RESEARCH ARTICLE

EFFECTIVENESS OF THE SAFE DELIVERY APP IN ENHANCING NURSING STUDENTS' KNOWLEDGE OF MATERNAL SEPSIS

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Manuscript Info

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Abstract

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Maternal sepsis is a life-threatening condition arising from infections related to childbirth, leading to severe complications or mortality. This study evaluates the effectiveness of the Safe Delivery App in enhancing nursing students' knowledge of maternal sepsis and its management. A quasi-experimental pre-test and post-test design was used. The study was conducted at Gian Sagar College of Nursing, Punjab, with 40 fourth-year B.Sc. Nursing students selected through convenient sampling. Data collection tools included a socio-demographic proforma, a modified structured knowledge questionnaire, and a Safe Delivery App module on maternal sepsis. An orientation session was conducted on app installation and usage, followed by a post-test on the seventh day to assess knowledge improvement. The findings showed a significant increase in students' knowledge and skills regarding maternal sepsis after using the Safe Delivery App, highlighting its effectiveness as an educational tool. The Safe Delivery App serves as a valuable resource for improving nursing students' competency in maternal sepsis management. Its integration into nursing curricula could enhance maternal healthcare education, leading to timely recognition and intervention, ultimately reducing maternal mortality and morbidity rates.

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Introduction:-

Maternal and newborn mortality rates remain a critical global health challenge, necessitating innovative interventions to enhance maternal care. The Safe Delivery App (SDA), developed by the Maternity Foundation in collaboration with the University of Copenhagen and the University of Southern Denmark, is a mobile health (mHealth) tool designed to improve healthcare providers' knowledge and skills in managing childbirth-related complications. The app serves as an instructional guide, offering evidence-based protocols for obstetric emergencies, thereby strengthening maternal and neonatal healthcare services, particularly in resource-limited settings [1]

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The Safe Delivery App provides healthcare professionals with instant access to evidence-based guidelines for handling childbirth complications, including maternal sepsis. Available in multiple languages and customizable to national guidelines, the app functions offline once downloaded, ensuring accessibility in remote areas. It integrates instructional videos, drug lists, and e-learning tools to enhance professional competency in Basic Emergency Obstetric and Neonatal Care (BEmONC). Additionally, the app's "My Learning" platform enables users to test their knowledge, achieve certification, and become Safe Delivery Champions[2].

Maternal sepsis, a severe and life-threatening complication, results from an uncontrolled immune response to infection during pregnancy, childbirth, or the postpartum period. It remains a leading cause of maternal mortality worldwide, particularly in low-resource settings where timely diagnosis and intervention are challenging. The World Health Organization (WHO) has defined maternal sepsis as a life-threatening condition marked by organ dysfunction resulting from infection, highlighting the need for improved detection and management strategies [3].

Despite advances in maternal care, the identification of maternal sepsis remains complex due to physiological adaptations in pregnancy that may mask early symptoms. Common clinical signs include fever, tachycardia, hypotension, and altered mental status, necessitating heightened awareness among healthcare providers. The Global Maternal Sepsis Study (GLOSS) emphasized the importance of standardized diagnostic criteria and early intervention to reduce maternal mortality rates associated with sepsis[4].

Several risk factors predispose pregnant and postpartum women to sepsis, including prolonged rupture of membranes, caesarean delivery, retained products of conception, and invasive intrauterine procedures. Additionally, underlying conditions such as diabetes, obesity, and immunosuppression increase susceptibility to severe infections. Regular training and a structured approach to assessment and management are essential in improving early diagnosis and outcomes for affected women [5].

The Safe Delivery App aligns with WHO guidelines by providing healthcare professionals with structured, evidence-based protocols for preventing, identifying, and managing maternal sepsis. By integrating digital learning tools into maternal healthcare education, the app empowers midwives and skilled birth attendants with the necessary competencies to enhance maternal and neonatal survival rates. The widespread adoption of such mHealth solutions could significantly contribute to achieving Sustainable Development Goals related to maternal and child health [6].

