staff turnover, the need to collect cultures in critically ill patients prior to resuscitation, and the time pressure of obtaining cultures before the first dose of antibiotics. Adherence to clinical decision rules and education of EMT/Registrar is needed to improve the efficiency of blood culture taking practices.

Keywords: blood culture; medical intensive care unit (MICU); medical high dependency unit (MHDU); emergency departments (EDs).

I. Introduction

As a way of identifying the organisms in the bloodstream, blood culture is a valuable method for health care practitioners. Blood cultures are an important investigation to help effective management for patients with severe infection/sepsis. A positive blood culture may indicate a conclusive diagnosis, allowing the individual organism to be targeted for therapy. However, false-positive results because of contamination can limit the utility of this important tool[1]. Owing to contamination, which happens when species that are not naturally present in a blood sample are grown in culture, false positives arise. For decades, contaminated cultures have been described as a problematic problem and continue to be a source of irritation for both clinical and laboratory workers. Clinicians must assess if the organism represents a clinically relevant infection associated with a high risk of morbidity and mortality or a false-positive result without any clinical effects in the face of a positive blood culture outcome. Contaminated samples increase the workload of the laboratory and can interrupt patient management or cause incorrect changes. This can prolong hospitalization of patients, increase the risk of harm, and increase health boards' costs. Current guidelines advocate a contamination rate of 2– 3% is acceptable[2]. Emergency departments (EDs) are important locations for the diagnosis and management of bacteraemia[3]. Blood cultures are considered the "gold standard" for the diagnosis of bacteraemia. Emergency departments are networks that are especially vulnerable to a heavy burden of infected blood cultures due to the high turnover of workers, the need to collect cultures before resuscitation of critically ill patients, and the time pressure to acquire cultures before the first dose of antibiotics[4]. This study is to compare the contamination rate and risk factors of blood culture done in the emergency department and MICU/MHDU.

II. Materials and Methods

Study design: This was a prospective observational study comparing the blood culture contamination rate and risk factors in ED and MICU/MHDU.

Study setting: Christian medical college hospital, established in 1900, is a tertiary care teaching hospital situated in Vellore, Tamil Nadu. It is an important referral center in Tamil Nadu and neighboring states. The ED is one of the largest in the country and has about 74,000 admissions per year. It has a central triage system that triages all patients presenting to the ED. There are 2700 beds in the hospital of which 115 beds are allotted for ICU care. Medical Intensive care unit (MICU) and the Medical High Dependency Unit (MHDU) have 12 beds each. They receive patients directly from the ED and from Medical Wards through an open admitting system.

Participants: All patients with features of bacteraemia/ fever or any infectious condition who underwent blood culture investigation in the emergency department and

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in the MICU/MHDU were recruited. Data with respect to culture methodology was collected from the ED department and MICU/MHDU.

Inclusion criteria: • Patients requiring blood culture taken in the ED. • Patients requiring blood culture in MHDU/MICU. • Patients above the age of 18. • Patients consenting to participate in the study.

Exclusion criteria: • Patients below the age of 18. • Patients NOT consenting to participate in the study. • Cultures transferred to the lab after 12 hours.

Duration of study: The study was conducted for a period of 2 months from January 2019 to February 2019. Sample size and sample size calculation: A total of 998 (570 from ED and 428 from MICU/MHDU) were recruited in the study.

Statistical analysis: Data from the Clinical Research Form was entered into epidata worksheet and the results were analysed using MS-Excel, epidata and medical.

III. Result

Table 1: Demographic characteristics

	ED (n=401)	MICU/MHDU (n=379)	Total (780)	P value	CI (95%)
Mean age (SD)	51.3 (17.5)	46.4 (16.5)	46.2 (17.2)	0.001	2.765-7.054
Male (%)	340 (59.6)	269 (62.9)	478 (61)		
Female (%)	230 (40.4)	159 (37.1)	389 (39)		

The mean age of population in the ED culture arm was 51 years and in the MICU/MHDU was 46 years. There is male predominance in both the arms. The total males accounted to 61% and the females accounted to 39%.

Table 2: Demographic variables

	ED (n=570)	MICU/MHDU (n=428)	Total (n= 998)
Comorbidities			
Diabetes	209(36.7)	130(30.4)	339(34)
Hypertension	186(32.6)	133(31.1)	319(32)
Cancer	55(9.6)	9(2.1)	64(6.4)
CKD	34(6.0)	63(14.7)	97(9.7)
CLD	24 (4.2)	8(1.9)	32(3.2)
HIV	9(1.6)	2(0.5)	11(1.1)
Admission diagnosis			
AUFI	133(23.3)	19(4.4)	152(15.2)
Lung infection/Pathology	100 (17.5)	93(21.7)	193(19.3)
Soft tissue infection	81(14.2)	1 (0.2)	82 (8.2)
Urogenital infection	64(11.2)	11 (2.6)	75(7.5)
Hepatobiliary pathology	37(6.5)	35(8.2)	72 (7.2)
Haematological conditions	23(4.0)	60(14.)	83(8.3)
Oncopathology	24(4.2)	8 (1.9)	32 (3.2)
Sepsis and septic shock	17 (3.0)	60 (14.0)	77(7.7)
Others	91(15.9)	141(32.94)	182(182)

a) Comorbidities

The most common comorbidity in this study was diabetes comprising 36% in ED and 30% in MICU/MHDU. The second most common comorbidity was hypertension comprising 32% in ED and 31% in MICU/MHDU. The number of patients with CKD were more in MICU/MHDU accounting 14%. A total of 11 HIV cases were included in this study of which 9(1.6) in ED and 2 in MICU/MHDU.

b) Admission Diagnosis

Lung infection/Lung pathology is the most common admission diagnosis encountered in the study comprising of 193 cases (19.3%). However, in ED the most common admission diagnosis was AUFI comprising of 23% of total ED cases. There are no cardiac diseases in ED. Others includes neuroleptic malignant syndrome, Diphtheria infection, G6PD deficiency, post renal transplant, nephrotic syndrome, polymyositis, Liver Abscess, cardiac pathology, acute abdomen, toxicology, autoimmune diseases.

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Table 3: Blood parameters at the time of admission

Variable (Mean/ SD)	ED (n=428)	MICU/MHDU (n=570)	P Value	CI(95%)
Haemoglobin	11.82(7.29)	9.89 (2.74)	0.001	1.20-2.65
Total Leucocyte count	14755 (21608)	13720 (12911)	0.380	-1279- 3348
Serum Albumin	3.460(0.90)	2.76(0.87)	0.001	0.57-0.81

The mean value of total leucocyte counts in ED arm is higher than that of MICU/MHDU. The mean serum albumin levels were lower in MICU/MHDU arm than ED arm. Hypoalbuminemia is observed in patients with positive culture growth in MICU/MHDU. The mean Hb levels were also lower in MICU/MHDU than ED arm.

Table 4: Site of poke

Site of Poke	ED (n=570)	MICU/MHDU (n=998)
Brachial	465(81)	129(30.1)
Femoral	18(3.2)	1(0.2)
Dorsum of hand	78(13.7)	1(0.2)
Central line	7(1.2)	153(35.7)
Arterial line	0	144(33.6)
EJV	2(0.4)	0

The most common site of poke for culture in ED is brachial 81% followed by dorsum of hand 14%. There was no arterial line in ED. The most common site of poke for culture in MICU/MHDU is Central line (35%) followed by Arterial line (33%). There was no EJV line in MICU/MHDU.

Table 5: Distribution of cases based on culture growth

Culture Growth	ED(n=570)	MICU/MHDU (n= 428)	Total (998)
No growth	462(81.1)	345(80.6)	807(80.9)
Growth	108 (18.9)	83 (19.4)	191(19.1)
True Pathogen	83(14.6)	60(14)	143(14.3)
No of Contaminants	25	23	48
Contamination rate	4.4	5.4	4.8

Out of 998 cases, 807(81%) showed no growth of which 462 cases are in ED and 345 cases were in MICU/MHDU. A total of 48 cases (4.8) were contaminated in the study out of which 25 cases were in ED and 23 in MICU/MHDU. The rate of contamination is lower in ED (4.4%) when compared to MICU/MHDU (5.4%). The total rate of contamination is 4.8%. Out of 998 cases, 191(19%) showed culture growth of which 108 cases are in ED and 83 were in MICU.

