Development Framework of Emergency Call Application in Pregnant Women

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ABSTRACT

Referral problem in high risk pregnancy can increase the pregnant woman mortality. Beside of referral's delay in emergency case, delay in knowing the danger sign also be the problem. In development of technology, much information system can be applied to recognize the danger signs of pregnancy and request immediate help in emergency case. One of them is using application in smartphone. This study aims to develop framework of emergency call application in pregnant woman. This study was literature review research from journal year 2009-2019, book, preceding that related with danger signs of pregnancy and emergency call apps in pregnant woman. Time research was done in July until Agustus 2019. The development framework of emergency call application in pregnant woman consists of personal information, danger sign information, and calculator prediction of risk pregnancy, emergency button, chat feature, and examination history. It needs to identify health professional, health care, and family that can be contacted immediately. The Conclusion is implementing an emergency system application for pregnant women, good technology literacy and joint commitments are needed.

Kata kunci:

Kerangka konsep
Panggilan darurat
Ibu hamil

Permasalahan rujukan di kehamilan dengan resiko tinggi dapat meningkatkan kematian ibu hamil. Selain karena disebabkan keterlambatan rujukan, keterlambatan dalam mengenali tanda kegawatdaruratan juga menjadi permasalahan. Dalam perkembangan teknologi, berbagai sistem informasi dapat digunakan untuk membantu mengenali tanda kegawatdaruratan pada kehamilan dan meminta pertolongan segera dalam kasus emergensi. Salah satunya dengan pemanfaatan aplikasi pada smartphone. Penelitian ini bertujuan untuk mengembangkan kerangka konsep pengembangan aplikasi kegawatdaruratan pada ibu hamil. Penelitian ini menggunakan metode literature review dengan sumber berasal dari jurnal, buku, dan prosiding dari tahun 2009 hingga tahun 2019 yang berkaitan dengan tanda bahaya dan aplikasi kegawatdaruratan pada ibu hamil. Penelitian dilakukan pada bulan Juli hingga Agustus 2019. Hasil penelitian ini adalah pengembangan kerangka kerja aplikasi kegawatdaruratan pada ibu hamil terdiri dari informasi individu, informasi mengenai tanda bahaya, kalkulator prediksi resiko kehamilan, tombol darurat, fitur chat, dan riwayat pemeriksaan. Selain itu diperlukan data mengenai nomor tenaga kesehatan, fasilitas kesehatan, dan keluarga terdekat yang dapat dihubungi ketika terjadi kegawatdaruratan. Untuk dapat mengimplementasikan aplikasi kegawatdaruratan untuk ibu hamil, diperlukan dukungan dan komitmen dari pihak terkait serta diperlukan literasi digital yang baik.

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INTRODUCTION

Maternal mortality still is the problem in many countries especially in developing countries. Even though maternal mortality ratio represent risk associated with obstetric risk and also a Sustainable Development Goals indicator.^[1] Complication during pregnancy can lead death and disability among pregnant women. According to World Health Organization (WHO), maternal death is the death of woman while pregnant or within 42 days of

termination pregnancy, from any causes related to pregnancy or its management, but not from accidental causes.^[2] There are roughly 303.000 maternal deaths are caused as a result of pregnancy and childbirth related complications.^[2]

Referrals delay is the problem that often occurs in many developing countries, such as Indonesia. In Semarang City, Indonesia, the maternal mortality rate can be occurred by various types of referral delay,

delay in decision-making, delay in accessing health services, and delay in acquiring health services.^[3]

There are many problem in referral case that can cause mortality in pregnant women. First, lack of information in pregnant woman especially in first pregnancy, and unwanted pregnancy. Based on Handriani (2015), the poor referral in pregnant woman in Sidoarjo City, Indonesia was caused by low education of pregnant woman in danger sign of pregnancy, and also the high risk pregnant woman not in good monitoring.^[4] Previous experience by women of early pregnancy complication also important to reduce maternal mortality in Nigeria.^[5] It related with ignorance, traditional myths, family restriction on seeking better care, and dependency of traditional birth.^[6] Many women don't give attention with her pregnancy in some cases. In unwanted pregnancy, the mother often feel shy to get antenatal care in health care. She usually look for the information herself, from internet and social media that unvalid information and can mislead the information.^[7] They also lack of awareness with their pregnant especially about danger sign. If there are some danger sign that happen, they also confused to say it to another person.

In the first pregnancy, the mother has lack of experience about it. They don't have experience about the risk of pregnancy and the danger sign about it.^[8] They look for the information for many source. The information must be valid so it doesn't make danger to the pregnant women. Second, the delay of referral can happen if the pregnant women doesn't know the family and health professional that closed with them. It is important to call the people soround them to ask help immediately.^[9] Third, knowledge and estimation about of risk in pregnancy. If the pregnant women know their condition or pregnancy risk, they will be aware and ready for asking help if there are any emergency case happen.^[10] They prepare for the nearest health care or health professional, money, person in charge, and also prevent the activity that can make worse condition.