Need Of Study
The time of childbirth poses significant risks for both mother and child. In 2019, 2.4 million newborns died in their first month, with nearly 6,700 deaths occurring daily. Additionally, approximately 2 million babies died during childbirth, highlighting the critical need for improved maternal healthcare [7]. Maternal sepsis remains a leading cause of maternal mortality, accounting for nearly half of intra-hospital maternal deaths worldwide, as reported by the World Health Organization (WHO) in 2020 [8]. Despite declining maternal mortality rates, sepsis continues to be an overlooked contributor, necessitating urgent attention to achieve Sustainable Development Goal 3 (SDG3) [9].Recent studies indicate a rise in sepsis cases, with reports from Imperial College London showing a 30% increase within two years [10]. Sepsis is responsible for 50% of intra-hospital maternal deaths globally, affecting both low- and high-income countries. However, data on the incidence and clinical outcomes of obstetric infections, including maternal sepsis, remains limited [11]

India accounts for 32,000 of the 2,95,000 annual global maternal deaths, representing 20% of maternal fatalities worldwide [12]. The primary cause is the lack of skilled care during childbirth. Investing in skilled healthcare could prevent an estimated 1,13,000 maternal deaths, 5,31,000 stillbirths, and 1.325 million neonatal deaths annually [13].

Addressing maternal sepsis through enhanced healthcare strategies, digital learning tools, and policy interventions is essential for reducing maternal and neonatal mortality rates globally.

Material and Method:-
After approval from Gian Sagar ethical committee and permission taken from Gian Sagar College of Nursing. The structured questionnaire was provided to the students. By enrolling 45 nursing students from BSc nursing 4[th]year from Gian Sagar college of Nursing Ramnagar, Rajpura,Patiala. Convenient sampling technique was used to select the samples. A self-structurequestionnaire was formulated and validated by 10 experts in the fields of Obstetrics and Gynaecology. The reliability of tool was checked by split half method (r= .8). The tool was divided into 3 sections

.Section-I is Socio Demographic Variablelikes age, gender, parents' occupations, mobile phone use, prior awareness of the Safe Delivery App, study time on the app, and exposure to maternal sepsis cases, Section-II is Self-structured knowledge questionnaire consist of 20 multiple choice question ,Section-III is Safe delivery app module for Maternal sepsis. After the data collection excel sheet was filled. One mark given for right answer and zero for wrong answer. The criteria used for the assessment ofknowledgewere Good knowledge score(13-20), Average knowledge score (7-12), Poor knowledge score (0-6). All the students were informed about the study. The anonymity and confidentiality of the participants about findings while reporting the study. Data was analysed by using excel, for descriptive statistics use of percentage, mean, median and SD were calculated.

Results:-
Section 1- Frequency and percentage distribution of socio-demographic variable of nursing students.
Section 2- Findings related to the effectiveness of safe delivery app on level of knowledge regarding maternal sepsis and its management.
Section 3- Findings related to the association between knowledge regarding maternal sepsis and its management with selected demographic variables of nursing students.

Section 1- Frequency and percentage distribution of socio-demographic variable of nursing students.
Table 1:- Frequency and percentage distribution of socio-demographic variable of nursing students.
**N-40**

Socio-demographic variable	Frequency (f)	Percentage (%)
Age of student in year		
≤21years	2	5%
22years	20	50%
23 years	12	30%
≥24 years	6	15%
Gender of student		
Male	13	32.5%
Female	27	67.5%
Occupation of father		
Home maker	0	0
Self employed	19	47.5%
Medical professional	4	10%
Nursing professional	0	0
Other professional	17	42.5%
Occupation of mother		
Homemaker	34	85%
Self employed	0	0
Medical professional	0	0
Nursing professional	0	0
Other professional	6	15%
You are using mobile for which purpose?		
Social media	1	2.5%
Study purpose	1	2.5%
Social media and study both	38	95%
Have you heard about safe delivery app (SDA) earlier?		
Yes	19	47.5%
No	21	52.5%
What was your estimated time duration for studying maternal sepsis while using safe delivery app?		
<1hour	15	37.5%
2 hours	21	52.5%
3 hours	3	7.5%
>4 hours	1	2.5%
Have you ever seen a patient with maternal sepsis?		
Yes	13	32.5%