Table 6: Culture growth

Culture growth	ED (n=570)	MICU/MHDU (n=428)	Total (n=998)
No growth	462(81.1)	345(80.6)	807(80.9)
E.coli	20(3.5)	8(1.90)	28(2.80)
Staph aureus	9(1.60)	4(0.90)	13(1.30)
Gram negative bacilli	2(0.40)	1(0.20)	3(0.30)
Pseudomonas	4(0.70)	3(0.70)	7(0.70)
Stept. Pneumoniae	6(1.10)	2(0.50)	8(0.80)
Proteus	1(0.20)	-	1(0.10)
Candida	1(0.20)	1(0.20)	2(0.20)
Salmonella typhi	1(0.20)	-	1(0.10)
Enterobacter species	2(0.40)	-	2(0.20)

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Vibrio	1(0.20)	-	1(0.10)
Klebsiella	2(0.40)	12(2.80)	14(1.40)
Burkholderia	1(0.20)	1(0.20)	2(0.20)
Stenotrophomonas	1(0.25)	-	1(0.10)
Acinobacter boumani	1(0.20)	1(0.20)	2(0.20)
Polyinfection	1(0.20)	5(1.20)	6(0.60)
NF- GNB	4(0.70)	14(3.3)	18(1.80)
Yeast	-	1(0.20)	1(0.10)
Coagulase negative Staph.	23(4.0)	7(1.6)	30(3.0)
Viridians Streptococci	2(0.40)	-	2(0.20)
Moraxella	1(0.20)	-	1(0.10)
Contaminants	25(4.4%)	23(5.40)	48(4.80)

In ED, the most common positive pathogen grown on culture was E.COLI (3.5) followed by Staph Aureus 9(1.6%) and the most common pathogen grown in MICU/MHDU arm was Nonfermenting gram negative bacilli (3.3%) followed by Klebsiella (2.8). The total numbers of contaminants were 48 out of which 25 in ED and 23 in MICU/MHDU. Ø During study most common contaminant was CoNS total of 26 cases out of which more were in MICU/MHDU (16 cases). Ø Second most common contaminant was NF-GNB 1 in each department.

Table 7: Distribution of Contaminant in ED and MICU/MHDU

	ED N=25	MICU N=23	TOTAL N=48
CoNS(As Contaminants)	10(40)	16(69.5)	26(54.20)
NF-GNB(As Contaminants)	1(4)	1(4.3)	2(4.20)
True Contaminant	14(56)	6(26.2)	20(41.60)

Total contamination was 48. Most common contaminant was CoNS (10 cases). NF-GNB as contaminant were found 1 in each department. Total True contaminants were reported (20 cases) out of which 14 were in ED and 6 were in MICU/MHDU.

Table 8: Contamination IN ED and MICU/MHDU

Department	Contaminants		P Value	Odds Ratio	95% CI
	YES (N=48)	NO (N=950)			
ED	25(52.1%)	545(57.4%)	0.470	0.808	0.452- 1.444
MICU/MHDU	23(47.9%)	405(42.6%			

A total of 48 cases were contaminated in the study. IN ED 25 cases were have contamination. In MICU/MHDU 23 cases were having contamination. In our study there was no significant difference found in contamination rate between culture done in ED and MICU/MHDU.

Table 9: Contamination based on site of poke

Site of Poke	ED	MICU/MHDU
Brachial	19/465(4.08%)	8/129(6.20%)
Femoral	4/18(22.2%)	0
Dorsum of hand	1/78(1.28%)	0
Central line	1/7(14.28%)	9/153(5.88%)
Arterial line	0	6/144(4.16%)

The most common site of poke for contamination in ED was from the femoral (22.2%) and the least common site of contamination was dorsum of hand (1.28%). In MICU/MHDU, the most common site of contamination is from the Brachial (6.20%) and the least common is from the arterial line (4.16%). Arterial line blood culture sample was not done in Ed. No femoral and Dorsum of hand blood culture sample was taken in MICU/MHDU.

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Table 10: Procedure related characteristics

Variables	ED (n=100)	MICU/MHDU (n= 100)
Sterile gloves	100	100
Mask	14	75
Wear in sterile manner	91	100
Crowding present	35	0
Allow to dry	32	100
Febrile	42	19
Scrub hand	0	62
Plastic apron	0	66
Head cap used	2	63
Culture bottle top cleaned	5	0
First Attempts	91	92
Adequate barrier method	14	64
Antibiotic taken prior	9	47
Chlorhexidine	115(20.2)	426(99.5)
Betadine	455(79.8)	2(0.5)
Blood culture set	443(77.7)	218(50.9)
Dressing set	115(20.2)	1(0.2)
Others	12(2.1)	209(48.8)
Volume collected		
5cc	197(34.6)	6(1.4)
10cc	364(63.9)	420(98.1)
<5cc	9(1.6)	2(0.5)
Culture taken by		
EMT	543(95.3)	0
Registrar	10(1.8)	382(89.3)
Intern	17(3.0)	46(10.3)

In our observation study it was found that there was no scrubbing of hand before the procedure in ED whereas scrub hand was found in 62% cases in MICU/MHDU. The gloves were worn in unsterile manner in 9 out of 100 cases of ED and overcrowding during venipuncture was found in 35 cases. The antiseptic used in ED was chlorhexidine (20% cases) and betadine (80%). The antiseptic used in MICU/MHDU was chlorhexidine in all the cases (100%). In ED, the antiseptic was allowed to dry in 32 cases only. The set used for blood culture was blood culture set (77%) and dressing set (20%) in ED. The blood culture set was used in 51% cases of MICU/MHDU and other sets in 49% cases. In ED, the volume collected was 5cc in 35% cases and 10 cc were collected in 64 % of cases. In MICU/MHDU, 10cc volume was collected in 98% of cases and in 2% cases < 5 cc was collected. In ED 95% of cases, were collected by EMT, 17 by interns and 10 by registrars. Where as in MICU/MHDU most of the cultures were taken by registrars (89%). In MICU/MHDU, 382 by registrar and 46 by interns. The blood culture was done in first attempt in 91% of cases of ED and 92% cases of MICU/MHDU.

Table 11(A): Procedure variables in ED

Procedure variable		ED contaminants (n=100)		P value	Odds ratio	95% CI
		Yes (n=5)	No (n=95)			
Mask	No	5	81	1.000	--	--
		100%	85.3%			
	Yes	0	14			
			14.7%			
Sterile manner	No	0	9	1.000	--	--
			9.5%			
	Yes	5	86			

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		100%	90.5%			
Wear cap	No	5	893	1.000	--	--
		100%	97.9%			
	Yes	0	2			
			2.1%			
Adequate barrier methods	No	4	82	0.537	1.577	0.163-15.234
		80.0%	86.3%			
	Yes	1	13			
		20.0%	13.7%			
Allow to dry	No	2	66	0.324	0.293	0.046-1.848
		40%	69.5%			
	Yes	3	29			
		60%	30.5%			
Overcrowding	Yes	1	34	0.655	0.449	0.048-4.176
		20%	35.8%			
	No	4	61			
		80%	64.2%			

Table 11(B): Procedure variables in ED

Procedure variable		ED contaminants (n=570)		P value	Odds ratio	95% CI
		Yes (n=25)	No (n=545)			
Set Used	Others	5	122	0.779	0.867	0.319-2.357
		20%	22.4%			
	Blood culture set	20	423			
		80%	77.6%			
volume	<=5cc	7	199	0.386	0.676	0.278-1.647
		28%	36.5%			
	>5cc	18	346			
		72%	63.5%			

The blood culture procedure variables done in ED were not significant with contamination (p value >0.05).

