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Can improved AMIS at Hospitals Improve Efficiency and Effectiveness of Decisions Taken by Senior Level Managers Working Under Crisis Conditions?

By

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ENDORSEMENT

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Al-Quds University

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بسم الله الرحمن الرحيم

"وما توفيقي إلا بالله"

Declaration

I certify that this thesis submitted for the degree of Master is the result of research, except where otherwise acknowledged, and that this thesis has not been submitted for a higher degree to any other institution.

Umayya H. Abu Shanab

Dedication

To

The memory of my father

Umayya H. Abu Shanab

Acknowledgement

I would like to express a special appreciation and gratitude to several of those who provided valuable advice and assistance during all stages of preparation of this thesis. To them all I am grateful. My appreciation to my supervisor, Dr.. Hossam ElSharkawi for unrelenting encouragement and support, special thanks are due to all of those who allow me to conduct the study in their hospitals. As well as every participant who voluntarily contributed in this study.

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Glossary

AMIS	Automated Management Information System
MIS	Management Information System
MoH	Ministry of Health
NGO	Non Governmental Organizations
PHC	Primary Health Care
PNA	Palestinian National Authority
PRCS	Palestinian Red Crescent Society
UNRWA	United Nations Relief and Working Agency
WB	West Bank

Abstract

This study discusses the effect of improved automated management information systems (AMIS) on the efficiency and effectiveness of decisions taken by senior level managers working at hospitals under crisis. Medical and administrative managers of all hospitals working in Nablus and Tulkarm districts (see map figure 1) were involved in the study. The Focus group technique and In-depth interviews were the tools employed for data collection.

The study asks the central question: "Can improved AMIS affect the efficiency and effectiveness of decisions taken by senior level managers working at crisis conditions?"

Crisis is defined as primarily conflict related causing both internal and external disturbances to hospital functions and staff. The application of information in a specific context becomes knowledge. Through experience stakeholders learn to understand the significance of information and use it to make informed decisions. Those decisions often lead to an action that is taken with the goal of having a positive impact (Agmalian and others, 2002).

After data collection, verification and analysis, the findings reveal that a well designed and functioning AMIS can aid decision making by producing timely, accurate and relevant information in the format of targeted reports usually upon request. However, a number of key pre-requisites have to be met for this to occur, otherwise the process risks adding complexity and wasting resources.

In Nablus city, stakeholders established an Emergency Committee; a formal structure and manual mechanism for data sharing amongst related parties in the local community. This structure was able to increase efficiency and effectiveness of decisions taken during crisis. But, the findings reveal that such a mechanism may also

benefit from the application of automated MIS. The study did not seek to compare the hospitals in the two cities, but the findings point to some differences is the use of manual and automated systems.

But, answering the central question is not a simple causal relationship between applying AMIS and improvements in decision making. AMIS can only function well and serve decision makers when a number of criteria are met that include proper needs assessments, well-designed applications, and an AMIS that serves at all levels of operations and management, Otherwise, AMIS may not benefit hospitals decision-making.

A conceptual model (see figure 3) was suggested to illustrate that a well designed AMIS that meets the necessary prerequisites outlined in this study will assist decision makers.

الملخص

تهدف هذه الدراسة إلى مناقشة تأثير أتمتة أنظمة المعلومات على فاعلية وإنتاجية القرارات التي يتخذها مدراء المستشفيات (الفنيين والإداريين) في ظروف الطوارئ.

الفئة المستهدفة في هذه الدراسة تتكون من المدراء الفنيين والإداريين لكافة المستشفيات الموجودة في منطقتي طولكرم ونابلس (مستشفيات حكومية/خاصة/أهلية).

وقد استخدمت في الدراسة أداتين لجمع المعلومات هما :

1- مجموعات العصف الذهني Focus Group وشارك فيها الفئة المستهدفة من مدينة طولكرم.
2- مقابلات شخصية In-depth Interviews: وشارك فيها الفئة المستهدفة من مدينة نابلس.

بعد جمع المعلومات وتحليلها أظهرت النتائج أن نظام المعلومات المؤتمت والمصمم بطريقة جيدة يمكن أن يساهم في دعم عملية اتخاذ القرار من خلال تزويد المدراء بالمعلومات الدقيقة والصحيحة وفي الوقت المناسب وذلك من خلال التقارير المختلفة.

وقد أثبتت النتائج أن مجموعة من المعطيات يجب أن تتحقق من أجل الحصول على نظام معلومات مؤتمت وفعال وفي حالة غياب هذه الشروط والمعطيات يمكن أن تتحول عملية الأتمتة إلى عملية معقدة وغير فعالة.

وفي نهاية الدراسة تم الخروج بنموذج مقترح يدعم ما توصلت إليه الدراسة من أن نظام المعلومات المؤتمت والمصمم بطريقة جيدة والذي يحقق كافة المتطلبات المسبقة يمكن أن يساعد في عملية اتخاذ القرار بشكل إيجابي.

Chapter one

Introduction

Information is one of the key inputs that must ideally be available for managers and users to make decisions. Information results from processing, extracting, analyzing and presenting raw facts, or data, about an event. This processing may be manual or computerized. Working with data that are filed manually is usually tedious, involving a great deal of paper or card shuffling to derive summary information or reports.

The Health sector is a vast field that manipulates different types of data. Collected data in a health sector may include:

1. Vital Statistics (deaths and births).
2. Epidemiological surveillance of health, diseases and injuries.
3. Routine activities from PHC (Primary Health Care) centers and hospitals.
4. Financial data, personal data, health insurance data.

These gathered data represent the basic types of information to be processed and analyzed. The resulting information (when available) can be used for different purposes including policy makers, operational decision-makers (workers) and researchers in the health sector. This data begins with patient-specific, clinical data, aggregated data (performance and use), knowledge-based data (for planning and decision support), comparative and community data for policy development.

Mckeown and Leitch (1998) wrote "data consists of all the facts that are processed to supply management with the information needed to engage in its various activities".

A Management Information System (MIS) can be defined as the system that captures, stores, retrieves, manipulates data to produce information (Alter, 1998). Usually, it has clear, logical and organized steps that meet the needs of the firm or the organization. This process is usually done in a systematic way that gives the users the ability to satisfy their needs.

Although Management Information Systems (MIS) need not to be computer-based, but often are (Daellenbach, 1994), as computers can store and manipulate data electronically, they can provide the same information much more quickly than manual

processing and with less effort, while achieving higher rates of accuracy. Senn (1999) explained "accuracy is to consider information either true or false, accurate or inaccurate".

Since 1950's, a new term in management "Automation" has been used in the literature which can be defined as "the use of machines to perform tasks that people would normally do" (Turban, Mclean & Wetherbe 1996). This was behind the popularization of another new term in recent years, that is "Automation of management information systems" (AMIS) which describes a computer-based system that makes information rapidly available to users, usually upon request, and in accordance with pre-programmed criteria and reporting formats, depending on the needs of users. A usefully system thus implies a proper needs assessment for users and their institutions.

An Automated Management Information System (AMIS) can be defined as the system that moves, stores, processes and displays information with the help of information technology which consists of hardware (that includes computers, peripherals, data and voice communication lines and equipment), and suitable software (Mckeown & Leithch, 1998; Alter, 1998).

The rapid pace of development in information technology (IT), - the hardware and software that makes information system possible (Turban, Mclean & Wetherbe, 1996)-, creates a wide spread adoption affects every firm today beginning from a private company to a public hospital or health centers, colleges, universities, and corporations. According to this Information Technology (IT) has become increasingly vital for creating and delivering the products and services in industrialized nation. Then, IT is likely to have an ever-increasing impact on our lives and the ways, in which we live them. It is important that we understand it so that we are not afraid of it but, rather, can take advantage of. This was one of the main factors that played a remarkable role in developing a computerized management information system in many firms especially in hospitals. Health field; mainly hospitals is a wide area where AMIS can be implemented on a wide range; for managerial works and operational levels.

