



Optimizing Antenatal Care by Digitalization Pregnancy Risk Screening

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ABSTRACT

In 2012, the Indonesian maternal mortality ratio (MMR) was 359 per 100,000 live births. Indonesian MMR is far above the target Millennium Development Goal of 102 per 100,000 live births in 2015. Indonesian government have been established the target MMR in Sustainable Development Goals of lower 70 per 100,000 live births. Some pregnancy complications are the chronic energy deficiency (CED), anemia, iodine deficiency, HIV / AIDS, malaria, Tuberculosis etc. Antenatal care must be carried out in a comprehensive, integrated and quality manner in order to detect all risks of pregnancy. Our goals were to develop a tool for digitizing the pregnancy risk screening. It is a part of electronic integrated antenatal care (e-iANC) was developed by used the Systems Development Life Cycle (SDLC) method in September 2019. For functionality testing of e-iANC specifically in pregnancy risk screening, nine participants were midwives of four Independent Practice of Midwives (Bidan Praktik Mandiri) in West Jakarta. All of them were asked to make midwifery care documentation in e-iANC during September 2019. Of 30 midwifery care documentation or ANC data, one to three were Cephalopelvic disproportion (CPD), CED, Hypertension, Anemia risk and Poedji Rochjati score was very high risk.

Keywords: Antenatal Care, Screening of Risk Pregnancy, CED, SDLC

I. INTRODUCTION

In 2012, the Indonesian maternal mortality ratio (MMR) was 359 per 100,000 live births, 307 per 100,000 in 2002. This increase happened in

spite of improvements in coverage over the same period (2002-2012): obstetric care or Antenatal Care (ANC) (92%-98%); delivery by healthcare provider (66%-83%); and delivery in health care facilities (40%-63%). Indonesian MMR is far above the target Millennium Development Goals of 102 per 100,000 live births in 2015(1)(2) Furthermore, in the Sustainability Development Goals is expected it decline to 70 per 100,000 live births in 2030(3).

In response to this situation, the Ministry of Health of the Republic of Indonesia created a national program, called Rencana Aksi Nasional Percepatan Penurunan Angka Kematian Ibu (RAN-PPAKI), or National Action Plan for Improving Mother and Child Health, containing multiple initiatives, including integrated antenatal care (ANC). Integrated ANC refers to comprehensive and quality ANC given to all pregnant women at every healthcare facility. In an integrated ANC program, healthcare providers must be able to ensure that the pregnancy is normal, to detect early problems and illnesses, and to intervene adequately so that pregnant women are ready to undergo a normal delivery. Specifically, integrated ANC refers to providing healthcare, including nutrition counseling and early detection of problems, diseases, and complications of pregnancy(4).

II. METHODS

Functionality testing include testing working versions of software before it is officially released. The stages of functionality is part of usability testing include: 1) select representative users, 2) select the setting, 3) decide what tasks users should perform, 4) decide what type of data to collect, 5) Before the test session (informed consent, etc), 6) during the test session, 7) Debriefing after the session(5)(6)(7)(8).

We conducted this test at Independent Practice of Midwives (Bidan Praktik Mandiri) in September 2019. Nine participants were midwives of four Independent Practice of Midwives in West Jakarta as table 1, they were recruited and provided informed consent for this study.

Table 1 Distribution of Participants

Independent Practice of Midwives (BPM)	Number of Participants
BPM 1	3
BPM 2	1
BPM 3	2
BPM 4	3
Total	9

For functionality testing of e-iANC specifically in pregnancy risk screening, all of them were asked to make midwifery care documentation in e-iANC. Pregnancy risk screening consist of the Cephalopelvic Disproportion (CPD), CED, preeclampsia, Hypertension, Anemia, and Poedji Rochjati's score which described as low, high, or very high risk.

III. RESULTS AND DISCUSSION

Characteristics of Participants

Nine participants completed this study. Of the 9 participants, Fifty-five point six percent were between 20 and 29 years of age, 11.1 percent were between 30 and 39 years of age, and 33.3 percent were older than 39 years of age. Eighty-eight point nine percent of participants had obtained a three-year diploma, with the remainder having completed a four-year bachelor's degree. Seventy-seven point two percent described themselves as computer literate. Further information is presented in Table 2.

Table 2 Sociodemographic Characteristics of Participants ($n = 9$).

	Category	N	(%)
Age	20–29 years	5	55.6
	30–39 years	1	11.1
	More than 39 years	3	33.3
Education level	Diploma (3 years)	8	88.9
	Bachelor's degree (4 years)	1	11.1
Computer literacy	Yes	7	77.8
	No	2	22.2

Features of e-iANC

Electronic Integrated ANC (e-iANC) is a web-based information system designed to assist midwives in recording integrated ANC data, including patient registration; anamnesis and physical examination; treatment; diagnosis and follow-up advice service.

Individual and aggregate data can be employed for clinical service and organization decision making, research, performance improvement, and education(9).

e-iANC is being an implementing of electronic medical records. An electronic medical record (EMR) is a real-time patient health record with access to evidence-based decision support tools that can be used to aid clinicians in decision-making(10)(11)(12)(13) (14). It can be access on www.e-ianc.net.

