The Electronic Maternal Surveillance System Relieves Midwives' Psychological Job Stress Symptoms

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The electronic maternal surveillance system relieves midwives' psychological job stress symptoms

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Abstract

Background: It isessential for midwives to carry out surveillance for monitoring maternal during antenatal care (ANC) so that maternal risk factors can be identified. The utilization of electronic-based surveillance technology is proven in accomodating midwives' tasks and reducing the symptoms of job stress.**Aims:** The research aims to analyze the effect ofthe electronic surveillance system in detecting pregnant women at-risk toward midwives' psychological symptoms of job stress. **Setting and Design:**It was a quasi-experiment design with treatment and control subjects.**Methods and Material:** Midwives who were responsible for ANC in five primary health care (PHC) in Grobogan District and met the exclusion and inclusion criteria were selected as samples; 37 midwives of the treatment group were trained to utilize electronic surveillance system (tg) to detect pregnant women at risk, while 43 midwives of control group detected pregnant women at risk by using paper-based system (cg). Data on psychological symptoms, which consisted of both mental and cognitive demands, were gathered by using questionnaires. The data were analyzed both descriptively and quantitatively (Independent *t test, α=5%).***Results:** The system had an impact on the scoring of mental and cognitive demands. The mean (SD) score of tg mental demands is lower than cg. (tg=16.35(2.97), cg=18.80(2.05), also in cognitive demands, tg=24.40(5.93), cg=27.40(2.89). The system affected both mental and cognitive demands significantly (t test=4.27, p=0.0001) and (t test= 2.79, p=0.007). **Conclusions:** Using the system is useful to relieve midwives' psychological symptoms of job stress and it assists midwives in monitoring maternal risk.

Keywords: electronic surveillance, psychological stress, midwives

Key Messages:

Electronic surveillance systems as a solution to reduce mental demand and cognitive demand for midwives in detecting pregnant women at risk, so the model should meet the needs of midwives.
Developing the electronic system should meet the needs of mental demand and cognitive demand on midwives' tasks.

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Introduction

In Indonesia, maternal death is caused by obstetric problems bothdirect events and indirect events. The indirect events are identified as "4 too and 3 delays". The "4 too" are too young or too old, too short pregnancy interval, and too many children. While the other three factors are lateness in (i) deciding to get medical access, (ii) reaching health care facilities, and (iii) receiving adequate and appropriate treatment[1]. Most of the indirect events can be prevented by monitoring the condition of maternal risk factors during ANC. It is very important to prevent adverse events in maternal that contribute to maternal mortality. This monitoring can be carried out during ANC.

Surveillance is an activity of systematic and continuous collection and observation, analysis, and interpretation of health data in the process of explaining and monitoring health events.Surveillance can serve as an early warning system for future public health emergencies, as a basis for decision making in health management[2].For example, delayed and inaccurate diagnosis of preeclampsia (PE) is one of the main causes of maternal mortality during pregnancy in Indonesia. When a midwife provides an ANC, she must be able to do early detection of the signs and symptoms of PE, give treatment as well as make a referral to appropriate health care facilities, and document the findings and care provided at the time of antenatal care.[3] Documenting ANC findings is part of MCH surveillance activities to support Maternal Care Health (MCH) program management activities quickly and promptly in making decisions, to prevent maternal mortality in Indonesia due to "3 late". That document gives alerts for midwives to detect maternal obstetric risk factors also. The risks are identified as "4 too".

The results of the preliminary study indicated there was a correlation of recording quality and midwives' workload. The study also proved that one of the possible approaches of intervention to overcome fatigue, boredom, lack of concentration while working on patients' data was by converting handwritten documentation into electronic based documentation[4]. In addition, the integration system between electronic surveillance and electronic data recording (e-health) might lower down workload.[6] E-health can be utilized to develop a model of health information system for surveillance. On the other hand the Government of Indonesia has issued a regulation of number 46/2014 which states that

information and communication technologies are necessary to improve the quality of health care and the effective and efficient working process by means of e-health.[7]

The technology used can reduce job demands related to psychological impacts. Psychological effects are characterized by, for example, anxiety, mental fatigue, mental demands, loss of concentration, feeling dissatisfied, cognitive demands, and cognitive decline.