Table 12(A): Procedure variables in relation to contamination in MICU/MHDU

Procedure variable		MICU/MHDU (n=100)		P value	Odds ratio	95% CI
		Yes (n=5)	No (n=95)			
Mask	No	1	24	1.000	1.714	0.191-15.481
		16.7%	25.5%			
	Yes	5	70			
		83.3%	74.5%			
Scrub hand	No	3	35	0.671	0.593	0.113-3.101
		50%	37.2%			
	Yes	3	59			
		50%	62.8%			
Apron use	No	1	33	0.661	2.705	0.303-24.131
		16.7%	35.1%			
	Yes	5	61			
		83.3%	64.9%			
Wear cap	No	2	35	1.000	1.186	0.207-6.815
		33.3%	37.2%			
	Yes	4	59			
		66.7%	62.8%			
Allow to dry	No	2	34	1.000	1.133	0.197-6.514
		33.3%	36.2%			
	Yes	4	60			
		66.7%	63.8%			

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Table 12(B): Procedure variables in relation to contamination in MICU/MHDU

Procedure variable		MICU/MHDU (n=428)		P value	Odds ratio	95% CI
		Yes (n=23)	No (n=405)			
Set Used	Others	18	192	0.756	1.125	0.535-2.367
		58.1%	55.2%			
	Blood culture set	13	156			
		41.9%	44.8%			
volume	<=5cc	1	7	0.367	2.584	0.304-21.94
		4.3%	1.7%			
	>5cc	22	398			
		95.7%	98.3%			

The blood culture procedure variables were not significant with contamination (p value >0.05).

IV. Discussion

This was a prospective study comparing the contamination rate and risk factor profile of blood culture done in the Emergency Department and MHDU/MICUs. The analysis contained a total of 998 cases. Out of which 570 were from ED and 428 were from MICU/MHDU. This first Indian studies looking at the rates of BCC in ED and MICU/MHDU to the best of our knowledge.

The mean age in our study in ED is 51.3 years and MICU/MDHU is 46.4 years. A similar study by Choi et al had shown a mean age of 67 years in ED and 65years in general ward[5]. As life expectancy in India is less when compared to Singapore, the mean age in our study is less than the study done by Choi et al at Singapore[5].

Our study shows a slight male predominance which is in contrast to Choi et al study where there is female predominance[5]. This might be because of the high female sex ratio (1:1.04) in Singapore when compared to India[6].

The most common comorbidity in our study is diabetes accounting for 339(34%) of cases. Choi et al also showed diabetes as the most common comorbidity accounting for 163/400(40.8%) cases[5]. There is a positive association of diabetes with culture growth in our study and study by Lee et al.[7]. The mean hemoglobin in this study in ED was 11.82mg/dl which is almost equivalent to the mean hemoglobin in Choi et al study which was 12.2 mg/dl[5]. The mean total leucocyte counts in ED were higher (14.7 x109/L) when compared to Choi et al study (11.6x109/L) as most of our cases presented with high fever[5].

The mean serum albumin in our study is 3.4 gm/dl which is slightly lower than Choi et al study which was 3.6gm/dl[5]. The total rate of contamination in our study done in ED and MICU/MHDU was 4.8%. In this study, the rate of contamination is lower in ED (4.4%) when compared to MICU/MHDU (5.4%).

A Similar study done by Choi et al showed blood culture contamination rates were higher in ED comprising 4% when compared to general wards (0.5%)[5]. In a study by Ramirez et al showed a blood culture contamination rate in ICU decreased from 23% to 13 % by using an education-based intervention[8].

Raja et al studied 11000 patients over 2 years period showed that the contamination rates were higher in ICU (31%) when compared to ED (20%)[9]. The Bentley et al study also found that BCC rates were higher in ED (4.74 percent), which they were able to reduce to 2 percent within a year with a simple and clear checklist and rationalizing equipment to help and not detract from this approach with a specifically specified preferred technique[2]. Self WH et al in their study was able to reduce the BCC rates from 4.3% to 1.7% by following a standardized, sterile process for culture collection using chlorhexidine skin antisepsis, sterile gloves, sterile drapes, and checklists[10].

In our study, the growth is seen in 191/998 (19.1%) cases. Of which growth in ED is 108 (18.9%) and in MICU/MHDU is 83(19.4%). A higher percentage of growth in ED may be because of more number of patients in this arm. A study done by Choi et al also had near similar growth in ED (17.5 %)[5]. A similar study done in ICU by Ramirez et al showed a culture growth of 31%(12). The most common contaminant found during this study was CoNS which was similar to most of the studies [7,9].

The blood culture procedure variables were not significant with contamination (p-value >0.05). But according to the study by Lee et al in Taiwan, there was a strong correlation between blood culture contamination rates and the degrees of ED crowding (P.001)[7,11].

A study done by Kim et al on blood culture contamination stated that the contamination rate was 0.5% in routine sterile gloving and 0.9% in optional sterile gloving with a significant P-value. Wearing a sterile glove in an aseptic manner before venepuncture may reduce blood culture contamination[12]. Various studies on the BCC rate among different antiseptics showed no significant difference among the antiseptics used[13]. Weinstein at el. study suggests that iodine tincture and chlorhexidine tincture are equivalent antiseptic agents for skin antisepsis in patients who require blood cultures[14].

In our study CoNS are commonly isolated contaminants (26 cases) from blood cultures, however,

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they can also cause true bloodstream infections. Due to its clinical effects, this distinction is of practical significance because it can avoid the unfair use of antibiotics and the development of antimicrobial resistance. More importantly, the inability to ascertain and treat true bacteremia can prove costly to the patient, more so if the patient is critically ill or immunocompromised. A clue to the significance of CoNS-positive blood cultures is the number of positive cultures, thus more the number of positive cultures, the higher the chances of it being true bacteremia. However, this is not feasible if before beginning the patient on antimicrobial agents, only a single culture sample is collected. Quantitative blood cultures (QBCs) can aid interpretation. QBCs are cumbersome and not very feasible. On the other hand, the time-to-positivity (TTP) of blood cultures after loading in the automated systems like BacT/ Alert may be a useful surrogate test for bacterial density and interpretation of the significance of CoNS isolated from positive blood cultures[15].

V. Conclusion

Blood culture contamination is a common clinical problem and often leads to both adverse impacts on health care and costs. We identified a low contamination rate among blood cultures collected in the adult ED at our hospital 4.4% when compared to MICU/MHDU (5.4%). We researched the process of blood culture collection and found inconsistent methods for culture collection with recurrent breaches in aseptic technique in ED. As we know ED frequently experiences high patient volumes and crowding and that leads to making things do as soon as possible and in that way, many lapses in protocol happen and that leads to degraded performance of blood cultures, both increasing the rate of contamination and decreasing the diagnostic yield.

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Study of Microbes Found on Mobile Phones of Street Food Vendors in Junagadh, Gujarat, India

By Dr. Darshit Ram

Abstract- *Objective:* Street vendors run various businesses include food; there is still a lack of regular hygiene monitoring while working while using cell phones. This is due to the high level of bacterial agents being isolated from cell phones through poor health and hygiene practices.

Material and methods: Standard microscopic and morphological methods were applied according to pharmacopeia. To isolate microbes streak plate technique applied.

Results: The prevalence of cell phone viral contamination was 81.5% privately Cell Phones the prevalence of cell phone contamination is 80% Women 84%. The most common microorganisms are isolated and the most common occurrence is *Staphylococcus aureus* (60%), *Staphylococcus epidermidis* (22%) *Bacillus spp*. (50%) and *Escherichia coli* (10%), the percentage of microbes isolated from personal cells in men the most common occurrence is *Staphylococcus aureus* (48%), *Staphylococcus epidermidis* (24%), *Bacillus spp*. (40%) and *Escherichia coli* (6%), in the case of Women's personal cell phones.