| No | 27 | 67.5% |

Table-1 This table gives details about 40 nursing students and how they study. Most students are 22 years old (50%) and more than half are female (67.5%). Almost half of their fathers are self-employed (47.5%), while most of their mothers are homemakers (85%). Almost all students (95%) use their phones for both studying and social media. About half of them (47.5%) have heard of the Safe Delivery App (SDA). Most students spent 2 hours (52.5%) using the app to learn about maternal sepsis. However, only 32.5% have seen a patient with maternal sepsis. These details show both their background and learning habits.

Section 2-Findings related to the effectiveness of safe delivery app on level on Knowledge regarding maternal sepsis and its management.
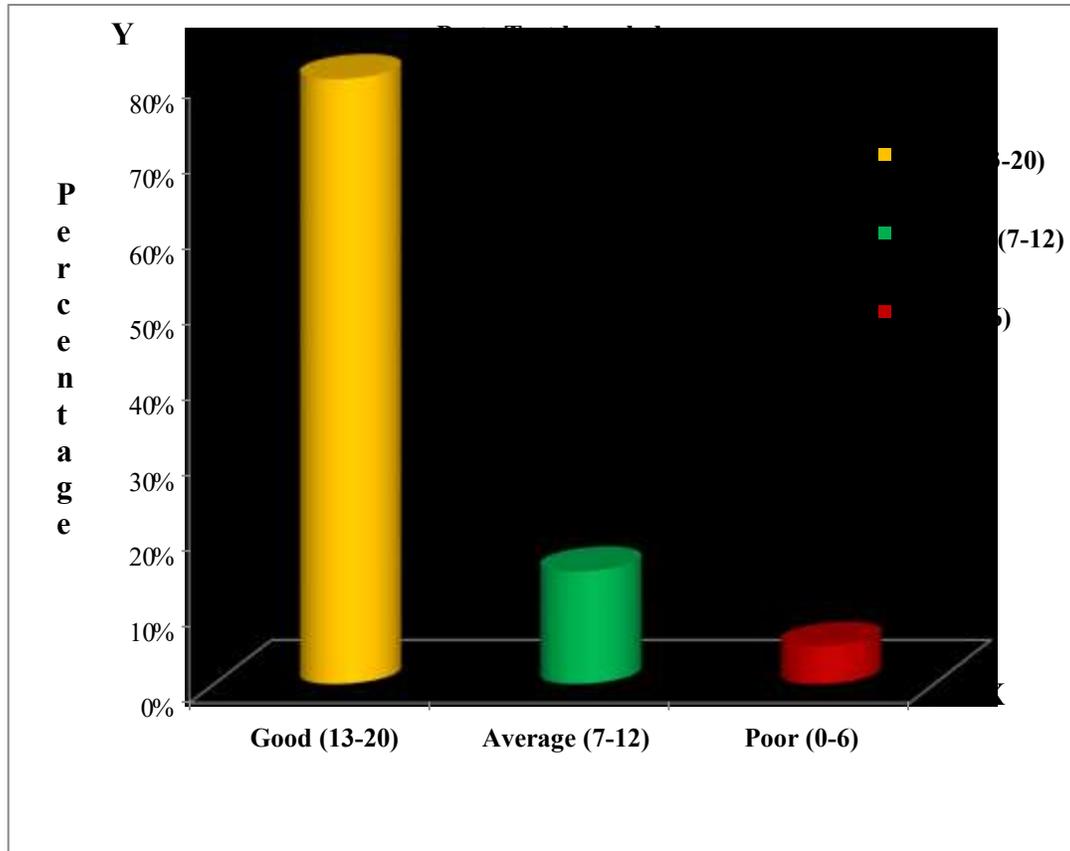
Fig 1:- Percentage Distribution of Subjects according to their level of Knowledge regarding maternal sepsis and its management shows the distribution of post-test knowledge scores among participants regarding maternal sepsis and its management. Out of 40 participants, 80% (32 individuals) achieved a "Good" level of knowledge with scores between 13-20, reflecting a strong grasp of the subject matter. 15% (6 individuals) scored in the "Average" range (7-12), indicating moderate understanding. Meanwhile, 5% (2 individuals) fell into the "Poor" category with scores between 1-6,suggesting limited comprehension.This data highlights that the majority of participants demonstrated a satisfactory to strong level of knowledge post-test, while a small percentage showed room for improvement.