The objective of the research is to analyze the effect of an electronic surveillance system in detecting pregnant women at-risk toward psychological symptoms of job stress.

Subjects and Methods

The study applied quasi-experimental designs; untreated control group design with pretest and post-test sample[14], that presents causality between intervention and results. Assessment of treatment group was conducted before and after the intervention and the control group was selected based on inclusion and exclusion criteria to overcome the threat of internal validity.The criteria wereperceptions of stress in the task as a midwife, neversuffered psychological problems, and in charge of providing ANC at PHC.

The accessible population was midwives conducting ANC in the working area of accredited PHC and from the result of location based cluster sampling and those who had received information about a software of Electronic Warning System for Maternal and Child Health and Preeclampsia Risk Detection (EWS KIA-PE) from the researchers. Samples of 80 midwives from 5 PHCs in Grobogan District were divided into treatment groups (n = 37) and control groups (n = 43) of those who met the inclusion and exclusion criteria.

The variable of mental demand in detecting a pregnant women at risk elaborated that the task required consentration. It was complicated, with a lot of matters to remember and think about all the time, as well as simple tasks. The variable of cognitive demand elaborated that the task were challenging, complicated, difficult, hustling, frustrating, interesting, relevant, stressful, and worthwhile.

This research has obtained Ethical Clearance from the Health Research Ethics Commission of Public Health Faculty, Diponegoro University, No 053 / EC / FKM / 2018.

The data were processed and analyzed by using SPSS application. The analysis was conducted descriptively (univariate and bivariate) and inferentially by using some types of statistics tests in accordance with the result of normality test and data categorization which was independent t- test. The significance level used was p <5%, CI = 95%.

Results

A. The Description of the Characteristics and Performance of Midwives in Detecting Pregnant Women at Risk of both Treatment Group and Control Group.

To ensure the internal validity, the inclusion and exclusion of the research subject of both treatment group and control group had been determined. Meanwhile, the characteristic and performance profile of both subject groups were statistically homogeny (p>0.05). The

characteristic consisted of duration of work, duration to be assigned in ANC, experiences related to incidences of maternal mortality, trainings to support ability in detecting and surveillance system, and health conditions as the subjects of influence of job stress. Performance described subject conducting detection to pregnant women at risk referring to ANC documentation and data recording.

Most subjects of the two groups worked and assigned in ANC for > 10 years, about 1/3 experienced maternal mortality incidences, more than 90% received training about PE and ANC data management to detect PE risk factors. The physical conditions of both groups of subjects were non hypertensive and Diabetes Mellitus (DM), but 1/3 was categorized as obese. Statistically, there was no significant difference in stress perception score related to the tasks as midwives between the two groups ($p>0.05$).

The performance of midwives in detecting mother at risk of PE based on ANC data of the two groups tended to agree (>50%) that ANC surveillance system was able to improve services to prevent PE incidences among pregnant women, improve the quality of the documents of pregnant women, assist in detecting pregnant women at risk based on documented surveillance results, and support the detection accurateness of the pregnant women at risk of PE based on data availability from surveillance system.

B. The Description of Electronic Surveillance System of Detection in Pregnant Women at Risk (ES)

ES met the criteria of usefulness and easy to use, such as providing a warning/alert facility in "colors" to easily detect pregnant women at risk as well as providing speed and accuracy in determining pregnant women at risk of PE.

ES was capable to assist midwives in managing ANC data and getting information needed quickly and accurately to determine whether or not a pregnant woman was at risk. Using ES in detecting pregnant women at risk of PE, was five times faster than paper-based handwriting method (6 minutes : 30 minutes) when implemented to detect 60 cases data of pregnant women who underwent ANC. There was avalue difference in the average speed between treatment and control groups and it was statistically significant (t test = 49.27, p = 0.0001).

Meanwhile, the average percentage of accuracy in detecting pregnant women at risk of PE in subjects of ES was higher (mean (SD) = 67.7% (13.5%), range = 37.8% -88.0%) than that of in subjects of manual/paper based method (mean (SD) = 65.0% (2.58%), range = 13.2% -85.6%), however, the detection accuracy between the groups was not different and it was statistically significance (t test = -0.028, p = 0.415).