Keywords: *bacterial, microscopic, isolate, contamination.*

GJMR-C Classification: *NLMC Code: QW 4*

STUDYOFMICROBESFOUNDONMOBILEPHONESOFSTREETFOODVENDORSINJUNAGADHGUJARATINDIA

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Study of Microbes Found on Mobile Phones of Street Food Vendors in Junagadh, Gujarat, India

Microbes on Food Vendor's Phones

Dr. Darshit Ram

Abstract- Objective: Street vendors run various businesses include food; there is still a lack of regular hygiene monitoring while working while using cell phones. This is due to the high level of bacterial agents being isolated from cell phones through poor health and hygiene practices.

Material and methods: Standard microscopic and morphological methods were applied according to pharmacopeia. To isolate microbes streak plate technique applied.

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Conclusion: The results of the study show *Staphylococcus aureus* and *Bacillus spp.* Significant viral infections are often associated with cell phones, which are more common in women than in men. You need to adapt the hygiene routine to street food vendors while using cell phones.

Keywords: bacterial, microscopic, isolate, contamination.

I. Introduction

Microbiological standards of health are essential for a healthy lifestyle. However, changing the practices found in standard hygiene standards in developing and developed countries. This study confirms such differences, as different types of viruses have been identified in cell phones. (1) A cell phone (also known as a cell phone, cell phone or cell phone) is a device. You make and receive phone calls over the phone while traveling around a large area in the area; research shows that the cell phone poses a serious health risk. 2000, World Health Organization (WHO) defines telephone radiation in and out of life-threatening radiation because radiation has been reported to be altered. Electrical activity in the brain causes insomnia, headaches, mental retardation, memory retention and low sperm quality. It damages the DNA of sperm production. (2,3) There was also a cell phone The germ cell is called, a cell for transmitting infectious diseases Always communicate by hand. (4) Cell phones can be dangerous to the health of tens of thousands of people. Viruses live on every square inch of the phone.

Staphylococcus aureus, a common bacterium Found in the skin and nose of up to 25% of people and animals Diseases from acne and abscesses to pneumonia and meningitis, and its close relative Methicillin Anti *Staphylococcus aureus* (MRSA). (5) Because a small group of isolated microbial viruses of the common skin microbiota proposed by previous researchers. (6) Staphylococcus aureus is a well-known microbiota of human skin that can be replaced by a cell phone or phone contact.

It serves as the primary vehicle for hand distribution of various small items. *Escherichia coli* and the accompanying bacteria make up 0.1% of intestinal flora, and Stool-oral transmission is the main pathway for pathogenic bacteria that cause disease. (7) Causes infections from acne and abscesses to pneumonia and meningitis Not available on cell phones. Confirmed by many colonial people. (8) Choto et al has shown that cell phones can be contaminated by sources such as human skin or hands. Bag, phone bag, bags, packs, ecosystems and food particles, these sources links what germs infect the cell in the colony, causing mild to chronic diseases. (9) However, germs have so far been identified by health researcher's especially indigenous plants Pollution.

They cause opportunistic infections. Karabe et al (10) *Escherichia coli*, *Bacillus spp*. and coagulase-negative *staphylococcus*, they are nosocomial infections, which can be separated from health workers' cell phones. (11) The presence of *Escherichia coli* in men's personal cell phones indicates contamination. - Microbes grow very isolated from cell phones. (12) *Staphylococcus epidermidis* and other coccyx Negative *staphylococci* (CoNS) have emerged as major causes of nosocomial infections. These organisms, which are an important part of normal skin and mucosal microflora,

It specializes in catheter-related infections and other medical devices Today mobiles have become one of the most important adornments in professional and social life. Closely (13,14) the purpose of this study is to

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examine the personal hygiene and contamination of cell phone viruses belonging to Baghdad University students, and if available these mobile phones pose serious health risks.

II. Material and Methods

Samples were systematically collected and analyzed by Kololanireza et al. The Streak plate method has been used with 100 phones for 100 students (50 men and 50 women) in Junagadh, Gujarat, India. Streak blade Technique was used for the first test, the cell phone started to be held with the help of sterile gloves. With a sterile cloth, sterile saliva moistens the face on both sides of the wire. The element is embedded in agar by a cellular sample fabric. Vaccinated plates are incubated back to a temperature of 37 ° C for 48 hours. Thereafter the plates were recognized the presence of individual colonies. The tiny organisms are separated from the petriplate into a tube containing a media element called agar. Thereafter, pure cultures of bacterial isolates were classified on the basis of morphological and biochemical experiments. Berkeley's treatise on official bacteriology was used in Note for Identification. (15) P-value statistical analysis (0.05).

III. Results

Usually the microorganisms were isolated and their percentage frequency *Staphylococcus aureus* (70%), *Staphylococcus epidermidis* (21%), *Bacillus spp*. (41%) and *Escherichia coli* (10%) (Table 1), microbial isolation in personal mobile phones for men Their frequency of occurrence is *Staphylococcus aureus* (60%), *Staphylococcus epidermidis* (22%), *Bacillus spp*. (50%) and *Escherichia coli* (10%) (Table 2), when private Mobile phones for women *Staphylococcus aureus* (48%), *Staphylococcus epidermidis* (24%), *Bacillus spp*. (40%) *Escherichia coli* (6%) observed.

These results were due to the fact that mobile phones are polluted by different types of bacteria Their individuality and proximity to the vital part of our body in use such as faces, ears, lips Users' hands can become real reservoirs of infections, which can lead to infections. Personal hygiene and hygiene activities such as hand washing and cleaning the environment Wash hands before and after handling food and phone cleaning People to prevent bacterial infections. The rate of bacterial contamination of personal mobile phones in general was 81.5% privately Mobile Phones for Men The rate of bacterial contamination in personal mobile phones is 80% Female 84%.

Table- 1: Frequency of bacteria isolated from personal mobile phones in general.

Bacteria	Personal mobile phone n = 100	Prevalence rate (%)
S. aureus	70	70
S. epidermidis	21	21
Bacillus spp.	41	41
E. coli	10	10

Table- 2: Frequency of bacteria isolated from personal mobile phones for male

Bacteria	Personal mobile phone n = 50	Prevalence rate (%)
S. aureus	30	60
S. epidermidis	11	22
Bacillus spp.	25	50
E. coli	5	10

Table- 3: Frequency of bacteria isolated from personal mobile phones for female

Bacteria	Personal mobile phone n = 50	Prevalence rate (%)
S. aureus	24	48
S. epidermidis	12	24
Bacillus spp.	20	40
E. coli	3	6

IV. Discussion

The result is similar to Yusha et al (l6), which found the average cell phone viral load was 80.0% 11, and Illusania et al. Food contamination of food retailers is 100% (2). High susceptibility to bacterial agents Cell phone isolation caused by poor health and hygiene habits. The results did not show a significant difference ($p < 0.05$) in isolated microorganisms. The percentage

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of frequency that occurs between male and female cell phones results of studies indicate that *Staphylococcus aureus* and *Bacillus spp*. Major virus classification often associated with personal calls as shown in Table 1 above. High classification of Bacillus spp. As shown in Table 1 above, it confirms the ubiquitous character Bacillus spp. This can empower the colonies and be able to withstand its grains Natural changes, dry heat and occasional mild disinfection, some *Bacillus spp*. *Bacillus cereus* is a common plant of water, vegetables, grains and cooked foods. It can cause toxic infections and allergies in humans. (16) Ilusanya et al. (17), Specify classified items and their percentage of Occurrences *Staphylococcus aureus* (50%), *Streptococcus faecium* (34%), *Bacillus serius* (30%), *Escherichia coli* (26%) and *Micrococcus ludius* (10%). The pathogenesis of *Staphylococcus epidermidis* is highly dependent on device-related infections. The ability of bacteria to adhere to the surface of the device. (18) Cell phones are a real pool of germs on the face, ears, lips and hands of various users of various health conditions. (19) These infections can be reduced by identifying and controlling predictive, educational and microbiological surveillance. (20) Most people do not realize the dangers of phone sharing. Sharing phone calls undoubtedly means excessive sharing. (21) Best ways to kill germs on cell phones should be developed to reduce the potential biological risks.

