

## ICT Alternative for Primary Care Delivery in Indonesia: A Proposal

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### Abstract

*This paper proposes a new research program and presents a current analysis of the potential of health information systems (HIS) to improve primary care delivery in rural Indonesia. A new HIS will be implemented to facilitate patient centred primary care and to support the interactions and collaborations between three types of participants including the patient, their doctors and pharmacist in Malang, Indonesia. A tetradic relationship between the new HIS and three participants (patient, doctors, and pharmacist) is examined through the lens of the actor network theory (ANT) with a view to form a new healthcare service delivery model for primary care providers in Indonesia. Based on this model, a network of primary care providers would share the patient medical records (PMR) and provide collaborative care programs to promote healthy life styles, prevent diseases, and to manage chronic disease care more effectively and efficiently.*

### Keywords

Actor network, primary care, health information systems, chronic care, developing countries

### INTRODUCTION

Despite favourable objective scores on health outcome indicators in some official national reports, e.g. MOH's recent Annual Report (DepKes, 2010), health care services in Indonesia were assessed as poor by international standards (OECD, 2010). The Ministry of National Development Planning (MNDP = Bappenas) reports major gaps in achieving health targets for the Millennium Development Goals (MDGs) which requires more effort leading up to 2015 (MNDP/ NDPA (Bappenas), 2010).

Although there are large numbers of *Puskesmas* or *Pusat Kesehatan Masyarakat* (PKM), which can be seen as Primary Health Centres in Indonesia, serious shortcomings in health service delivery remain. The key challenges identified by national and international reviews of health care in Indonesia are:

1. Low numbers of doctors with a ratio of 1.1 for 10,000 people (Meads, 2006). This low ratio is further exacerbated by the unequal distribution of services and high absentee rates for health staff (Wanandi, 2009). A major reason for these outcomes is the very low salary provided by local government (Andriyani, 2009).
2. Low health literacy of patients in rural areas (Husada et al., 2011). Patients tend not to seek, or understand, medical information even if it is available (OECD, 2010).
3. Long ordering times for medical supplies for PKM, of up to 2 months (Arya, 2009), show deficiencies in supply chain management using manual processes.
4. Incorrect diagnosis, inappropriate prescription and therapy, and misreading of test results (especially for chronic diseases) are reported, due to insufficient communication between doctors, pharmacists and patients (Kit & Oki, 2009).

Despite the government efforts to meet the MDGs on health indicators, Indonesia still has a long way to go to achieve good health for all in rural areas. More efforts are needed in dietary energy consumption, maternal mortality rates, and bed nets for children under 5 years (MNDP/ NDPA Bappenas, 2010). The proposed research is motivated to address the above four outlined challenges from the perspectives of doctors i.e. General Practitioners (GPs), pharmacists and patients. Doctors tend to focus on providing therapy rather than communicating with patients, promoting health literacy, or including patients in the decision making process. Pharmacists also focus their activities on the obtaining and dispensing of medicines rather than improving patients' health literacy, illness prevention and adherence to chronic care management plans (Hepler & Strand,

1990). The orientation and focus towards patients can increase the health status of whole populations (Porter & Teisberg, 2006) and will particularly benefit poor people in rural areas who currently have a low level of health literacy.

Services of PKM, using a centralised health information system (HIS), are not currently available. Scholars and researchers located in the vicinity of these centres have not conducted research into alternative programs for operation in both clinics and pharmacies. There is a lack of an implementation program measuring and evaluating health outcome improvements for all stakeholders using key performance indicators (KPI) as it has been used in a variety of fields and locations internationally (Kaplan & Norton, 1996). There is a good opportunity to improve the currently situation because freshly graduated academics are likely to be more willing to initiate and accept change in health care systems (Glasgow, Goldstein, Ockene, & Pronk, 2004).

We are motivated to introduce health information systems (HIS) to improve primary care delivery in rural Indonesia. Our research aims at implementing a new HIS to facilitate patient centred primary care and to support the interactions and collaborations between three types of participants including the patient, their general practitioner (GP) and pharmacist. This paper outlines our research project and presents current progress.