C. The Effects of Electronic Surveillance Systems of Detection in Pregnant Women at Risk of Preeclampsia (ES) toward the Mental Workload, Psychological Symptoms and Physiological Symptoms of Work Stress and sAA Stress Response

Table 1 shows the results of statistical tests that ES significantly affected psychological symptoms of work stress in terms of mental demands and cognitive demands. ($p < 0.05$).

Table 1. The effect of ES toward psychological symptoms of work stress (mental demand and cognitive demand)

Variable		Group: Treatment Mean (SD)	Group: Control Mean (SD)	Different (Δ) Mean (CI=95%)	p
Psychological Symptoms					
a. Mental Demand	Pre test	12.40 (2.52)	11.69 (2.47)	- 0.71 (-1.82-0.40)	0.210[2]
	Post test	16.35 (2.97)	18.80 (2.05)	2.486 (1.32-3.64)	**0.0001**[2]
b. Cognitive Demand	Pre test	23.81 (3.65)	23.56 (3.65)	-0.252(-1.92-1.42)	0.764[2]
	Post test	24.41 (5.93)	27.40 (2.89)	2.990 (0.84-5.14)	**0.007**[2]

α= 0.05

Discussion

ES was able to detect mothers at risk by signaling a certain "color" so that it could warn health workers/midwives to be alert and conducting an action plan. This result is supported by previous research that the use of computerized clinical reminders shows significant impact on workload ($p < 0.001$).[4]The implementation of a computerized system has been proven to reduce the average score of workloads from 66.41% to 23.93%.[4,5]

The percentage of answers of the treatment group (tg) that stated to agree toward the statement that detecting tasks required concentration and constant cautiousness during on duty was lower than the control group (cg). This could be explained as mental demand is mental and perceptual activities required to watch, remember, and search; whether a job is easy or difficult, complex or simple, lose or tight.[6-7]

ES is equipped with a warning facility in the form of "colors" as well as a facility for easily, rapidly and accurately discovering pregnant women at-risk and types of the risks. Based on information produced by ES, midwives can make action plans that must be performed on pregnant women. Furthermore, ES provides facilities of data input, data storage, and data accessibility. When needed, converting paper-based notes into digital/computer format can be done quickly; thus, it helps midwives to discover/remember pregnant women at risk. Officer can access information quickly by information technology.[10]

In addition, during performing ANC, the midwives can access the electronic database anytime they need it or during a maternal audit. Maternal audit when mortality incidence occurs may contribute to stress among midwives. Limited time to assess the data of patient contributed to stress. [11]This result was in line with the previous research that a computer-based surveillance information system

could find important information; thus, improving the timely recognition of maternal clinical conditions and improving maternal safety. [12]ES influenced cognitive demands (p = 0.007). Cognitive demands are cognitive interpretations/thoughts about work task demands felt by midwives in terms of complexity, speed, difficulty, suitability, and stress. The data of the study revealed that that the treatment group (tg) who used ES to detect pregnant women at risk obtained lower score than control group (cg) in terms of challenge, complexity and difficult tasks, causing stress, and must be done quickly.

Previous study supports this finding that cognitive demands could turn into cognitive burdens. Cognitive burdens in the use of information technology are related to the benefits and ease of use[13]. This result was supported by a research on Healthcare information systems: the cognitive challenge that the developed technology is beneficial when paying attention to the cognitive abilities and skills involved in patient care, so technological development must be sensitive to the cognitive demands of work[14]However, cognitive demands depend also on the available individual resources. Meyer, 2018 stated that cognitive demands may be positively related to the personality and attitudes of employees, [15] as a very significant factor in using information technology while age, education level, and cognitive ability are not related to the use of information technology.[16]The use of information technology is a coping strategy in dealing with work demands.[17]

Previous research found that the use of information technology increases cognitive burdens, but cognitive burdens are not always detrimental.[18] The information technology users who take into account technology as a resource will experience less stress[19]. Resources can affect positively or negatively on the performance of staff causing health problems.[20]

Conclusions and suggestions

The use of ES reduces psychological symptoms of work stress, especially on mental demands and cognitive demands. Based on the study results, it is recommended to conduct further study on the implications of the use of electronic technology in the management of health care service data by officers in community health center in the real situation/on the job of Mental Workload (MWL) and work stress that has the same conditions in other wider areas.

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