V. Conclusion

These results have shown that cell phones are contaminated in a variety of ways Microbes, and their diversity and proximity to an important part of our body Use like faces, ears, lips and hands of users can be real repositories of germs. Infection is possible. Personal hygiene and hygiene activities such as hand washing and cleaning Hand washing before and after handling environmental hygiene and food and telephones People must be accepted to prevent bacterial infections. Suggestions for street food vendors are; it is important to keep cell phones away from children, the spread of germs, your people are encouraged to be interested in human hygiene and sanitation, Prevent the outbreak and spread of disease. Develop effective prevention strategies such as cleaning cell phones with alcohol having an antibiotic reduce the risk of infection. Phones Another way to reduce cell phone contamination is to enlighten the generalization of small cell phone colonies and the use of standard cleaning agents and redesigning their environment. The phone is easy to use while you are in the toilet or toilet and eating so even washing your hands after using the toilet, can lead to food pollution Mobiles Do not handle phones in toilets, toilets or dirty places.

Conflict of interest: NIL

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Urgent Need to Address Gap in COVID 19 Vaccination Coverage among Refugees and Vulnerable Internal Migrants in India

By Dr. Nilofur Banu

Abstract- *Introduction:* COVID 19 vaccination is a important domain of this current emergency public health response to curb this pandemic situation, as we cannot afford to deal with recurrent out breaks of COVID 19, hence gaps in COVID 19 vaccination to be addressed and effectively gaps to be bridged.

Methods: Largest vaccination drive in world was COVID 19 vaccination, started in phase manner based on the risk factors and exposure of the population, first phase was for health care worker end of first phase was for frontline workers and municipal workers, second phase was for gendral population above the age of 60 and 45-59 with co morbidities.

Results: Government documents-ID proofs where needed to register the priorities population in the Co-WIN Portal and eventually will be vaccinated, refugees and internal immigrant who were eligible to get vaccination based on their age criteria were not able to get their vaccination due to lack of government documents and ID Proof.

GJMR-C Classification: *NLMC Code: QW 806*

URGENTNEEDTOADDRESSGAPINCOVID19VACCINATIONCOVERAGEAMONGREFUGEESANDVULNERABLEINTERNALMIGRANTSININDIA

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Urgent Need to Address Gap in COVID 19 Vaccination Coverage among Refugees and Vulnerable Internal Migrants in India

Bringing the Gap in COVID 19 Vaccination

Dr. Nilofur Banu

Abstract- ***Introduction:*** COVID 19 vaccination is a important domain of this current emergency public health response to curb this pandemic situation, as we cannot afford to deal with recurrent out breaks of COVID 19, hence gaps in COVID 19 vaccination to be addressed and effectively gaps to be bridged.

Methods: Largest vaccination drive in world was COVID 19 vaccination, started in phase manner based on the risk factors and exposure of the population, first phase was for health care worker end of first phase was for frontline workers and municipal workers, second phase was for gendral population above the age of 60 and 45-59 with co morbidities.

Results: Government documents-ID proofs where needed to register the priorities population in the Co-WIN Portal and eventually will be vaccinated, refugees and internal immigrant who were eligible to get vaccination based on their age criteria were not able to get their vaccination due to lack of government documents and ID Proof.

Conclusion: To *Building a fairer, healthier world, the* the policy makers should take necessary steps to vaccinate refugees and internal migrants based on current age group criteria despite of them not able to furnish necessary document for registration and make an effort to link them to Co-WIN portal, in all vaccination centers for the benefits of individual and to the community.

I. Introduction

Novel corona virus COVID 19 has caused an outbreak globally, affecting nearly 132,046,206 till date globally,[1] COVID 19 disease manifest from milder disease (with symptoms of mild cough, sore throat, generalized body pain) to severe life threatening acute respiratory syndrome corona virus which has caused 2,867,242 death so far globally,[1,2]. With no proven drug to cure the diseases, the only way to escape from the diseases is prevention by maintaining social distancing, adopting safe and effective hygiene practice and vaccination.

Among all the preventive measures, vaccination is the most important health measure to minimize the spread of the infection which will significantly help us to curb the pandemic situation. Owing to this pandemic, immunization against COVID 19 is very essential, and thus it is very important to continue immunization services in all mere feasible areas to prevent recurrent outbreaks of COVID 19. This is a very important domain of this current emergency public health response to curb this pandemic situation, as we cannot afford to deal with recurrent out breaks of COVID 19, hence gaps in COVID 19 vaccination to be addressed and effectively managed .[3]

a) COVID 19 vaccination-world's largest vaccination drive

On January 16 2021, India started first phase of largest vaccination drive -COVID 19 vaccination, to begin with, government started to prioritize the population, first priority was given to health care workers in all public and private health care facility and had eligibility citeriea which included all health care workers, supporting staff, helper ect who were at most risk of getting infected by COVID 19 by handling COVID 19 patients.[4] Prior registration of health care worker with government ID proof (other than adhaar card) along with employee id card (with the eligibility under government norms) was done and started vaccinating health care workers, [5]. At the end of first phase front line worker (engineers, revenue department staff, police officers, journalist) and municipal workers (sanitation workers in COVID care center, waste collectors, sweepers, waste processing plant operators engineer and segregator, vehicle drivers of government city bus, conductors, water tanker operators, cremation ground staff, maintenance staff) where vaccinated by walk in registration with ADHAR card in Co-WIN portal.

On march 1 2021, second phase of COVID 19 vaccination was started for general public to all above the age of 60 and 45-59 years of age with co morbidities, it was either through Aarogya Setu app (is a mobile application developed by the Government of India to connect essential health services with the people of India in our combined fight against COVID 19) registration or by walk in to allotted government and private health care facility and to register with ADHAR card, PAN card ,Indian passport, voter id ,driving license

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and smart card, MNREGA job card, official identity cards issued to MPs/MLAs/MLCs, pass book issued by Bank/post office, service identity card issued beneficiaries were registered in Co-WIN portal and after vaccinating, certificate was issued central/state Government and smart card issued by RGI under NPR in Co-WIN portal and after vaccination, vaccinator will update in portal that the beneficiary has been vaccinated, and message will be delivered to the beneficiaries to the linked mobile numbers of the beneficiaries from where the benefiters were able to down load the certificate of COVID 19 vaccination.[5]

b) COVID 19 Vaccination's Digital platform boon to many but curse to refugees and internal migrants

The Co-WIN System is cloud based platform that helps beneficiary to register, help create micro planning of sessions by the vaccinators and issue of certificates to the beneficiary who have been vaccinated ,it is consider as digital back bone of the vaccination drive in India, it is linked to Evin and SAFEVAC which help in cold chain monitoring and vaccine logistics planning, it is very good digital initiative[5] but Atmost concern is about the Refugees, it has been estimated that 250,000 current refugees and also asylum seekers has been left out and thereby have been Denied access to government-issued documentation it is not the case of only refuges but also many Vulnerable Internal Migrants who have to travel from less-developed part of the country to larger industrialized towns and many cities in search of better living.[6] According to the reports from recent census, in 2011, nearly 456 million of internal migrants are there in India who amount to nearly one-third of Indian population. internal migrants despite of being Indian citizens, many of them find that mere crossing of a state border has put them in a similar condition of international refugees, further more they end up having no documentation which leave them with no legal recognition thereby they may not be eligible for government documents issued to citizens of India, such as passports and voting cards.[6 7]

It has been identified by UNHCR that many refugees have been denied the Aadhaar card on the basis that they do not belong to legal residents criteria. Internal migrants also face similar situation in obtaining Aadhaar, since many of the internal migrants have no documentation linked to their residence in any place. These issues became worse when the government of india made Aadhaar cards mandatory to be linked to obtains certain basic benefits like bank accounts, employment, advanced health care and also a mobile phone card. [6,8]

c) Building a fairer, healthier world

Nerveless, this refuges and internal migrants who may not possess the required ID proof as mentioned in the Co-WIN PORTAL to get them register as a beneficiaries [5] and thereby won't be able to get COVID 19 vaccination, refugee who live in unfavorable conditions are at most risk of COVID 19 infection and may be source of super-spreaders who may be potent carrier [9 10] and even with adequate vaccination coverage of rest of the population we may still not be able to curb COVID 19 infection and spread efficiently.