Table2 (a):- Frequency and percentage distribution of post-test knowledge scores regarding maternal sepsis and its management.
N-40

Level of Post-Test Knowledge	Scores	Frequency	Percentage
Good	13-20	32	80%
Average	7-12	6	15%
Poor	1-6	2	5%

Table-2 (a) Shows the distribution of post-test knowledge scores among participants regarding maternal sepsis and its management. Out of 40 participants, 80% (32 individuals) achieved a "Good" level of knowledge with scores between 13-20, reflecting a strong grasp of the subject matter. 15% (6 individuals) scored in the "Average" range (7-12), indicating moderate understanding. Meanwhile, 5% (2 individuals) fell into the "Poor" category with scores between 1-6, suggesting limited comprehension.This data highlights that the majority of participants demonstrated a satisfactory to strong level of knowledge post-test, while a small percentage showed room for improvement.

Table2(b):- Mean, standard deviation and t- value, degree of freedomof knowledge score regarding maternal sepsis. **N-40**

Descriptivestatistics	Mean	SD	T – value	df
KnowledgeScore	14	3.587	24.680	39

Table-2 (b) reveals that after the test, participants' understanding of maternal sepsis was measured using a questionnaire. Out of a possible score of 20, the average score was 14, indicating that most participants understood about 70% of the concepts. The variability in scores, represented by the standard deviation of 3.587, shows that while some scores were higher or lower, most were close to the average. The statistical results showed a t-value of 24.680 with 39 degrees of freedom, confirming that the improvement in knowledge was not random, it was significant. This data clearly shows that participants gained meaningful knowledge after the test.

Table3:- Item wise frequency distribution analysis of responses given by nursing students on post-test questionnaire regarding maternal sepsis and its management. **N-40**

Items	F	%
Meaning of sepsis	40	100%
Common sign & symptom of maternal sepsis	30	75%
First identification of maternal sepsis can be done by	32	80%
Signs of sepsis diagnosis	34	85%
Without signs of septic shock, time interval for fluid balance calculation in sepsis	15	37.5%
Importance of assessing fluid balance of a female in shock	36	90%
Term used for uterine infection during antenatal period	33	82.5%
True about tetracycline drug	26	65%
Time interval for fluid balance calculation after septic shock	23	57.5%
Drug to avoid during pregnancy and breastfeeding	30	75%
Route of artesunate drug administration in maternal sepsis	19	47.5%
Drug(s) appropriate for treating malaria in maternal sepsis	21	52.5%
Fluid balance in maternal sepsis	28	70%
Term used for infection occurred after delivery in the womb (uterus)	35	87.5%
Critical complications post sepsis	26	65%
Treatment for chorioamnionitis	25	62.5%
Treatment for mastitis	32	80%
Correct dosage for metronidazole in sepsis	20	50%
Antibiotics given in maternal sepsis	33	82.5%
Appropriate dosage of gentamicin in sepsis	22	55%