## **THEORETICAL FOUNDATIONS**

Based on the following theories, this study develops a framework to improve healthcare for poor people in rural areas of Indonesia through developing and introducing a new health information system.

### **Collaborative Care Model (CCM)**

CCM (Wagner, 2000) is a model to support collaboration in chronic care management. This model promotes informed, activated patients and support their interactions with prepared, proactive practice teams in collaborative care (Bodenheimer et al. 2002). CCM consists of six components: self-management support, clinical information systems, delivery system redesign, decision support, health care organization, and community resources. Coleman and colleagues undertook a review of various implementations of CCM in the last decade (Coleman et al 2009). Improved quality of care and health outcomes for patients was found to be consistent with findings across different CCM implementations in USA and various international settings. Although there was limited evidence for short-term cost effectiveness of CCM, evidence for long-term benefits start to emerge. CCM was also found to be complex and difficult to implement. Different hospitals and healthcare organizations implemented CCM in different ways. Instead of implementing all the six components of CCM, they often selected a subset of the CCM components to implement. The CCM model has also been implemented and found useful in improving chronic care in different clinical and community care settings (Wagner, 2000).

At this stage, this study examines two CCM components in the context of a Village Clinic and Pharmacy setting called Apotek/ Klinik Desa (AKD) in a rural town in Indonesia. The first component includes health education and self-management support for the patients. Patient's health literacy has been agreed to play a significant role in improving health conditions (Jordan et al. 2009) and is found to potentially facilitate self-care behaviours (Poissant et al. 2005). The second component, delivery system redesign, will focus on coordinated interventions by multidisciplinary care teams. The delivery of care will be reviewed and redesigned to support better interactions and collaboration between the three participants including the patient, the GP (doctors) and the pharmacist. It is a common view that doctors and pharmacists tend to pursue their own fields independently of each other, yet collaborative efforts between them can potentially improve their patients' health (Wagner, 2000) hence leading to improvements in the economic situation (Bloom & Chatterji, 2009). The CCM model (Wagner, 2000) is therefore adopted to support the collaboration between the healthcare practitioners and improve patients' self-care management. The model will be integrated within this study to support the communication between general practitioners and pharmacists in delivering primary care as well as empowering the patients by making health information accessible.

### **Actor Network Theory**

Actor-network theory (ANT) is a framework originally developed by Michel Callon (1986), Bruno Latour (1987), and John Law (1987). ANT can be seen as a systematic way to gain an understanding of science and technology (Latour, 1987). Two primary concepts of ANT include actors (or actants) and their relations. Actors can be human beings, organisations, or non-human for example technology or physical objects. The social and professional relations and interactions between different actors enable various organisational/business processes to be conducted (Law, 2008). Actors and a network of their relations can be examined to gain an understanding about the organisation and its environment (Spender, 1996). ANT can also be used as a conceptual tool to analyse changes to the relations between human and non-human (such as technology) actors in a socio-technical

environment (Engeström, 2001; Tatnall & Gilding, 1999). In healthcare, ANT has been found to be useful in examining the potential of technology (Salamat & Hassan, 2011).

## PROPOSED RESEARCH PROGRAM

With an aim to improve primary health care in rural Indonesia through developing a new HIS in an AKD setting, we seek to answer the following research questions:

1. How can a HIS empower patients in health literacy, self-care, and participation in healthcare decision-making?
2. How can a HIS facilitate the interactions and collaboration between patients, their general practitioners and pharmacists?

### Research approach

Design science research (Hevner et al. 2004) has been selected to address the above research questions. Design science research can be defined as the development of technology solutions to practice and evaluate their practicability in an organisational context (Markus et al. 2002). Design science research can be characterised as a problem solving activity in which the solution can be a novel methodology, method process system, or a new technology. Based on their analysis of a number of previous applications of the design science research approach, Gregor (2002) and Venable (2006) proposed a set of guidelines to conduct this research approach in Information Systems (IS).