Further more this year world heath theme- *Building a fairer, healthier world, has rightly emphasized on the need to* highlight particular group of population who does not enjoy the health benefits like other ,few such group who do not get health benefits like others are refugees and internal migrants. Getting health benefits is the fundamental right of every individual.

II. Conclusion

Hence, the policy makers should take necessary steps to vaccinate refugees and internal migrants based on current age group criteria despite of them not able to furnish necessary document for registration and make an effort to link them to Co-WIN portal, in all vaccination centers for the benefits of individual and to the community there by we will be able to tackle this public health emergency in a much better way and there by curbing COVID19 infection.

Source of support
None.

Conflicts of interests
None to be declared.

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Mechanosensors, and Mechanosensing: Mechanosensation, a Perception of the Force and Response

By Rajiv Kumar

Opinion- According to the law of motion, reflex or a reflex action is an uncontrollable phenomenon in response to any induced forces. The same also applies to the cellular processes. Force and response are the two factors of a perception that generates mechanical force and alter cellular behaviors. This phenomenon defined as mechanosensing. Here. The mechanical force originates changes in the conformation of mechanosensory and heaved extracellular matrix or cytoskeletons toward mechanical force.[1] The mechanical force-driven tension instigated in a lipid bilayer and initiated conformational changes in the entrenched sensors. The process of mechanotransduction, cell response toward a mechanical force, translated conformational changes that were generated via mechanical force into a signal having a biochemical message.[2] Overall, mechanosensory are molecules that perform interactions or enzymatic events and can directly sense mechanical dynamics.[3]

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MECHANOSENSORSANDMECHANOSENSINGMECHANOSENSATIONAPERCEPTIONOFTHEFORCEANDRESPONSE

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Mechanosensors, and Mechanosensing: Mechanosensation, a Perception of the Force and Response

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Opinion

According to the law of motion, reflex or a reflex action is an uncontrollable phenomenon in response to any induced forces. The same also applies to the cellular processes. Force and response are the two factors of a perception that generates mechanical force and alter cellular behaviors. This phenomenon defined as mechanosensing. Here. The mechanical force originates changes in the conformation of mechanosensory and heaved extracellular matrix or cytoskeletons toward mechanical force.[1] The mechanical force-driven tension instigated in a lipid bilayer and initiated conformational changes in the entrenched sensors. The process of mechanotransduction, cell response toward a mechanical force, translated conformational changes that were generated via mechanical force into a signal having a biochemical message.[2] Overall, mechanosensory are molecules that perform interactions or enzymatic events and can directly sense mechanical dynamics.[3] Such a mechanism needs a sense or natural ability to generate and recognize a reflex or reflex action. In the cellular mechanism, these senses operate through mechanical forces (vibration and pressure) recognized by sensory neurons, and the process defined as mechanosensing (Fig. 1). So the physiology of these senses linked directly to cellular behavior.[4] Mechanosensors are the linkages between sense and cellular responses or functioning. The mechanical force is the component of the blueprint of the cell mechanotransduction process to induce changes in cellular behavior or responses. Identifying these processes or changes in cellular responses and pathways as a route for the theranostics will be the key. It will be an important source for early diagnosis, in situ disease monitoring, and prevention.[5] This mechanism is like an evenness process with two phases, forward and backward, simultaneously to represent transformations in the system. Here, "the perception of the force and response to it" has similarities with the symmetry phenomenon of the cellular environment. In cellular processes, conformational changes induced by mechanical forces regulate the mechanosensory via mechanosensing phenomenon, as explained by referring to the law of motion.

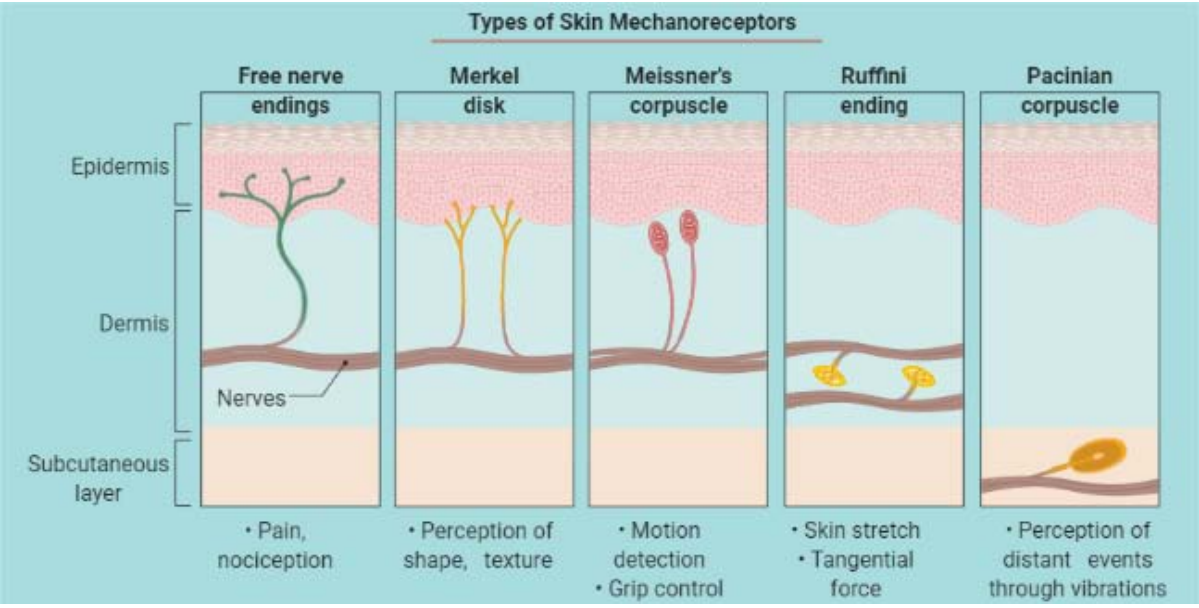


Fig. 1: Illustrate the phenomenon of mechanosensors, and mechanosensing: mechanosensation, a perception of the force and response. "Adapted and created with permission from [biorender.com] and acknowledged.

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The mechanosensory are there in lipid bilayers with two ends, one of them surrounded by extracellular matrices or the cytoskeleton, and the opposite end is available for pulling toward the mechanical force.[6] These processes happening on the surfaces of the lipid bilayers will generate vibrations within it. The reaction or any action of the cells toward such activities is governed through cellular response and outlined as mechanotransduction.[7] The chain of the processes proceeds further for translating the earlier proceeding into biochemical signals. Finally, the conformational changes generated by mechanical forces get converted into signaling pathways biochemically. During these biological signaling processes, many chemical changes have occurred[8] It may be the protein-protein interactions or enzymatic activities modulated as force-induced structural changes. For the proof of such chemical transformations, there is a need to identify and discover the molecules successfully having the senses exists in the cellular environment.[9] Therefore, their outputs are implemented to utilize these chemical transformations during the design and architecture of preventive and regenerative therapies. The phenomenon of these transformations occurred by the involvement of the chemicals (molecules) along with their mechanical action as illustrated. It is pointed out that the mechanical stresses or forces originating within the cellular environment and active cytoskeleton can be stimulated by external and endogenous forces.

Generally, cells have focal adhesion proteins and can transmit external forces with their assistance and finally generate cytoskeletal tension and be marked as mechanosensors. Various techniques, including a magnetic tweezers, nanoscale particle tracking, traction microscopy, atomic force microscopy, applied for detecting changes done. The aforementioned techniques used to expose various steps and routes of force transmission and structural remodeling.[10] The approach of force sensing can be applied further to understand the various features of cell division and differentiation and recommended for investigation and innovations in medicine and biology.