Managers are a main target group that has been directly affected by these changes. In their daily management processes and decisions, they have to deal with data, which may have a positive, or a negative impact on their work and decisions taken in all scenarios; in routine and in crisis.

Decision-making during crisis is a special case in which information is typically required on a more immediate basis and decisions are needed in very short periods of

time. In such scenarios, organizational information systems are typically over stressed and must produce (or fail to) needed reports to inform decision-makers.

Regester (1989) highlights the need to consider the worst case scenarios when managing in crisis, which means that decision makers need to assess situations, what can be termed "situation awareness" (Endsley, 1995) and formulate effective tactical and strategic options.

One of the modern world's longest conflicts continues in the occupied Palestinian territories of the West Bank and Gaza (see Appendix III). This conflict is the factor underlying the complex context of this area and influencing all aspects of people's lives. The direct effect of the conflict on health status is observed through thousands of deaths, injuries, disabilities, and mental health disorders. (Hamdan & Defever, 2002). The impact on the health care system has seen shortages of medical and non-medical supplies, disruption of emergency medical services, and inability of staff and patients to access medical facilities.

In Palestine, the Palestinian National Authority (PNA) is the main provider of health services for all Palestinians living in West Bank except those who live in refugee camps as they are under the responsibility of the United Nations Relief and Work Agency (UNRWA) since 1948, additionally the services of other Non-Governmental Organizations (NGOs) and private sector facilities.

The Ministry of Health (MoH) administers the health sector. Ministerial headquarters are in Gaza city, while the MoH departments for the West Bank are situated mainly in Nablus and some in Ramallah.

"The goal of health management information system is to obtain, manage, utilize the information to improve health care and medical services" (Palestinian MoH, 2000). The 1994 Palestinian National Health Plan stated "an efficient nation wide computerized information system is quite necessary for improving the health care management".

Historically the Palestinian health sector has been lacking reliable data on health status, this was caused by many factors like absence of the state that can manage scarce resources, absence of the correct use of new technologies, lack of well trained people in the IT sector. Data is still collected manually and in an inefficient and slow method (in health centers) that results in a very long delay in preparing and publishing the reports in a timely manner. Within these published data, there is a kind of incompatibility appears from report to report. There is a real need to produce more accurate (true/false) and

consistent health data for all Palestinians especially those working in the managerial level to support them taking appropriate decisions. These decisions can have positive impact on hospital functions in routine and crisis conditions.

1.1 Assumptions

It is assumed that

- Response will be high among senior level managers in hospitals.
- The researcher can complete the study within the time span allowed.
- No effect for regional differences (Tulkarm and Nablus) on the output of the study.

1.2 Statement of the problem

Most organizations have their own information systems, which represent an entity composed of a variety of "logical" steps and physical resources. It is clear that this entity is strongly affected by all other subsystems of the organization and also acts to affect them.

M.o.H. has its own MIS, part of this system is still working manually in health care centers in districts all over Palestine (hospitals and PHC centers), the other part (in the main offices of MoH.) is nearly automated (scattered databases are used) and completely depends on computers (working with spread sheets and some statistical packages).

The situation is not much different in the private and non-governmental sector; the financial situation in both is somehow better which provides a better infrastructure and a bigger chance for achieving better management information systems.

1.3 Significance of the Problem

In the capacity of an IT person working in the health sector, the author of this study recognized that health sector is proceeding rapidly towards the use and formalization of AMIS. But, it is not clear whether this process of automation of MIS has positive or negative impact on the decisions taken by the senior level managers working at hospitals in crisis/conflict conditions? Thus, the decision was taken to conduct this study using Palestine as a developing country under extreme and unstable socioeconomic and political conditions, while working towards developing its own capacities and institutions.

This thesis proposes that a well functioning automated management information system with all of its components and modules (hardware, software, IT personnel) can aid and assist decision making at times of crisis.

For this purpose, a descriptive and analytical review of ongoing decision making processes using manual MIS versus an AMIS in the health sector during crisis may assist in assessing the actual situation and highlight the challenges and necessary prerequisites for successfully deployment of AMIS..

1.4 Palestine, Nablus and Tulkarm districts:

Palestine comprises two areas separated geographically: the West Bank and the Gaza Strip. The West Bank is an area of approximately 5,634 Square Kilometers. It is a hilly region located between the coastal plain in the west and the Jordan valley in the east. It is divided into three regions and ten provinces (governorates), with the north comprising Jenin, Tulkarem, Nablus, Qalqilia and Salfit, the middle comprising Jerusalem, Ramalla/Bireh, and Jericho and the south comprising Bethlehem/Beit Jalla and Hebron. (See Appendix III)

Gaza Strip is a narrow zone of land along the Mediterranean Sea. It is 50 kilometers long and 5-12 kilometers wide with a total area of 362 square kilometers. It is a subtropical region of five provinces (governorates): North Gaza, Gaza city, Mid Zone, Khan-Younis and Rafah.

According to the 1997 census of the Central Palestinian Bureau of Statistics (CPBS), the total Palestinian population residing in the Gaza Strip, West Bank and Jerusalem was 2,895,683 of whom 1,074,718 were registered refugees. The population in the Gaza Strip was estimated at 1,022,207.

The three most prominent providers of health services are the Ministry of Health, the United Nations Relief and Works Agency (UNRWA), and Non-Governmental Organizations (NGOs). Private for-profit service providers (primarily involved in diagnostic services and individual or group specialized care) account for a relatively small proportion of services delivered. However, there are many physicians who are working in more than one setting, including public and private clinic or NGO. The MoH is responsible for a significant portion of both primary health care (PHC) and Secondary Care and some Tertiary Care. Moreover, the MOH purchases tertiary services from other health providers, both locally and abroad.

Table 1: Hospitals in Palestine, 2001*

	Government	NGOs	Private	UNRWA	Total
No. of Hospitals	20	29	20	1	70

Nablus and Tulkarm cities are in the north of Palestine. Population of Nablus counted 290,621 (census of the Central Palestinian Bureau of Statistics (CPBS), 1997). Six hospitals are allocated in the city:

Table 2: Hospitals in Nablus District

Hospital	Type	Services	No. of beds
Rafidia Hospital	Governmental	Surgical	154
Al-Watani Hospital	Governmental	General	94
Ev. Mission (El-Enjili Hospital)	NGOs	Surgical	48
Al- Itehad Hospital	NGOs	General	75
Specialized Arab Hospital	Private	Surgical	25
Nablus Surgery Hospital	Private	Surgical	75

Tulkarm is about 149,188 (census of the Central Palestinian Bureau of Statistics (CPBS), 1997). Three hospitals are allocated in the city:

Table 3: Hospitals in Tulkarm District

Hospital	Type	Services	No. of beds
Dr. Thabet Hospital	Governmental	General	74
Al-Zakat Hospital	NGOs	Surgical	54 (24 only work)
PRCS Delivery Hospital	NGOs	Maternity	12

*All no. are referenced to Palestinian Ministry of Health Annual Report 2001.

1.5 HMIS in Palestine:

The ministry of health (MoH), largely through donor assistance, has embarked on a process of building a Health Management Information System (HMIS) infrastructure. This infrastructure has consisted of several different, purposeful systems, for example for the Government Health Insurance System (GHIS), health status and health services information and nascent epidemiological surveillance systems.

The 1994 Palestinian National Health Plan stated "an efficient nation wide computerized information system is quite necessary for improving the health care management". Given this critical role of a computerized information system, the 1994 plan identified HMIS as a priority area for development of the health system.