Design science is relevant to address the proposed research questions from two aspects: an intention to seek a novel solution and a socio-organisational context of rural Indonesia. We seek to develop a technology solution to problems in a primary care delivery. Such problems potentially extend beyond the clinical organisational issues to include also socio-economical issues in rural healthcare delivery in Indonesia.

### Research setting and design

The project in Malang Regency is planned to take place in 10 collaborative village clinic-pharmacy (apotek/klinik desa = AKD) units between Dampit, Turen and Gondanglegi. The research process will be cyclic and consisting of the following stages: problem investigation, solution development, and evaluation (Hevner et al, 2004). Two Indonesian universities (Surabaya University in Surabaya, and Brawijaya University in Malang) and academics from Deakin University (Victoria, Australia) join their efforts in the project.

*Data collection:* During the first design science phase of problem investigation, semi-structured interviews and focus groups with the participating GPs, pharmacists and patients will be conducted to identify and examine their information and communication needs, clinical workflows and issues, as well as discovering possible technology tasks. The findings will inform the development of a new HIS. During the evaluation, semi-structured interviews and focus groups will also be conducted with the participants to receive their feedback in regard to the solution design, implementation and staff training. In addition, monthly meetings, clinical reports and the researcher's observation notes will be collected as empirical data for on-going evaluations of the HIS.

*Data analysis:* Content analysis, a qualitative data analysis method (Kvale, 1996; Strauss, 1987), will be used to analyse the collected data. Data condensation, thematic analysis and pattern identification will be used to extract the main meanings of the text and identify key themes and their relationships.

From a clinical and organisational perspective, a standard operating procedure will be developed and incorporated into the systems solution. GPs and pharmacists can be trained to measure economic achievements during their social visits to the different households for follow up of the therapy results. Patient Medical Records (PMR) will be included in the empirical data about the performance of different clinics.

## INITIAL FINDINGS

During the problem investigation stage, an initial study was undertaken in 2008 until 2009 to examine the orientation toward technology in primary care. Three key human actors including Doctors, Pharmacists, and Patients and their relationships were subject to an ANT examination. Findings from that study reveal that doctors did not communicate to patients sufficiently. The same was found with pharmacists. Doctors and pharmacists were found to perform their job well in general, however their relationship with each other was not found to be strong because each party focused solely on their own job. A better focus on patients and interactions with them would provide better results of the therapy. Activities to improve health literacy of patients and a focus on communication with patients were rarely found.

Based on the above findings, several guidelines to improve the relationship between doctors and pharmacists were proposed in the forms of:

- Conducting routine meetings to discuss care cases of the week.
- Developing common settings such as formulary, as well as other common matters like drug incompatibilities.
- Obtaining feedback from patients on therapy and results of home visits as agreed upon by the doctor and the patient.
- Assessing changes in patients' Health Literacy as a result of better communication between GP, pharmacists and the patients.

Further, ANT was used to explore a future situation, in which the proposed health information system (HIS) would be a new actant, i.e. a non-human actor. The role of this actor is to support the implementation of the above guidelines. The above activities are to be documented in the embedded HIS (actor) and shared between other actors, namely doctors and/or pharmacists, in the same clinic. Analyses of data and reports generated by the HIS will provide a sound basis to evolve the functions of the system, as well as monitoring the patient progress and treatment results.

The new actor HIS will also remind and supply doctors or pharmacists with information to promote healthy lifestyle and prevent chronic diseases during the communication between them and their patients. In a long run, patients will take more responsibilities for their own health, and with improved health literacy they are expected to become partners to their doctor and pharmacists. Patients' increased health literacy can improve their ability to accept more responsibilities not only for self-care, but also for their family members.

The proposed activities can be measurable. For example, patient health literacy and patient satisfaction with their doctors' and pharmacists' communication are measurable. Such measures can be used to set targets for a new KPI Communication. The actor HIS will generate reports on treatment progress and well-being of patients. Such reports will be submitted to various health authorities (external actors) and PKM (the black box of a clinic consisting of their doctors/pharmacists and HIS). The reports would be useful for the purposes of generating knowledge about public health in the local village and for better planning of health care deliveries.