Fourth, lack of interaction between the pregnant woman and her midwife or medical doctor. Most of mother just have interaction in offline condition trough antenatal care. They limited to ask some information that related with pregnancy.^[11]

In this technology era, it should be un happen. The pregnant mother can consult the pregnancy condition also in online consultation through

telemedicine or instant messaging. And also referral delay should be can reduced. The expansion of mobile phones or smartphone usage presents potential opportunity to improve maternal service delivery.^[12]

RESEARCH METHOD

This study was literature review research from journal year 2009-2019, book, proceeding that related with the research such as 'danger signs of pregnancy', 'high risk pregnancy', 'pregnant women', and 'application'. Time research was done in July-Agustus 2019.

RESULT AND DISCUSSION

Definition's Agreement

Before develops the framework of emergency calls application, definition's agreement about many terms related with emergency situation in pregnant women must be done clearly such as definition of pregnant women, danger sign of pregnancy, risk pregnancy, emergency case in pregnancy, and application.

Pregnant Women

Pregnant women means someone who has pregnancy. Since 1960s, the begin of pregnancy still debatable. Many legal countries states that the began of pregnancy from fertilization and conception, but other countries states that the began from implantation.^[13] In Indonesia, based on Minisitry of Health Regulation in Indonesia, pregnancy starts from conception until fetus delivery. Normal pregnancy time approximately 280 days (40 weeks or 9 months).^[14] On the other hand, based on American College of Obstetricians and Gynecologitsts (ACOG), a pregnancy is considered to be established only when the process of implantation is complete until delivery.^[15] So that, the pregnancy can began from conception or implantation until delivery.

Risk of Pregnancy

Risk of pregnancy is the risk status of pregnancy based on pregnancy risk factors in the form of low risk-pregnancies, high risk- pregnancies, and very high risk-pregnancies. Risk factor of high risk- pregnancy involve :

- Existing health condition such as diabetes, high blood pressure, and being HIV positive.^[16]
- Overweight and obesity. Obesity can increase risk of high blood pressure, preeclampsia, gestational diabetes, still birth, neural tubes defect and raise of infant's risk heart problems.^[17]

- Multiple births. Risk of complication in women with multiple fetuses (twins and more) is higher. The complication can include preeclampsia, premature labor, and preterm birth.^[18]
- Young and old maternal age. Pregnancy in young women and old women more than 25 years increase the risk of preeclampsia and gestational high blood pressure.^[17]

There many calculation or scoring system regarding the risk factor. In Indonesia, there are prediction score to know the risk of pregnancy that was called “ Poedji Rochjati Score”.^[19] That's score based on many risk factor such as age, pregnancy distance, children number, delivery history, section casearia history, disease such as anemia, tuberculosis, diabetic, malaria, heart failure, and sexual transmitted disease. Oedem, gemelli, intra uterine fetal death (IUFD), bleeding, blood pressure, and breach positon also the risk factor prediction. The number of the score can divides the risk of pregnancy to 3 types low risk pregnancy, high risk pregnancy, and very high risk pregnancy.^[19] Risk of pregnancy also affect or consider the labor's places. In low risk pregnancy, the pregnant mother can consider labor in private midwives practice or healthcare. In high pregnancy, pregnant mother should labor in healthcare with medical doctor. Pregnant mother that has high risk pregnancy should labor in obstetrician and gynecology specialist.^[20]

Danger Sign in Pregnancy

Pregnant women should know the danger sign in pregnancy. It should differ with uncomfortable symptoms but no serious problems. Normal discomforts of pregnancy can include nausea (especially in the first 3 months), heartburn, a need to urinate often, backache, breast tenderness and swelling, and also tiredness.^[21]

Being aware with danger sign is important to help the pregnant women to know when they need special care from healthcare provider. There are many danger sign of pregnancy:

Miscarriage

Bleeding, contraction, and cramping during first 20 weeks pregnancy can be sign of miscarriage.^[22] Other signs include gush or bleeding from vagina. In early pregnancy there are sometimes happen physiological bleeding, but it must be differ with pathological bleeding. Miscarriage can happen both complete and incomplete that can lose the baby.