Since 1995, the MoH has initiated a development of some distinct information systems, taking in consideration that these information systems are working alone without any integration between each other.

Private and NGOs sectors have developed health information systems that are organization-specific and largely not designed to link across organizations. Some have developed differing systems within one hospital. This bodes both positively and negatively for strengthening the HMIS: positively, there is keen interest in ensuring the availability of comprehensive, decision-liked, valid data and information. On the other hand, there has been proliferation of numerous information systems of varying quality and with almost no ability for linkage.

The HMIS has to provide current, reliable and relevant data to support the MoH and other health providers in improving productivity, cost-effectiveness, quality and

safety of health services. It is expected to yield operational benefits for clinicians and administrators, while providing practical data for health planners and health policy-makers.

At the current time, in spite of the crisis that Palestine lives, MoH is establishing a Palestinian Health Information Center with the aid and fund from World Bank. This center is expected to manage health information and statistics for the whole population of Palestine.

MoH is working towards the aim of establishing a wide HMIS for all Palestine with the support of different donors like World Bank, WHO and others.

From the overall review of the HMIS status in Palestine (at hospital and PHC centers level), the following notes were recorded by a study conducted by WHO team (2001) and published on its official site:

- There is an unnecessary recording and reporting burden on service staff which leads to great amounts of data accumulating while little are analyzed and used.
- In general, data routinely reported by health services are considered of dubious quality (validity and completeness), and therefore are frequently not relied upon.
- Despite considerable investment in computers and data processing, inadequate use is being made of computers for better management and communications of health data.
- Effective coordination of health information is lacking which results in duplication and gaps in data collection, reporting, use and management of data.

1.6 Purpose of the study:

- Locate barriers to adequate utilization of available IT tools, and identify policies for developing and improving available IT.
- To determine the level of awareness among managers working at hospitals regarding the importance and extent of utilizing AMIS especially under crisis and or disaster conditions.

- To determine perception of major effects of AMIS on decisions taken by senior level managers working in un-stable conditions; crisis and emergency.

1.7 Research Questions:

1. What are the main barriers to adequate utilization of available IT tools?
2. What is the level of awareness among managers working at hospitals regarding the importance and extent of utilizing AMIS especially under crisis and or disaster conditions.
3. Can improved AMIS at hospitals improve efficiency and effectiveness of decisions taken by senior level managers working under crisis conditions?

1.8 Methods:

1. Focus group technique with medical and administrative managers working at hospitals in Tulkarm city.
2. In-Depth interviews with medical and administrative managers of hospitals in Nablus city.

1.9 Limitations of the study:

The researcher expects the following limitations:

1. The framework in which the study was conducted was of a general national crisis situation, and therefore participant responses need to be viewed within such a context.
2. Local constraints associated with roadblocks, curfews and military closures, have continuously resulted in modification of methods and timeframes.
3. Lack of relevant local literature on the topic.

1.10 Ethical consideration

Permission from MoH and other private and participating NGOs involved in the study. (An official letter was passed from the administrative of "School of Public Health / Al-Quds university" to the target hospitals).

1.11 Definitions:

Data: are the raw facts or observations, typically about physical phenomena (Senn, 1999).

Hard Data: (Quantitative): is the name given to numbers and statistics, to the facts and figures that are collected regularly on the activities within the workplace and the outcomes of those activities (UNRWA, 1999).

Soft Data: Soft data is more subjective and is not perceived as having the accuracy of hard data. It often represents people's opinions on whether things were 'good' or 'bad'. Soft data is usually collected through questionnaire, interviews, conversations or observations. Information arising from soft data has a vital role to play in the interpretation and explanation of information derived from hard data, it is essential in the development of knowledge (UNRWA, 1999).

Information: is a collection of facts (data) organized in a context appropriate for a particular use (Piercy, 1984; Daellenbach, 1994).

Knowledge: is a combination of instincts, ideas, rules and procedures that guide actions and decisions (Alter, 1998).

System: is an integration of elements, all working towards an objective (Turban, Mclean & Wetherbe,1996; Thieraul, 1996; Daellenbach, 1994). All systems include 3 primary elements :

Input ====== Process ====== Output

Management: is about making the best use of the resources available to provide highest quality service possible (Bruch, Strater & Grudnitski, 1996).

Information System (IS): is a system that uses information technology to capture, transmit, store, retrieve, manipulate, or display information used in one or more business processes (Alter, 1998; Thieraul, 1996).

Automation: is the use of machines to perform tasks that people would do (Alter, 1998).

Computers: Computers are electronic machines that can accept raw facts called data and based on instructions from the user, convert the data into usable information (Thieraul, 1996).

Hardware: Is the physical equipment used in the gathering, entering and storing of data (Thieraul, 1996)

Software Software comprises the set of programs used to operate the hardware and to process data into information (Thieraul, 1996; Daellenbach, 1994).

Data base: is an integrated collection of computerized data, organized and stored in a manner that facilitate easy retrieval (Morgan, 1997).

Stakeholders: People with a real ability to influence the system. (WHO, 1993)

(through the research, stakeholders are all those working in the health sector (MoH, Private and NGOs health centers) or participant of the local community (municipality) that have their own effect of the health process).

End users: People who use an IS or its products (Daellenbach, 1994)

Effectiveness:

- How well the goals and objectives of the entity or activity are achieved (Daellenbach, 1994).
- The ability to achieve results as well as the ability to increase and maintain assets that allow to produce results (RYU, 2002).

Efficiency:

- Producing a given level of output with the minimum amount of inputs or resources (Daellenbach, 1994).

Productivity: Is the ability to increase the efficiency (Daellenbach, 1994).

Crisis: Crisis are extreme events that cause significant disruption and put lives and properties at risk (National Academy Press, 1999).

Management Information System (MIS): is a system for the collection, storage, processing and dissemination of information to users, which may not be computerized (Alter, 1998).

Automated Management Information System (AMIS):

- is a computer based system that makes information rapidly available to users with similar needs, and usually in data base formats (Mckeown & Leithch, 1998).

Alternatively

- AMIS can be defined as the system that moves, stores, processes and displays information with the help of information technology which consists of hardware (that includes computers, peripherals, data and voice communication lines and equipment), and software of all types. (Alter, 1998)

or

- AMIS is a set of procedures organized and programmed by computers to generate information that enables managers to review operational, tactical and strategic planning activities (Schultheis, Sumner, 1989).

Health Information System: Interrelated component parts of acquiring and analyzing data and providing information (management information, health statistics, and health literature) for the management of a health program or system and for monitoring health activities (Mckeown & Leithch, 1998).

Information Technology: It can be defined as the output of computing and telecommunications for the purposes of handling information (Burch & Grudnitski, 1989).

Chapter Two

Literature Review

2.1 Data and Information

2.1.1 Data, Information and Knowledge:

The terms data, information, and knowledge often are used interchangeably. However, there is a conceptual difference between these three terms. Data are a representation of facts about things or entities in the real world (Agamalian, Donelson, Memel & Oliveria, 2002). When data are put into context, they acquire meaning, and become information. The application of information in a specific context, becomes knowledge (Agamalian, Donelson, Memel & Oliveria, 2002). An important key concept regarding data is that processed information for one level of the organization may be only raw data for another level (Mckeown & Leitch, 1998). Through experience, people learn to understand the significance of information, and use it to make "informed" decisions under all circumstances; crisis or normal. The outcomes associated with those decisions are more immediate and visible during crisis. These decisions often lead to an action that is taken with the goal of having a positive impact on a person or situation.