Understanding in these blueprints of cell mechanotransduction machinery will nourish the strategies by including these facts. In last, these strategies implemented in the innovation of preventive and regenerative therapies, for enhancing the therapeutic values and initiating the use of nanoscale tools for healing. To achieve these goals, a necessity is there to understand the mechanism of the physiology of multicellular tissues, how do they transmit mechanical forces-induced signals between cells.[11] The understanding of the mechanism of mechanosensing which occurred via mechanosensor is an important aspect, and utilized during the trials of nanoscale therapeutics and theranostics tools in drug delivery and diagnosis.

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The Development of Vaccines against SARS-Cov-2 Virus. An Overview

By Dr. Sujan Narayan Agrawal

Abstract- The COVID-19 is a zoonotic disease and is caused by the SARS-CoV-2 virus. It is the type of coronavirus. The structural proteins of the virus include the spike (S) protein, membrane (M) protein, envelop protein (E), and nucleocapsid (N) protein. The replication of the virus utilizes all structural proteins. The infection of the host occurs due to the binding of the spike protein to the angiotensin-converting enzyme II (ACE II). It is a positive-sense single-stranded RNA virus belong to the family Coronavridae. The recent outbreak of this disease has caused a lethal pandemic. The previous knowledge of SARS-CoV has helped to develop a vaccine against SARS-CoV-2 also. The humoral and cell-mediated immune response is protective against this infection. The antibody response generated against the S protein, which is the most exposed protein of SARS-CoV, has been shown to protect from infection in mouse models. Multiple studies have shown that the antibodies generated against the N protein of SARS-CoV, are highly immunogenic and abundantly expressed protein during infections.

Keywords: SARS-CoV-2; COVID-19; vaccine; viral vector; coronavirus; live attenuated virus; protein sub-unit; virus-like particles (VLP).

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The Development of Vaccines against SARS-Cov-2 Virus. An Overview

Dr. Sujan Narayan Agrawal

Abstract- The COVID-19 is a zoonotic disease and is caused by the SARS-CoV-2 virus. It is the type of coronavirus. The structural proteins of the virus include the spike (S) protein, membrane (M) protein, envelop protein (E), and nucleocapsid (N) protein. The replication of the virus utilizes all structural proteins. The infection of the host occurs due to the binding of the spike protein to the angiotensin-converting enzyme II (ACE II). It is a positive-sense single-stranded RNA virus belong to the family Coronavridae. The recent outbreak of this disease has caused a lethal pandemic. The previous knowledge of SARS-CoV has helped to develop a vaccine against SARS-CoV-2 also. The humoral and cell-mediated immune response is protective against this infection. The antibody response generated against the S protein, which is the most exposed protein of SARS-CoV, has been shown to protect from infection in mouse models. Multiple studies have shown that the antibodies generated against the N protein of SARS-CoV, are highly immunogenic and abundantly expressed protein during infections. The T cell response provides long-term protection, maybe remain up to many years. Due to its possibility of long-term protection, it has attracted and provoked interest for the prospective vaccine against SARS-CoV-2. Among all SARS-CoV proteins, the T cell response against the structural proteins is the most immunogenic, as compare to the non-structural proteins. There are frenetic efforts to develop a vaccine against COVID-19, because of the pandemic situation. The various platforms are based on inactivated or live attenuated viruses, protein sub-unit, virus-like particles (VLP), viral vector (replicating and non-replicating) DNA, RNA, and nanoparticles, etc. Each candidate has some advantages and shortcomings. In this paper, an attempt is made to have an overview of the most promising vaccines for the infection by the SARS-CoV-2 virus.

Keywords: SARS-CoV-2; COVID-19; vaccine; viral vector; coronavirus; live attenuated virus; protein sub-unit; virus-like particles (VLP).

I. Introduction

The COVID-19 is a zoonotic disease and is caused by the SARS-CoV-2 virus. It is a type of coronavirus. The structural proteins of the virus include the spike (S) protein, membrane (M) protein, envelop protein (E), and nucleocapsid (N) protein. The replication of the virus utilizes all structural proteins. The infection of the host occurs due to the binding of the spike protein to the angiotensin-converting enzyme II (ACE II). Coronavirus is a positive-sense single-stranded RNA virus that belongs to the family Coronavridae. [1] These viruses mostly infect animals, including birds and mammals. In humans, they generally cause mild respiratory tract infection, just like the common cold. However, some recent coronavirus infections have resulted in lethal pandemics which include the SARS-CoV-2 virus. It belongs to the Beta coronavirus genus. [2] Its ~30 Kilobases genome size encodes for multiple structural and non-structural proteins just like other coronaviruses. Because of the recent discovery of the SARS-CoV-2 virus, the immunological information about this virus is limited. The preliminary studies have suggested that SARC-CoV-2 is quite similar to SARC-CoV based on full-length genome phylogenetic analysis. [3-4] The cell entry mechanism and human cell receptor usage are also similar. [5-6] This similarity in knowledge and researches help in understanding the immune responses and development of a vaccine against SARS-CoV-2. The previous studies also suggest a protective role of both humoral and cell-mediated immune responses. The antibody response generated against the S protein which is the most exposed protein of SARS-CoV has been shown to protect from infection in mouse models [7-8]

Multiple studies have shown that the antibodies generated against the N protein of SARS-CoV, are highly immunogenic and abundantly expressed protein during infections. [9-10] It was also found that antibody response was short-lived in the convalescent SARS-CoV patients. [11] The T cell response provides long-term protection, maybe remain up to many years. [12-13] Due to its possibility of long-term protection, it has attracted and provoked interest in the prospective vaccine against SARS-CoV-2. Among all SARS-CoV proteins, the T cell response against the structural proteins is the most immunogenic, as compare to the non-structural proteins [14] T cell response against the S and N proteins has been reported to be the most dominant and long-lasting, and both are structural proteins. [15]

There are frenetic efforts to develop a vaccine against COVID-19, because of the pandemic situation. The various platforms are based on inactivated or live attenuated viruses, protein sub-unit, virus-like particles (VLP), viral vector (replicating and non-replicating) DNA, RNA, and nanoparticles, etc. Each candidate has some advantages and shortcomings. [16] The immunogenicity is enhanced by adding adjuvants. [17] The immune-

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informatics approach is also used for the epitope identification of vaccine candidates. They are used to identify the significant cytotoxic T cells and B-cells epitopes found in the viral proteins. [18-19]

II. Nucleic acid Vaccine

The nucleic acid vaccines use genetic material from the disease-causing virus or a pathogen to stimulate an immune response against it. Depending upon the type of vaccine, the genetic material could be DNA or RNA. In the case of COVID-19 this usually the viral spike protein. Once this genetic material goes into human cells, it uses our cells to make the antigen that will trigger an immune response. There are many advantages of nucleic acid vaccines, they are easy to make, and are cheap. The antigen is produced inside our cells so the immune response is strong. It has got certain disadvantages too, however, so far, no DNA or RNA vaccine has been licensed for human use. The RNA vaccines are needed to be kept at an ultra-cold temperature (i.e., -70O C or lower) and it can be a real challenge for the countries that don't have the specialized cold storages. This is the main hurdle particularly in the low- and middle-income countries.

The DNA vaccine: These are the most revolutionary approach to the vaccination program. These DNA vaccines encode for the antigen and an adjuvant which induces the adaptive immune response. The transfected cell expresses the transgene, and it provides a steady supply of the transgene-specific protein. This phenomenon is quite similar to the live virus. They also stimulate effective humoral as well as cell-mediated immune response. [20] The mRNA vaccines: They are an emerging, non-infectious and non-integrating platform of vaccine development. They have no potential risk of insertional mutagenesis. This platform has the potential for a rapid vaccine development program due to its flexibility. It can mimic the antigen structure and the expression as seen with the natural infection. [21] The example of the mRNA vaccine is Pfizer BioNtech and Moderna vaccines.