Tubal Pregnancy

Pain and pressure in lower belly in first 3 months of pregnancy can be sign of fertilized egg is outside uterus that called tubal or ectopic pregnancy. Pain may be worse and sometimes spread in the shoulder. The pregnant women also feel dizzy, nausea, and vomiting.^[23]

Severe Morning Sickness

Nausea and vomiting is normal sign in the first 3 months of pregnancy, but severe nausea and vomiting can be danger sign that could lose weight and make dehydration so that the baby not get enough nutrients and need to be treated in healthcare. Morning sickness usually be better after first 3 month pregnancy.^[24]

Preterm Labor

Normal labor occurs between weeks 37-40 of pregnancy. Labor that happens between 20 weeks until 37 weeks was called preterm labor. The signs of preterm labor can be cramps, pelvic pressure, backache, and bleeding or vaginal discharge.^[25]

Infection

Infection or illness of infection can appear if temperature over 100°F or 37.8 °C. Fever or infection can lead preterm labor. So that it must be treated with antibiotics or other medicines.^[26]

Less Baby Movements

In 20 weeks, pregnant women should feel the baby movements. Each baby has own pattern and movement. If there is less or different pattern of baby movements pregnant women should be aware and should go to healthcare.^[27]

Preeclampsia and High Blood Pressure

High blood pressure can be danger symptoms in pregnancy such as gestasional hypertensi, preeclampsia, and soon. Symptoms of preeclampsia can include headache, swelling of your feet, ankle, face, and hands, proteinuria, and blurred vision.^[28] Danger sign of preeclampsia can in form of blurred vision, seizure, and unconsciousness that can cause brain, liver, kidney, heart, or eye damage.^[29]

Problems with the Placenta

Vaginal bleeding in second or third semester of pregnancy can indicate placenta problem such as solution placenta, vasa previa, and placenta previa.^[30] Bleeding in first trimester pregnancy can be sign of abortus. In second trimester, bleeding can be sign of solutio plasenta or

plasenta previa. Bleeding in solutio plasenta more dark than plasenta previa. It also tenderness sign in mother's stomach. Bleeding in plasenta previa more bright and much volume. It depends on the location of plasenta, marginal or total plasenta previa. In third semester, bleeding can happen in plasenta previa, abruption plasenta, and vasa plevia. In the last time of pregnancy, blood mixed with mucus can be delivery sign. So it must differ with the bloody sign.^[30]

Development Framework of Emergency Calls Application in Pregnant Woman

Based on the literature review, the development framework of emergency call application in pregnant women consists of personal information, danger signs of pregnancy information, calculator prediction of risk pregnancy, emergency button, chat feature, examination history.

Personal Information

Personal information is important to show the information of the mother. It contains of name, age, address, the pregnancy, abortus history, delivery history, estimated born date, first date in the last menstruation schedule, family, and the midwife that closed with the mother.^[31] This information can shows obstetric status and can give information about the closed family and health professional. It's very important to call them accidentally, if any danger sign happen

Figure 1. Design framework of Emergency Calls Application in Pregnant Women

Danger sign of pregnancy information

It's important to know the danger sign of pregnancy for example the bleeding and unconscious, fever, and severe nausea. It can be the sign of preterm labor, miscarriage, preeclampsia, infection, and hyperemesis gravidarum.^[32] So, if the pregnant mother have sign of danger sign in pregnancy, they must asking for help immediately.

Calculator prediction of risk pregnancy

If the pregnant women know her risk of pregnancy earlier they can be aware with their condition.^[33] The pregnant women in high risk pregnancy should have antenatal care and monitored by health professional such as midwife or doctor.^[19] Very high risk pregnant women should be monitor by obstretic and gyneacology specialist.^[19] They must be have intense and closed monitoring.

Emergency button

In emergency situation, someone often be panic and don't know what should they do. Who will be called in this situation and where they can asking for help? Emergency button was needed in this situation that can connect them with closed health professional or health care. Of course, they must save the number of emergency call in their application. It also better if the emergency button can send the pregnant location with GPS location.^[34] So that, the rescue can arrive in location by GPS. It will be more accurate and reduce the respon time.

Chat feature

In this era, online medical consultation can be the choice of the millennial pregnant women because it more flexible and cheaper.^[35] They can ask for many health informantion whenever and wherever. But, it more likely that the health professional know the pregnant women condition in previous offline antenatal care. So that, it doesn't happen the misdiagnosis and make harm to the pregnant women.

Examination History

Examination history feature is important in emergency application of pregnant women. It because the history can be personal health record that more efficient and can bring in everywhere and everytime.^[36] If they go to another midwife or medical doctor, they can show the examination history, so the new midwife can know the previous condition of the pregnant women. The

examination history can monitor the condition of the pregnant women especially in very high risk condition.

Figure 2. Design feature of emergency calls application in pregnant women

Although, the using of emergency calls application can reduce the referral problem of pregnant women. There's also the challenge for using it such as the mother's literacy. The should get used to the smartphone, so if there were some emergency case they can push the emergency button. It also need of commitment between healths professional to give the best care to patient. They should come to the location or give the respon when the patient gives the emergency sign. The procedure and regulation about it should be developed so that the application can used wisely and not disturb the other person.

CONCLUSION

Emergency calls application has potency to reduce referral problem of pregnant women through the feature such as personal information, danger sign of pregnancy information, calculator predication in risk pregnancy, emergency button, chat feature, and examination history. It needs to identify health professional, health care, and family that can be contacted immediately. To implement an emergency system application for pregnant women, good technology literacy and joint commitments are needed.

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