2.1.2 Information Theory:

Shannon in 1948 laid the foundation of the modern science of Information Theory. He defined information in terms of reduction in uncertainty, making information and communication as the focal points of his theory, which was called "The mathematical Theory of Communication" (Senn, 1999).

Schweber (2001) explained this theory by "A mathematical Theory of Communication offered a precise definition of information content in terms of the number of bits you need to transmit".

Communication is any procedure by which one person might affect the mind of another. This includes all aspects of human behavior, not merely, written narrative and oral speech. There are three levels of potential problems in information communication (Shannon & Weaver, 1994).

- **Technical**: How accurately can the symbols of communication be transmitted?

  The technical problem concerns the accuracy of transmission of a set of symbols from the sender to the receiver (Senn, 1999).

- **Semantic: How precisely do the transmitted symbols convey the desired meaning?**

  The semantic problem is concerned with how precisely the receiver understands and interprets the sender's meaning.

  Thus, designers of computer-based systems must ensure that output is presented in a way that can be understood and used by the recipients of the information (Senn, 1999).

- **Effectiveness: How effectively does the meaning affect the behavior in the desired way?**

  Effectiveness problem concerns the success of the communication in producing the desired actions or conduct. Effective communication makes clear the intended meaning and results in proper action being taken (Senn, 1999).

2.1.3 Information Types:

Senn (1999) classified information needed to top level managers into seven categories:

- **Comfort Information**: keeps managers informed about current situations or achievements levels; allows the individual to know that performance is on track and in time with general expectations in an area of interest.
- **Status Information**: keeps managers abreast of current problem and crisis as well as reporting advances to take advantage of opportunities that may disappear if not acted on.
- **Warning Information**: signals that changes are occurring, either in the form of emergency opportunities or as omens of trouble ahead that will affect the success of the firm, its products or services.

- **Planning Information**: description of major development and programs due to begin in the future; includes assumptions on which plans are based or anticipated developments essential for the realization of the established plan.
- **Internal Operations Information**: key indicators of how the organization or individuals are performing; useful for reporting the overall health of an organization, subsidiary, division or product. Areas in which actual performance doesn't match expectations are reported as exceptions.
- **External Intelligence**: information, gossip and opinions about activities in the environment of organization.
- **Externally distributed Information**: information the chief executive wishes to review before its release to stockholders.

2.1.4 Information value :Definition:

Attributes of information are the characteristics that are meaningful to the user of each individual item of information. (Senn, 1999). They include **accuracy** (information is true or false), **form** (distinctions of form are qualitative and quantitative, numerical and graphic, printed and displayed), **relevance** (information is relevance if an individual needs it in a particular decision-making or problem-solving situation), **completeness** (if a set of information tells the user everything that needs to be known about a particular situation, we say that it is complete), **timeliness** (any manager has two important concerns: is the information available when I need it? And is it outdated when I receive it or when I want to use it?) , and **value** (its relation to amount of knowledge previously gathered or stored).

Value involves another key element in the entire analysis, the information receiver. The person who obtains and uses the transmitted knowledge is the one who should place an economic valuation on it (or a utility). This means that it may not be possible to establish a universal and absolute value for a unit of information. (Senn, 1999)

The value of information in a message is relative to the value it adds to the total information or body of knowledge. In other words, the focus is on the incremental value of information in a message, the additional economic gains that can be obtained

by using it. Value does not depend on how much information the message contains, but on its relation to the amount of knowledge previously gathered or stored.

2.1.5 Information Challenge:

One of the most important categories of challenges that are facing any organization, especially healthcare ones, are those related to information itself. The primary problem resulting from these challenges was summarized in the concept "Data Toxicity" (Agamalian & his colleague, 2002).

Data Toxicity is an overload of redundant, inaccurate, uninformative or confusing "facts" often leading to incorrect conclusions. In other words, enormous masses of data are being generated and disseminated, thus the ability to produce the needed information is lost in the process and the quality of the information that is being produced, is not optimized. The major challenges leading to the problem of data toxicity are the lack of data standardization, including terminology and information representation, the absence of standard process for capturing and storing data, poor quality of data in both paper-based and electronic information sources, lack of skills in processing and dealing with gathered data, also lack of priority setting (i.e. It is easy to say we want to log everything and report on everything, but reading all reports takes time).

It is important to examine current data collection processes. Key personnel (working with real data) should be asked to group the data in one of the following categories defined by Barron & his colleagues (1998):

- Essential to know.
- Nice to know.
- Useless to know.

The process assists in setting clear priorities. Those stakeholders (managers at various levels in a hospital, as well as front line staff) should be encouraged to consider what is missing from current data collection procedures and compared to what is required. By this, "Data Toxicity" can be limited and managers will be able to define

ensuring data quality; and having processes ensuring the data is turned into information and used appropriately and in timely manner by the designated persons.

2.2 Management Information Systems:

Management is about making the best use of the available resources to provide the highest quality service possible. This requires the ability to organize and regulate both people and other resources. Many information systems are tools to assist us in making the correct decisions (UNRWA, 1999). Information about stock level, staff, suppliers and other types of data may play a remarkable role in assisting the decision-makers.

Heeks (1998) defined MIS as "the system that provides reports which assist the managerial monitoring and control of organization functions, resources"

MIS provides the specific information support needed to make appropriate decisions at each level of health services. This means that we have to know the answer for the question "How can information be or become a real source to solve health problems at all levels, especially managerial one?"

The inputs of an information system are mainly the raw data while the output is "information" in a usable "form", as a management resource, to support decision making.

The information Process can be broken-down in the following steps:

1. Data Collection.
2. Data Transmission.
3. Data Processing.
4. Information Generation.
5. Information Use.

(See figure 1; Management Information Systems)