The Moderna vaccine is composed of synthetic mRNA encapsulated in a lipid nanoparticle (LPN) which encodes for the full-length, pre-fusion stabilized spike protein (S) of the SARS-CoV-2 virus. It does not contain inactivated pathogen or sub-units of the live pathogen, so it is relatively safe.[22] The vaccine has got fast-track approval from FDA to conduct the phase II trial.[23] Another mRNA vaccine is by BioNtech/Pfizer. It is a codon-optimized mRNA vaccine and it encodes for the trimerized SARS-CoV-2 RBD. It has good immunogenicity. The mRNA is encapsulated in an ionizable lipid nanoparticle. This ensures its efficient delivery. The post-vaccination reactions are local and transient, and there are no systemic events. [24]

III. The Whole Virus Vaccines

One of the common ways to make a vaccine is to use inactivated or killed virus or microbe. They are inactivated by chemicals, heat, or radiation. The technology for making such vaccines has proven technology and know-how. Moreover, they can be manufactured on a reasonable scale. The drawback is it requires special laboratory facilities to grow the virus or bacterium safely. It has a relatively long production time, and it requires two or more doses. Examples of this approach are flu and polio vaccines. It can also be given to people with a compromised immune system. Yet another approach is to use a living but weakened version of the virus (live attenuated). The technology used to manufacture the vaccine are similar to the inactivated vaccine. However, these vaccines may not be suitable for people with the compromised immune system. The measles, mumps, and rubella (MMR) vaccine and chickenpox and shingle vaccines are examples of this type of vaccine. [25]

The advantages of live attenuated vaccines are: they have well-established technology. They evoke a strong immune response, which involves B cells and T cells. They are simple to manufacture. The disadvantage is that they are unsuitable for the compromised immune system. They are relatively heat-labile so, they require cold storage facilities. The live attenuated vaccine developed by the University of Hong Kong (DelNS1-Sars-CoV2-RBD) is influenza-based. There is the deletion of the NS1 gene. It is re-organized to express the RBD domain of SARS-CoV-2 spike protein on its surface. It is cultivated in the chick embryo and /or Madin Darby Canine Kidney Cells (MDCK) cells. It is potentially more immunogenic than the wild type of influenza virus. It can be administered as a nasal spray. [26]

IV. Protein Sub-unit Vaccines

A subunit vaccine is based on the synthetic peptide or recombinant antigenic protein. They are necessary to produce the immune response. [27] The existing hepatitis B vaccine is an example of a subunit vaccine. These subunit vaccines exhibit low immunogenicity and require an adjuvant to potentiate the vaccine-induced response. It has been found that the S protein of the SARS-CoV-2 is the most suitable antigen to induce the antibodies against the pathogens. The virus enters the cell via endocytosis, for this, it utilizes the S-protein mediated binding to the hACE2 receptors. The S-protein and its antigenic fragments are the prime targets for making the subunit vaccine. [28] The NVX-CoV2373 (Novavax, inc/emergent BioSolutions) is a nano-particle-based vaccine. It is based on the recombinant expression of the stable pre-fusion, coronavirus S-protein. [29-30] The subunit vaccines are also called acellular vaccines because they

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contain a purified piece of protein that can evoke an immune response. These fragments are incapable of causing the disease so they are considered very safe options. They are of many types: proteins from viral or bacterial pathogens, or polysaccharide vaccines containing chains of sugar molecules, or conjugate subunit vaccines, they bind a polysaccharide chain to a carrier protein to try and boost the immune response. At present, only protein sub-unit vaccines are being developed against the coronavirus. The subunit vaccines are already in use. The hepatitis B and pertussis vaccines are examples of protein subunits. The pneumococcal vaccine and MenACWY vaccine are polysaccharide vaccines. These subunit vaccines produce a strong and effective immune response. The risk of side effects is minimal. Such vaccines are relatively cheap and easy to manufacture. They are also more stable than those vaccines containing viruses or bacteria. These vaccines contain the adjuvants to boost the immune system and also, they require a booster dose.

V. Viral Vector Vaccines

The vaccines based on viral vectors are highly promising. They are very specific in delivering the gene to the targeted cell. The gene transduction is very efficient and induces a good immune response. [30] They offer a long-term antigenic protein expression. It also triggers and prime the cytotoxic T cells (CTL) and thus ultimately leads to the elimination of the infected cells. [31] The concept of the viral vector was introduced in 1972 with recombinant DNA from the SV40 virus.[32] The vaccinia virus was used subsequently as a transient gene expression vector in 1982. [33]

The ad5-nCoV vaccine developed by the CanSino Biologics inc/Beijing Institute of Biotechnology is an example of a viral vector vaccine. It is a recombinant, replication-defective, adenovirus type-5 vector (Ad5) expressing the recombinant spike protein of SARS-CoV-2. It is developed by the cloning optimized full-length gene of the S protein. The cloning is done with the plasminogen activator signal peptide gene in the Ad5 vector. [34] *Coroflu* developed by Bharat Biotech is a vaccine given by the intra-nasal route thus mimicking the natural route of the viral infection. M2SR is a version of the influenza virus. It is modified by the insertion of the SARS-CoV-2 gene sequence of the spike protein. This vaccine expresses the hemagglutinin protein of the influenza virus, and thus it induces the immune response against both the viruses. This influenza virus is a self-limiting virus and does not undergo replication since it is lacking the M2 gene. The intra-nasal route activates several modes of the immune system and thus it has higher immunogenicity as compared to the intramuscular injection. [35] The vaccine LV-SMENP-DC is developed by engineering the dendritic cells (DC) with the lentiviral vector expressing the conserved domain of the SARS-CoV-2 structural proteins and the protease using the SMENP minigene. The vaccine is given subcutaneously. It activates the cytotoxic cells and generates the immune response. [36] Viral vectors are used to develop a vaccine against COVID-19. Adenovirus-based vectors are the most preferred approach. It elicits robust antibody response and offers protection against SARS-CoV-2. The classical route of delivery of vaccine is intramuscular but intranasal spray has also been promising. It has also been demonstrated that the prime-boost strategies provide superior immunity and protection.

VI. Conclusion

The duration of the clinical trials is the greatest hurdle for the development of any new vaccine. As per FDA, a vaccine candidate has to pass through at least three phases of placebo-controlled trials for validation of its safety and efficacy, and it may take years to gather. The safety trials are to be conducted for the children, pregnant women, and immune-compromised patients before the extension of vaccination for this group. [37] The viral genome is in a process of constant change and mutation. The mutations vary according to the environment, population, population density, and geographical area. The scientist identified approximately 198 mutations of the virus inside the human host. These mutations may lead to the formation of different subtypes and thus allow the virus to escape the immune system, even after vaccination. [38] There is a large number of vaccine candidates for the COVID-19 disease and are based on various platforms. The various stages of vaccine development and quite a lengthy and laborious process. This includes the clinical and preclinical trials. Due to this pandemic scientific community is using the unconventional approach to accelerate the process of vaccine development and of course without compromising with the safety and quality. As per the WHO: “vaccine must provide a highly favourable benefit-risk contour; with high efficacy, only mild or transient adverse effects and no serious ailments.” It must be suitable for all ages, pregnant, and lactating mothers and should provide a rapid onset of protection. It should also provide immunity at least for one year with a single dose.

In India, six biotech companies are venturing in developing vaccines against coronavirus. They are Serum Institute of India, ZydusCadila, Biological Evans, Indian Immunologicals, Bharat Biotech, and Mynvax. They are working on DNA vaccines, live attenuated recombinant measles vaccines, inactivated viral vaccines, subunit vaccine, and vaccines developed by Condon-optimization, [39] Currently there are more than 100 candidates SARS-CoV-2 vaccines under development. The World Health Organization (WHO)

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regularly publishes an updated list of vaccines in development. All these can be accessed at https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines). The universal priority is to develop a safe and effective COVID-19 vaccine that can induce an appropriate immune response, to combat this pandemic.

Ethical issues: None.

Financial Implications: None.

Competing Interest: None

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- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.



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Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

Tips for writing a good quality Medical Research Paper

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of medical research then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.



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6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.



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Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.



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Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

Criterion for Grading a Research Paper (Compilation) by Global Journals

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals.

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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