Each PKM can monitor their performance through measuring KPI during the evaluation stage of the project. A cross comparison analysis will be conducted to compare KPI of different PKMs to draw lessons for future HIS implementation in other rural areas of Indonesia.

## **EXPECTED OUTCOME**

Based on two CCM components including activated patients and care delivery redesign (Wagner, 2000), an application of actor network theory (Engeström, 2001; Tatnall & Gilding, 1999) can be used to inform the development of a new HIS to improve primary care in Indonesia.

The new HIS will improve primary care delivery in Indonesia through supporting the collaboration between doctors and pharmacists and increasing patients' health literacy. Doctors and pharmacists can collaborate with each other to better prevent chronic diseases from occurring (Strong et al. 2005). It is expected that economic productivity will improve together with the health conditions (Bloom & Chatterji, 2009).

This study will develop a standard (clinical) operating procedure to guide the clinical process analysis and modelling to improve the information and collaboration between the health practitioners and patients, as well as evaluating the care quality and outcome before and after the solution implementation. Standard Operating Procedures (SOP) for both doctors (Homedes & Ugalde, 1979) and pharmacists (Hepler & Strand, 1990) will enable positive changes to current practices and improve the delivery of primary care to poor people in rural areas. It is expected that doctors (Davidoff, 1997) and pharmacists (Schnipper et al., 2006) spend more time consulting patients and improving patients' satisfaction.

Figure 1 presents our current conceptual framework for subsequent design science stages. Based on our initial ANT examination, new roles and networks of relationships between different actors can be facilitated through three layers: Organisational, Clinical and Societal (Community). On the organisational layer, there will be services, resources and infrastructure to coordinate and support activities on the other layers. On the clinical layer, there will be coordinated functions of and collaboration between doctors and pharmacists through SOP and improved communication with patients using the new HIS. On the community layer, the promotion of healthy lifestyle and the provision of health information to patients and family members will lead to better health and well being of people in rural areas. In future, we will seek to support patients' responsible and reliable health information seeking using the Internet and mobile applications. The use of mobile devices in Indonesia has increased and will partly influence patients' information behaviours.

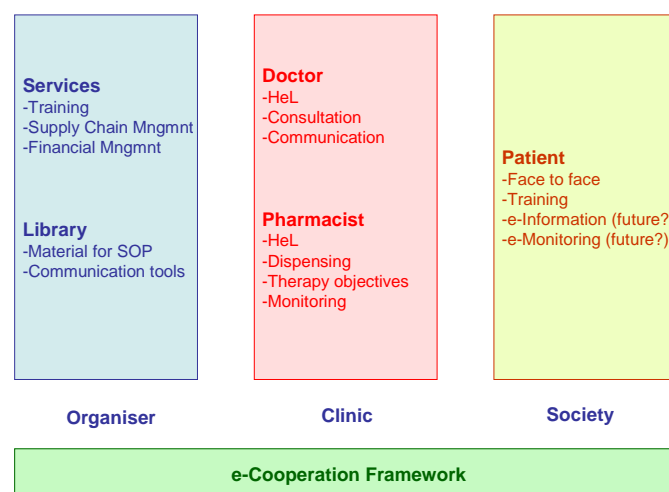


Figure 1: e-Cooperation Framework

In Indonesia, geographical distance and low-income result in low accessibility to healthcare in rural areas. This study argues for the necessity and possibility to develop a technology-enabled solution to problems in primary care delivery. The solution will be designed to support a collaborative model of chronic care, through engaging doctors and pharmacists in empowering patients and improving the collaboration between the health providers and health consumers. The target patient population is Malang regency, a rural area of Java. The ultimate aim of the project is to contribute to delivering better health services to the rural population in Indonesia.

The study will contribute to extending human knowledge in the areas of patient empowerment and collaborative care between different healthcare professionals in primary care using HIS. The study will help understand the role of IS in the above areas. Technology will enable better monitoring of an agreed healthcare delivery using clear targets in the form of KPI for all stakeholders.

In future, partnership with health authorities and PKMs, as well as other parties seeking to use the proposed system for different market segments is feasible. Further, AKD is planned to qualify to be a provider for health insurance in 2014.

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