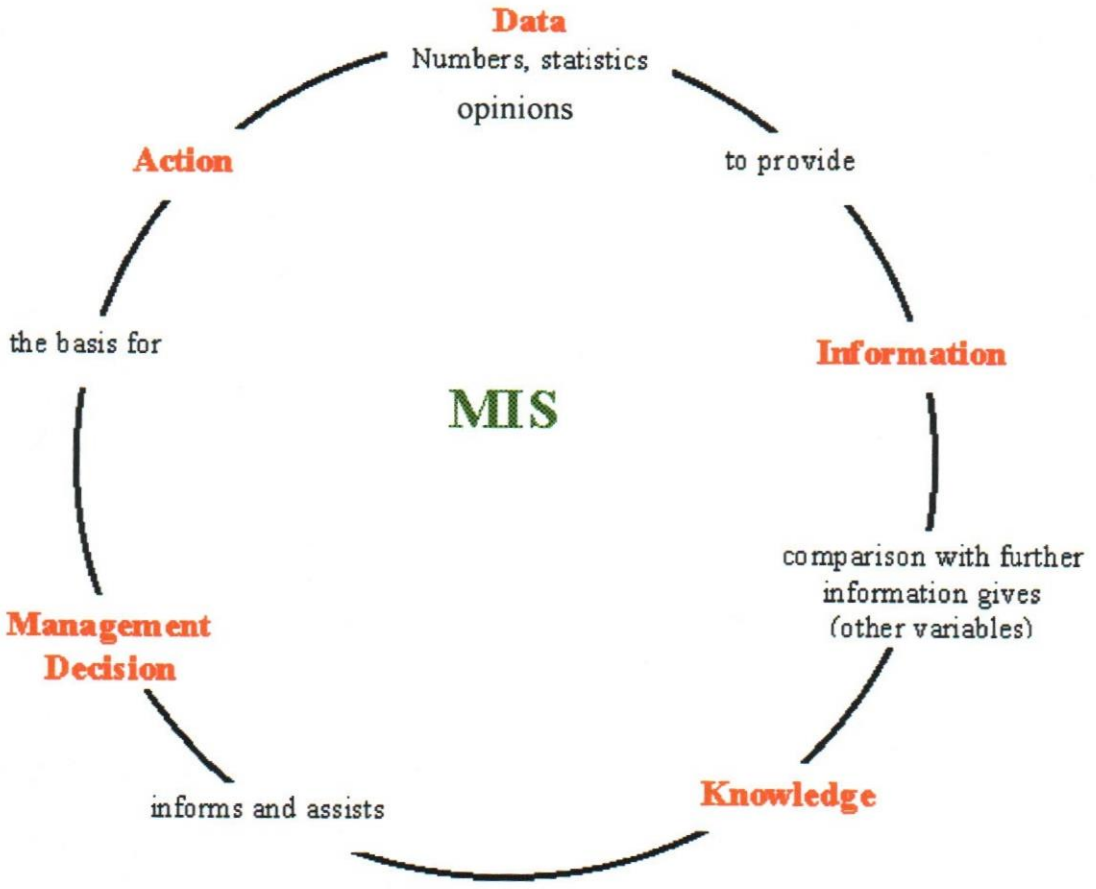

Figure 1: Management Information Systems

For MIS to be of value to managers at all levels, they must utilize the information that is provided. They need to choose appropriate indicators that are considered of significance and usefulness. Collected data must also be presented in a way that is simple to understand (UNRWA, 2000).

By this, we can consider MIS as an essential management tool as through the collection of reliable data, the analysis of this data and the comparison of the analysis with relevant indicators, managers are equipped with meaningful knowledge to help them to take decisions rooted in findings derived from data collection.

AMIS is the automated form of any MIS using computers and networks that assist and enable rapid processing of the functions of a MIS.

2.3 Reports as output of AMIS:

Central to its monitoring and key role, AMIS produces reports. This is mainly what managers may perceive an AMIS to be since these are its tangible outputs. Reports come in many forms. They can be differentiated in two main ways:

- **Differentiation by content:**
    1. **Detail Report**: this contains all relevant information on the report topic.
    2. **Summary Report**: this contains summarization of information on the report topic.
    3. **Exception Report**: this filters out information to provide just that which is deemed to be most important, according to some pre-set criteria. It may be summarized or detailed.

- **Differentiation by schedule:**

    Reports fail into three main categories:
    1. **Periodic Report**: this is produced at regular intervals: daily, weekly, monthly, quarterly, etc.
    2. **Event-triggered Report:** this is produced in response to a particular event or select of conditions.
    3. **Request Report:** this is produced as and when required in response to an ad hoc request.

From all these reports, managers know that the AMIS system is "watching out" (Heeks, 1998) for certain problems and will alert them if these problems arise, in this case a corrective action is required from the manager. Request reports provide the manager with a great deal of power. They can produce information that more exactly matches the managers' particular needs at the moment of need; they can be considered as response to unexpected in unexpected emergency.

As with all information systems, the response to the request can only be as good as the data that has been put into the system. MIS data is often entered with the expected rather than the unexpected in mind, leading to the risk that unexpected requests cannot be answered. If, on the other hand, large swathes of data are entered

into the MIS "just in case they are needed", this runs the risk of substantial expenditure on gathering data that is never used.

Thus when planning for crisis type scenarios, it is essential that managers establish clear and well communicated plans that define their facilities' roles and functions in these events. Such an approach would ensure availability of special types of information during crisis and conflicts

Since those reports are required to assist managers in making decisions (UNRWA, 2000) about changes occurring in, or that have to be made to organization or the way in which various activities are performed, or even their direct response to whatever crisis they face, thus managers have to be involved to decide how to lay out the final reports so that they are clear, easy to understand. (UNRWA, 1999). A process that entails customization of such systems to fit the unique needs of each facility and/or region.

2.4 Crisis and Crisis Management:

Crisis are often caused by external disasters. Disasters can be classified into two categories, natural and man-made crisis, which can be defined as events with dramatic impact on people and properties (RC & RCS, 2000). Crisis can also be caused by internal factors resulting from mechanical and physical failures, etc

Disasters can cause extreme disruption of the functioning of a society that causes widespread human materials or environmental losses that exceed the ability of the affected society to cope with using only its own resources (RC & RCS, 2000).

The damage caused by disasters touch many people, ranging from crisis responders who try to reduce the loose of life and property, to those in the affected communities who rely on warnings and other information to inform their own individual responses. Both, crisis and disasters are actual emergency cases during which quick and effective action is required (National Academy Press, 1999). This action can much be affected by information used at time and in the suitable form for any of the decision-makers involved in the process of crisis management.

Crisis management is an activity encompassing the immediate response to such events, recovery efforts (immediate protection of life and property), mitigation (is the on going effort to reduce the impact of disasters on people and property) and preparedness efforts (covers range of activities taken in advance of crisis) to reduce the impact of future crisis (National Academy Press, 1999).

The most immediate need (beyond the obvious damage and suffering caused) in a disaster and post-disaster by most concerned responders and stakeholders is for immediate information to enable decisions related to the consequences of the disaster. This can be at the hospital emergency room level, at the hospital pharmacy or district coordination of emergency responders. The information needed relates to both the scope of the disaster (damage done, deaths, injuries, causes, expected duration and evolution), and information related to the capacity and resources of the responding organization to handle the situation (in the case of a hospital, information about medical supplies, blood availability, food, fuel, water, staff, etc).

Thus, crisis responders need to obtain information quickly and to make decision rapidly. Information presented must be concise and directed to serve the specifics of the crisis. Not all the data collected during crisis needs to be disseminated to all decision makers (although capture of all information may be invaluable later for analysis and training purposes). This information can offer quick and effective action, which is required in crisis. However, providing a central information clearing house or database accessible to major stakeholders can further information exchange efficiencies and enable better-focused interventions.

2.5 Decision Making:

One of the central activities and responsibilities of senior executives is to make important strategic decisions and to guide to decision-making processes within their firms. In doing so, managers often necessarily rely on intuition, especially given insufficient information and time constraints (Loch, 2002). However, at times of crisis, decision making takes on a more immediate operational and tactical dimension.

When making decisions, managers communicate meaning about what is important, what is happening in the internal and external environment. Sometimes they

gather information and ignore it (Elsharkawi, 2000), as they work with ad hoc decisions which usually have their own effect (positive, negative) on their firms.

For this, an UNRWA team (UNRWA, 1999) expressed that MIS is an essential management tool as through the collection of reliable data, the analysis of this data and the comparison of the analysis with relevant comparators, managers are equipped with managerial and reliable knowledge to help them in taking managerial decisions.

2.5.1 Decision Making Frameworks:

Decision making theories have evolved over the past decade in attempts to understand, predict and even influence behavior.

Several frameworks have been developed to describe the decision making process. Researchers found that a fully and knowledgeable decision-maker selects the alternative that maximize utility for the decision (Forgionne & Guissepi, 2000), such that benefits can be achieved with its most positive impact.

- **According to the Bounded Rationality Model:** time, information, and space constraints cause the decision-maker to seek a satisfactory, rather than optimal, decision alternative (Ackoff, 1962).
- **The Organizational Model hypothesis** states that a decision-maker uses available procedures captured in a continuously updated organizational memory, to solve decision problems (Cyert & March, 1963).
- In the **Classical Decision Theory Model**, the decision-maker identifies the criteria, events, and alternatives, forms a relationship between these elements, and then uses the relationship to identify the alternative that best meets the criteria (Howarth & Mtheson, 1968).

Whatever the model is, during the process, the decision-maker observes reality, gains a fundamental understanding of existing problems or new opportunities, and acquires the general quantitative and qualitative information needed to address the problems or opportunities.