Table-3 Shows that 40(100%) knowledge among nursing students regarding meaning of maternal sepsis,30 (75%) knowledge among nursing students regarding common sign and symptoms of maternal sepsis, 32(80%) knowledge among nursing students regarding first identification of maternal sepsis can be done by, 34(85%) knowledge among nursing students regarding signs of sepsis diagnosis, 15(37.5%) knowledge among nursing students regarding Without sign of septic shock, time interval for fluid balance calculation in sepsis, 36(90%) knowledge among nursing students regarding importance of assessing fluid balance of a female in shock, 33(82.5%) knowledge among nursing students regarding term used for uterine infection during antenatal period, 26(65%) knowledge among nursing students regarding true about tetracycline drug, 23(57.5%) knowledge among nursing students regarding time interval for fluid balance calculation after septic shock, 30(75%) knowledge among nursing students regarding drug to avoid during pregnancy and breastfeeding, 19(47.5%) knowledge among nursing students regarding route of artesunate drug administration in maternal sepsis, 21(52.5%) knowledge among nursing students regarding drugs appropriate for treating malaria in maternal sepsis, 28(70%) knowledge among nursing students regarding fluid

balance in maternal sepsis, 35(87.5%) knowledge among nursing students regarding term used for infection occurred after delivery in the womb (uterus), 26(65%) knowledge among nursing students regarding critical complication post sepsis, 25(62.5%) knowledge among nursing students regarding treatment for chorioamnionitis,32(80%) knowledge among nursing students regarding treatment for mastitis, 20(50%) knowledge among nursing students regarding correct dosage for metronidazole in sepsis, 33(82.5%) knowledge among nursing students regarding antibiotic given in maternal sepsis, 22(55%) knowledge among nursing students appropriate dosage of gentamycin in sepsis.

Table4:- Findings related to completion status of Module on maternal sepsis on Safe delivery app.
N-40

Levels of Module		F	%	Completion Status
Level-I	Familiar (1-12)	4	10%	Incomplete
Level-II	Proficient (1-12)	9	22.5%	Partially Complete
Level-III	Expert (1-12)	27	67.5%	Complete

Table-4 highlights the completion status of a module on maternal sepsis through the Safe Delivery app among 40 participants. It shows that 4 individuals (10%) are at the basic "Familiar" level, with their progress marked as incomplete. Nine participants (22.5%) are at the intermediate "Proficient" level, indicating partial completion. The majority, 27 individuals (67.5%), have achieved the "Expert" level, signifying full completion of the module. This indicates that most participants have successfully engaged with and completed the module.

Discussion:-
Maternal sepsis remains a critical public health challenge, contributing to preventable maternal morbidity and mortality worldwide. Effective management depends on healthcare professionals' knowledge and preparedness, including nursing students. This study evaluated the effectiveness of the Safe Delivery App (SDA) as a digital learning tool for enhancing nursing students' knowledge of maternal sepsis and its management in a selected college in Punjab.The study findings revealed a significant improvement in knowledge levels post-intervention. After using the SDA, 80% of students demonstrated good knowledge, 15% had average knowledge, and 5% had poor knowledge. A t-value of 24.680 (p<0.00) confirmed the effectiveness of the SDA in enhancing knowledge. These results align with a study by Joyti Choure et al. (2023), which assessed the SDA's utility among staff nurses in Bhopal, reporting 76% with good knowledge, 16% with average knowledge, and 8% with poor knowledge, with a t-value of 9.4043 (p<0.05), further validating SDA's effectiveness.Additionally, the study examined the association between students' knowledge and demographic variables. Gender was found to be statistically significant (p=0.02), with female students demonstrating stronger knowledge levels. Other factors, such as age, parental occupation, mobile phone use, prior awareness of SDA, study time on the app, and exposure to maternal sepsis cases, did not show significant associations (p>0.05).[14]

Conclusion:-
This study highlights the SDA's positive impact on nursing students' knowledge of maternal sepsis. The significant improvement observed post-intervention underscores the potential of digital learning tools in bridging educational gaps and enhancing maternal healthcare outcomes.

Conflict Of Interest
There is no conflict of interest.

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