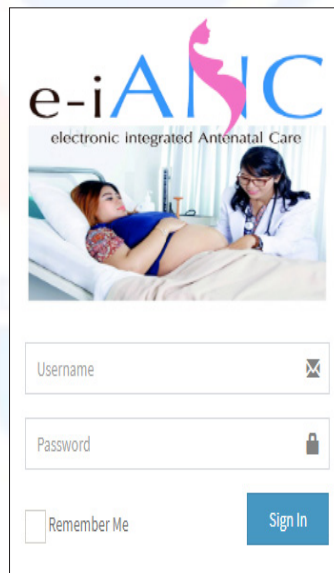


Figure 1: Feature for login on e-iANC

Some of features on e-iANC include:

1. **Patient Identification:** enabling entry of demographic and financial sources data, including whether a patient pays in cash or is financed by the Healthcare and Social Security Agency.
2. **Anamnesis:** including history of current or previous pregnancy as well as labor history, as needed to identify high-risk patients. The first day of the last menstrual period is used to estimate the expected date of birth.
3. **Physical Examination:** results of physical examinations, including vital signs used

to detect early pregnancy risks, such as cephalopelvic disproportion, preeclampsia, and other conditions.

4. **Laboratory test:** Urine protein, hepatitis B surface antigen (HBsAg), mycobacterium tuberculosis, and other tests, as medically indicated
5. **Screening of Risk Pregnancy:** Described as low, high, or very high risk(15)
6. **Communication, Information and Education (CIE):** Education materials related to factors such as delivery planning, nutritional problems, tetanus toxoid immunization, HIV/AIDS and other communicable diseases, exclusive breastfeeding, and other topics(4)
7. **Treatment and follow-up:** Key treatments administered, including injection of tetanus toxoid and the provision of multivitamins. Midwives can enter the number and doses defined and administration instructions
8. **Diagnosis:** Entry of specific antenatal diagnoses, using ICD-10 codes as required to process claims for reimbursement
9. **Graphics of the maternal weight and Body Mass Index (BMI):** Can be used to monitor maternal weight before for each visit. This novel visualization of health information was seen as necessary to expedite
10. **Patient Disposition:** Follow-up instructions including discharge or referral if necessary to other healthcare providers or healthcare facilities with more complete equipment.

Visualization of the Maternal Weight and Body Mass Index

Graphics of the maternal weight and Body Mass Index (BMI) can be used to monitor maternal weight before for each visit. The X axis show the pregnancy period consists of trimester I (blue color), II (pink color), and III (green color), while the Y axis refers the growth

weight during woman pregnancy in kilograms. This novel visualization of health information was seen as necessary to expedite.

BMI categories consist Underweight, Normal, Overweight, and Obesity. Four categories of BMI have been distinguished color, Underweight (red), Normal (green), Overweight (blue), and Obesity (yellow). In table 3 shown BMI categories and the growth weight.

Table 3 BMI categories and the growth weight

BMI before pregnancy	BMI Categories	Color Coding	The Growth Weight (kg)
BMI ≤ 18.5	Underweight	Red	14-20 kg
18.5 < BMI ≤ 25.1	Normal	Green	12.5-17.5 kg
25.1 < BMI ≤ 30	Overweight	Blue	7.5-12.4 kg
BMI > 30	Obesity	Yellow	5.5-10 kg

In figure 2, one green spot shown in the pink part is meaning a pregnant woman as Normal BMI. Her first ANC visit in the 2nd trimester and 2 kg gained weight since her pregnancy. Based on the information, the midwives should suggest increasing maternal weight during pregnancy between 12.5- 17.5 kg.



Figure 2: Graph of the Maternal Weight at first ANC visit

In figure 3, it shown a pregnant woman had three times ANC visit.

The first ANC in 1st trimester, the second in 2nd trimester, and the third in 3rd trimester. The green color shown that she was Normal BMI by the growth pregnancy weight was 8 kg in 3rd trimester. It indicated that growth weight was under recommendations between 12.4-17.5 kg. A midwife should advise her in order to raise weight up to 17.5 kg.



Figure 3: Graph of the Maternal Weight at three times ANC visit

Digitalization Pregnancy Risk Screening

This studi have collected thirty midwifery care documentation of four Independent Practice of Midwives. Of the 30 midwifery care documentation in e-iANC have found pregnancy risk screening as follow in table 4.

Table 4. Distribution of Pregnancy Risk Screening on Midwifery Care Documentation in e-iANC (n=30).

Pregnancy Risk Screening	N	(%)
CPD	Yes	1 3.3
	No	29 96.7
	Total	30 100
CED	Yes	2 6.7
	No	28 93.3
	Total	30 100



Pregnancy Risk Screening		N	(%)
Hipertensi	Yes	1	3.3
	No	29	96.7
	Total	30	100
Anemia	Yes	3	10
	No	27	90
	Total	30	100
Poedji Rochjati's Score	Low	25	83.3
	High	2	6.7
	Very high	3	10
	Total	30	100

Of 30 midwifery care documentation or ANC data, one to three were Cephalopelvic disproportion (CPD), CED, Hypertension, Anemia risk and Poedji Rochjati score was very high risk.

Obesity in pregnancy related with unfavorable clinical outcomes for both mother and child. Many of the risks have been found to depend linearly on the BMI include intrauterine death, and neonatal deaths can be attributed to the consequences of maternal overweight and obesity(16).

The results are discussed in the context of present and other relevant work here. Authors offer their perspectives and insights into their results in this section. Potential impacts, plans, and recommendations for future work may also be presented here. It is important for authors to include a discussion of the limitations of their work and potential pitfalls in the interpretation of their results

IV. CONCLUSIONS

In medicine, practitioners and other professionals are faced with almost insurmountable amounts of data pertaining to clinical symptoms, laboratory results,

medications, quality reporting, and such. Optimizing ANC by digitalization pregnancy risk screening can be employed for accelerating risk maternal care interventions..

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