In some decision situations, competition, external constraints, internal restrictions, as other factors may make it impossible to improve organizational performance (Forgionne & Guissepi, 2000). So, the solution appears to be in finding the best problem solution by retrieving all possible alternatives that best meets the decision criteria. This can be achieved successfully by performing the general phases of decision-making: intelligence design, choice and implementation (Forgionne & Guissepi, 2000).

As decision making processes are continuous, decision-makers need to constantly monitor the various indicators produced by the collected data and processed information. This plays a main role in controlling the productive time spent on decision making (Forgionne & Guissepi, 2000), which directly as Kumar (1999) said "increases the improvement in personal productivity", such as reducing the time needed for decision making or increasing the amount of information, knowledge and wisdom from decision making (Kumar, 1999).

2.5.2 Recent Approaches to Decision Making:

Situation awareness seems part of many suggested approaches to improving team interaction, especially when that team is likely to encounter problems during crisis situations.

- **Recognition-Primed Decision-Making [RPD]**: is an approach that reflects knowledge and experience when applied in rapid decision making situations (Klein, 1993). In RPD there is a direct focus on situation assessment, evaluation of options and on the elaboration of (and improvement in) these options (Klein, 1993; Flin, 1996).

  Subjective determination models like RPD assume consensual knowledge from "experts" produces a good satisfying outcome not necessarily the best action.

- **Method of Tactical Reasoning [MTR]:** is an approach that links situation awareness and problem or decision analysis (Pandele 1995). MTR essentially outlines five stages of processing:

1. Search for information
2. Analysis and anticipation of information based on current and future states.
3. Identification of task.
4. Management of time.
5. Elaboration of options for maneuver (Pandele relates this to the "intentions" of a fire sector leader).

These stages can be redefined in terms of situation awareness and problem resolution –find information, analyze information in term of situation and what needs to be done, determine workable solutions.

- **Crisis-think** : is a model presented by Heath (1995, 1998) that enables the user to focus on three key elements in effective problem resolution or crisis management by proposing three questions that need semi-automatic use:

    1. How do I get more information?
    2. How do I get more time?
    3. How do I conserve / save resources?

Crisis-think points the way toward three important needs for effective decision making in problem and crisis resolution – gaining more and better information, gaining more time in which to make decisions and deploy resources effectively, and reducing the costs and losses involved. While the questions are simple and help users focus on important aspects of the problem or crisis, users still may need to understand a number of supporting strategies and tactics that need to be adapted by any given situation. So, a process of thinking is needed that helps decision-makers focus upon data available in the situation.

2.6 AMIS in Literature:

Although published evidence on the value of information technology in hospitals is scarce (Chris, 199) it is clear however that in recent years more attention has been addressed towards Automation of Management Information Systems as one of the main aspects in the development of Health services all over the world and its effect on decision making process for managers working under all conditions. Special considerations have taken place globally towards improving the AMIS implementation in terms of management and employee performance (Mitchell & Sullivan, 2001).

AMIS is becoming the art of management in building new firms with new techniques. In the 1980's, most organizations moved into a totally different information management environment. This shift was influenced by the integration of data processing, telecommunications and office automation. As Shutheis and Sunner (1989) explained that office automation refers to the use of "computer based office-oriented technologies to increase productivity".

Since that time, AMIS became fundamental for public sector organizations seeking to support the work of managers (Montealegre, Sullivan, 2002). This was achieved by using computers which offers the promise of improved productivity (Brabcheau, James, Janz & Brain, 1996) giving the organization a competitive advantage that has a positive influence on the efficiency of all employees of any organization, as most of the available literature mentioned.

Reynolds (2000) mentioned that some managers view AMIS as a means to reduce costs and improve effectiveness; others see it as a means to achieve strategic competitive advantage.

Heeks (1998) expressed that the role of AMIS is largely supervisory in nature as it is well used to support day-to-day monitoring and control.

Mitchell and Sulivan (2001) said "Doctors and patients were generally positive about use of computers". As they think that primary care computing systems can improve practitioner performance. In another study Sulivan & Mitchell (1995) both found that most practitioners willingly accepted computers as part of their working environment and were positive about their use, especially when working with

computerized records and reports, which help them much in retrieving data and accessing it as quick and easy as possible.

Although the Audit Commission (1995) states that "information is one of the most important resources" that a hospital holds, information is also its least tangible resource. Information can be defined only by its function –"organized data or knowledge that provides a basis for decision-making" (Shorliffe & others, 1990) and consists of knowledge about how to achieve a goal and data about any problem appears.

But it is not easy at all to talk about the value that computers can provide to health sector especially in management field, "it is potentially huge" (Lock, 1996) and there are few studies on the effects of computers on the health sector. "Published evidence on the value of information technology is scarce and far from conclusive" (Lock, 1996).

It was estimated that about a quarter of employees' time in health sector in different societies, is spent collecting data and using information (Aduit Commission, 1995). In this light, the use of modern information technology seems not only appropriate but also unavoidable. "Information Technology will become more than a tool; it will become an integral skill equal to reading and writhing (Deluca, 1997).

It is difficult to document tangible benefits from the use of computers (the main component in AMIS) in health care, because firstly the diversity of computer applications (Donaldson, 1996). Electronic patient records, tele-medicine, knowledge data-bases, interactive educational packages, electronic networking, patient administration systems, decision support systems, clinic based and population based information systems, health care process. The list is long but far from exhaustive.

Secondly, the evaluation of information technology investments is hindered by the difficulty of specifying measurable benefits,

In spite of these difficulties, WHO teams found that "many countries are struggling to keep up with the developments in the information technology" (WHO, 2000) which is considered as a health-system management tool. As it can provide reports that assist the managerial monitoring and control of organizational functions, resources or other responsibilities and can support the different management roles of public administration (Heeks, 2002).

Sullivan & Mitchell (1995) wrote that in the United States computing is seen as "essential technology for health care". This is so clear in all countries even in less developed countries (Montealegre & Ramiro, 1999), which are still far away from what may be considered full and appropriate use of computers in implementing AMIS in all health fields especially in management field due to various obstacles: lack of harmony of data management among the different programs and departments, too much data are collected, shortage in financial resources, poor infrastructure, and insufficient human resources.

Kraeme (1995) in his study about the impact of Information Technology on city government in the United States, said "computers were found to be useful in setting the stage for decisions", by providing needed information on different matters, while (Mitchell, 2001) emphasized this by saying "Most of the 89 studies in this review found positive effects of computerization", this appears clearly in the accuracy and the time savings that can be achieved by computerized (or automated) MIS, which becomes so essential as data resource in any organization is growing rapidly in size, complexity and value (Brancheau, James, Janz & Brain, 1995). This means to work with new methods in dealing with "Data mining", which emphasized the notion that organizational data are still largely not recognized, inaccessible, and underutilized. Information System must develop a climate within its department throughout the organization that values data as a corporate asset.

Much attention has been placed on tracing how effective decisions have been (and can be made). Dealing with problems in crisis situations, this attention has included "backward mapping" (Elmore, 1982) and situational awareness (Endsley, 1995).

Regester (1989) highlighted the need to consider the worst case scenarios when managing in crisis situations. The issue then becomes one of how to probe the situation and develop the decision process so that the decision maker is neither frozen (Heath, 2002) in a speculative worst case scenario that does not match the situation nor moved readily towards a dangerous underestimation of the problem or crisis. This suggests that decision makers need to assess situations – what can be termed "situation awareness" (Endsley, 1995) and formulate effective tactical and strategic options (Heath, 2002).

Finally, at the end of this review we may go to the definition that says "good health management information system is to obtain, manage and utilize information to improve health care and medical services" (Palestinian Ministry of Health Annual Report, 2000). In introducing information technology into health care institutions many people tend to forget the "information" part and overemphasize "Technology". This has led to excellent computer systems, but poor information systems especially in crisis were time taken for retrieving and using information plays a key role in taking the sound and timely decisions.

Chapter Three

Methodology

3. Introduction

This chapter aims at presenting the methods, techniques, and procedures utilized in the study. The chapter contains five major sections. The first section is to review the objectives of the study. The second is to present the research design used. The third is to present the set up of the study. The fourth section identifies the population studied. The fifth is to explain the instrument used.

3.1 Review of objectives:

The main objective of this study is to explore the effect of improved AMIS on decision making effectiveness at senior level managers working under crisis at Palestinian hospitals in the West Bank cities of Tulkarm and Nablus districts were used to conduct field research. This study explores the following:

- Locate barriers to adequate utilization of available IT tools.
- To determine the level of awareness among personnel regarding the importance of and extent of utilization MIS.
- To determine the effect of automated MIS on decisions taken by senior level managers working in crisis and emergency.

3.2 Research Design:

This study utilizes a qualitative approach using both focus group discussions and in-depth interviews

The research process can be thought of as a circular process that begins and ends with a conceptual issue (Pein and Preadic, 1997).

This process starts with research design, which was defined by Boone and Kurtz (1986) as "a series of decisions taken together, comprise a master plan, or model for the conduct of investigation"

Tablot (1995) stated that "research design is the platform from which the researcher explores new knowledge in an effort to better describe and understand phenomena, clarify plausible explanations, and sometimes identify potential causative factors". The research design provides "the back-bone structure of the study as it determines how the study will be organized, when data is collected and the research steps are to be implemented.

Literature has revealed three types of research:

1. **Experiment:** measuring the effects of manipulating one variable on another variable.
2. **Survey:** collection of information in standardized form from groups of people.
3. **Case study:** development of detailed, intensive knowledge about a single case or of a small number of related cases.

There are two approaches for a research:

✓ **Quantitative Approach:**

Which is referred to as "hard science" since it is perceived as rigorous, systematic and objective focusing on numerical data and using statistical analysis and control in attempt to eliminate bias.

This kind of research seeks to establish relationships between variables and causal links when indicated.

✓ **Qualitative Approach:**

It is a systematic approach in its analysis, but it is not interested in the preservation of the holistic, subjective experience of individuals.

By the term of qualitative research, we mean any kind of research that produces findings not arrived at by statistical procedures or other means of quantification. It can refer to research about persons, lives, stories, and behavior. But also about

organizational functioning, social movements or interactional relationships (Strauss & Corbin, 1990).

Triangulation: is a term used to describe the technique for using two known points to plot the location of unknown third point (Talbot, 1995).

Then, Triangulation entailed employing multiple measures to investigate a single concept. A key aspect of this view of triangulation is that multiple measures to be chosen to counterbalance the threats to validity identified in each. The reasoning behind this approach is that an investigator can be more confident in the study results if they have been confirmed using multiple measures. Thus the original purpose of triangulation was to confirm one's findings (Talbot, 1995).

Methodological Triangulation:

Methodological Triangulation refers to the use of different data collection techniques in the same study (Talbot, 1995). The techniques are deliberately selected because their respective strengths and weakness are thought to be counterbalance one another.

Since there is no one best design for all types of research, each type helps in a specific approach and should be selected accordingly to fit the nature of the issue, resource and time extent of existing knowledge...

3.3 Setting of the study:

The study is intended to cover senior level managers, working at different hospitals / West Bank – mainly in Tulkarm and Nablus district.

3.4 Population of the study:

Senior level managers (medical and administrative) of the three hospitals allocated at Tulkarm district (governmental, PCRPC, Al-Zakat hospital) are chosen to make up the focus group participants. While, in-depth interviews were held with senior level managers (medical and administrative) working in all hospitals (2 governmental, 2 private, 2 NGOs) in Nablus district.

3.5 Instruments used:

1. Self contained focus group technique.
2. In-depth Interviews.

3.5.1 Focus Groups

Focus group instrument is not new in social studies and can be used in different cases especially, as Thompson and Demerth (1982) expressed in "studies on factors that affect the productivity of work group".

Group discussions or "Focus Groups" are essentially a way of listening to people and learning from the group discussions to create a process of sharing and comparing among the respondents (United Business Media, 2002). Focus groups are a form of group interview that capitalizes on communication between research participants in order to generate data (Kitzinger, 1995). Although group interviews are often used simply as a quick and convenient way to collect data from several people simultaneously, focus groups explicitly use group interaction as part of the method; as people are encouraged to talk to one another: asking questions, exchanging anecdotes and commenting in each others' experiences and points of view.

In any interview, the skill of the interviewer both as initiator and facilitator is of a vital importance. In focus group interviews this role is called moderator (Smith, Thrope & Lowe, 1991). The task of the group interviewer –the moderator- is not to conduct interviews simultaneously but to facilitate a comprehensive exchange of views in which all participants are able to speak their minds and to respond to the idea of others.

Kitzinger (1995) stated that groups can be "naturally occurring" (for example, for people working together). The typical focus group consists of 7-9 respondents (although smaller groups are possible) and a moderator (United Business Media, 2002). But can be up to 15 participants.

Each session lasts from 90 to 120 minutes. The moderator creates a relaxed, open, accepting atmosphere, so that the participants feel free to express their thoughts and feelings candidly and without coercion .

Although the conversation is usually structured around a discussion document, it allows spontaneous and deep seated feelings on a subject to emerge naturally.

Interaction between respondents and honest discussion are some of the advantages of this qualitative method (United Business Media, 2002).

In cases in which the potential pool of participants due to selection criteria is small, a special type of focus group is conducted which is termed a "panel interview". This was the case in this study.

3.5.2 In-Depth Interviews:

The interview is a kind of conversation with a focused purpose. Interviews carried out for research or inquiry purposes are a very commonly used approach, possibly in part because the interview appears to be a quite straight forward and non-problematic way of finding things (Robson, 1993).

Information, received during in-depth interviews, reflects not only standard thinking of people, but also their deep psychological processes, may reveal motivation to different actions, mechanisms of creation of installations in relation to these or those goods, services, events.

In-depth interview - special kind of purposeful interview, when the concentration of interviewer forces is directed on study of the certain problem (Agency of Social Information, 2002).

In-depth interviews with a single individual allow significant probing of a respondent's thought and opinions. They can also cover the most intimate of subjects, as the face-to-face nature of the interviewing technique allows a bond of warmth and trust to be created (Senn, 1999).

For the purposes of this study, the themes that have emerged from interviews have enhanced focus group discussion results. Researchers (United Business Medicine, 2002) described interviews as providing "great details" which is able to

enrich the collected data as interviewees have a chance to express their feelings and beliefs without the possible coercion that may occur in groups.

In such a qualitative technique (Maniglio, 2002) mentioned that "interviewers will be able to help individuals represent their personal experiences fairly well".

This method of data collection was described by (Smith, Thrope & Lowe, 1991) "the opportunity for the researcher to probe deeply to uncover new clues, open up new dimensions of a problem and secure vivid, accurate inclusive accounts that are based on personal experience".

3.5.3 *Focus Groups compared to In-Depth Interviews:*

The comparative advantage of focus groups as an interview technique lies in their ability to observe interaction on a topic (Morgan, 1997). Group discussions provide direct evidence about similarities and differences in the participants' opinions and experiences as opposed to reaching such conclusions from post hoc analysis of separate statements from each interviewee. This reliance on group interaction, however, also means that individual interviews have clear advantages over focus groups with regard to (a) the amount of control that the interviewer has and (b) the greater amount of information that each informant has time to share.

By comparison, focus group (a) requires greater attention to the role of the moderator and (b) provide less depth and detail about the opinions and experiences on any given participant.

But, often new ideas are generated from the discussion group that may not have been elicited from individuals. Ideas that may not be readily elicited when individuals are asked in solo settings.

To facilitate the data collection process, this study used two techniques:

1- Focus Group

2- In-depth Interviews

The target group for both techniques was readily available due to work commitments; the focus group was prearranged three times before it was held. And the researcher visited the managers at workplace. , Focus Group and Interview were conducted in Arabic, a translated version of these was prepared and the notes were translated and are annexed.

Chapter Four

Data Analysis

4. Data Analysis:

Due to the nature of decision making process in health sector -continuous, dynamic, individual and culture specific, (Elsharkawi, 2000)-, and the methodology of collecting data, one must pay special attention to conclusions and implications of the findings.

Two tools were used: Focus Group and In-depth Interviews. The data collected shed light on the issues related to AMIS and its effect on the process of decision making in all cases with a focus on crisis/disaster management, and the overall awareness that senior managers have towards information and AMIS while managing their hospitals in crisis cases.

The interviews were conducted at the manager's offices. The transcripts of the interviews were then analyzed, which involves reading through the data, identifying recurrent and unique themes, and organizing them into categories.

It is difficult to quantify this type of data or assign orders of magnitude of importance to the various beliefs and attitudes expressed, therefore no statistical tools were used to analyze the data as it is of the qualitative type and needs special methods for analysis.

This study tries to explore the level of impact that information and AMIS have on the process of decision making in crisis and emergency.

4.1 Results From Focus Group:

A number of key themes emerged from these focus group discussions and are summarized in the grid below.

The key themes that emerged from this focus group discussion addressed:

- **External/political**

  - Curfews and closures (traveling problems)

- New employment criteria
- Donors

➢ **External/community**

- Lack of cooperation in Tulkarm
- Monopolization / limited suppliers
- Cross-sharing data
- Active role of local community
- Emergency Committee (crisis)

➢ **Internal/hospital**

- Traveling problems / employees absence
- Lack of equipment
- Scattered subsystems
- Huge amount of data
- Lack of authority
- Need for comprehensive services
- Preparedness plan (crisis conditions)

➢ **Internal MoH**

- Over centralization of stores
- Lack of information about available stocks at central stores
- MoH responsibilities towards health sector

➢ **Knowledge & skills**

- Data / information concepts

- Aware of the cost and benefits of using AMIS
- Experience from Previous Intifada

Participants stressed throughout the session the daily difficulties they face moving under curfews and closures, "the only thing you have to think of is how to reach your office and fetch your employees". This has a very negative impact on their plans, as under such conditions "you don't know if you can move even in your ambulance", depending on this, the participants raised the point "the only good and useful information is about the curfew". This reflects the level of difficulties that curfews result and their negative effect on daily issues (traveling, education, getting their needs of food and drugs, medical services) of all Palestinians including employees at hospitals.

Employees and their traveling were and still one of the main problems that need daily and changeable decisions. This issue was a direct result of the crisis that hospitals live daily and have to deal with on daily even hourly considerations. Thus, information related to this issue has to be available at time to help managers.

About hospital readiness, nearly all participants agreed on the same idea, that says all hospitals are used to working under crisis conditions and the only difference in the current crisis is in the level of emergency they have to chose to work at. At 1998 MoH published its Emergency Plan, which classified the situation of emergency in hospitals into three levels:

1. **Level one**: which means to discharge all stable cases and keep working normally.
2. **Level two**: to increase the level of emergency by canceling pre-dated operations and work with urgent cases only.
3. **Level three**: to stop all kinds of operations, stop in-charging any cases (except urgent ones) keep the stock of resources within the strategic level (that satisfies the hospital needs for 3-6 months).

In Tulkarm district, it was clear that the communication between different hospitals was not very active. Stakeholders (hospital managers and all other parties from the local community) conceptually understood the need to build clear

cooperation levels between each other under crisis conditions. There was some agreement; that part of good management (minimizing the negative impact of the problem while choosing the best available alternative) for their daily problems needs to be rooted in "active cooperation" as one noted. This gives the chance to solve the problem depending on their " local resources" which means, as one explained, "all available resources within the city itself".

The majority agreed that they had enough available information about their own centers but also added that "having information without authority means nothing", which raised the disadvantage of centralization especially in governmental sector (external matters related to MoH). Information about their stocks (medical, food, fuel, blood) "all are available, but how can I bring my needs from the central stores in Ramallah?"

There were many emotional statements made to express shortages of resources (especially in the governmental hospitals). The discussion around the causes for such situation addressed the following:

- ✓ **Over centralization of stores:** As MoH already has two central stores; one general and the other is medical. All hospitals, PHC centers and other health centers have to get their medical and non-medical needs from these stores in routine monthly procedures. By this they keep their stocks within the accepted level with a chance/ permission for "Urgent Order", through which health centers can cover their urgent and unexpected shortages of selected items.

- ✓ **Lack of information about available stocks in central stores:** Participants tried to explain an active issue. They don't know what is in the central stores and what are the actual stocks. Sometimes they are forced to purchase urgently needed items from their limited monthly allowances; while it is available at Central Stores. It is important to clarify that both stores have AMIS and well-designed databases (that is updated daily and routinely). They can produce many useful reports that meet clients' requirements.

- ✓ **Monopolization/Limited Suppliers**: Medical suppliers (equipment or drugs) market in Palestine is limited in size and does not offer the consumer choice. Most of medical agents are in the south of W.B. Transferring medical needs from south was and still remains an immense problem. Even if the supplier is from the north, the same challenges remain as many items are imported from abroad. An example relates to the Oxygen supply. The only supplier is from Jenin city, which means that hospitals (governmental, private, NGOs) faced difficulties in getting their needs as Jenin city faced an acute escalation in the military crisis thus shutting down the city and access for over a month.

- ✓ **Extended & Lengthy curfews and continuous closures**: Since March 2002 onward all Palestinian major cities and most villages and refugee camps (especially in the north of W.B.) experienced extended curfews; "one can't get out of his house to bring even milk and food to his children", and continuous closures that force "us to live just in big prisons". Within this time, life and business stopped "except the terrorism stories". One of the participants explained "we spend most of our time trying to stay alive or managing to reach our work".

Participants stressed the real need for comprehensive services to minimize patient travel between cities, as the three hospitals in Tulkarm city are not able to meet total patient needs. "a CT scan machine" can not be found in Tulkarm and all patients have to be referred to Nablus or Ramallah cities. They noted that there is a need for more individualized and unique care plans offered by health agencies especially MoH, which is not "playing its adequate role" as one of the participants said. Frequently, during the discussion, participants mentioned MoH and its responsibility towards the health sector. They expressed that MoH is responsible for "developing and supporting" the health sector; governmental or non-governmental.

The group of managers expressed interest in having AMIS, and raised the problem that all the health centers have "scattered subsystems" in some of their departments; financial, personnel, pharmacy and blood bank. "There is no integration between these subsystems" which means that duplication of work is

done each time. It was clear that participants are in favor of automated systems. "I would like to have a system that gives (data upon request)", which means to have the required data at the needed time. Even if the system is manual, you can have the data you need as it is "stored in papers or in minds". But, one of them explained: "the difference is in speed and accuracy". This summarizes the general view amongst managers as to automated systems and their possible benefits.

One of the main themes in the discussion was to have an efficient and legal way to "cross-share data" between different centers. Some mentioned that part of the information they have and depend on is "from friends and comes through informal channels"; the local community represents a rich source for rumors; "many times we had to act according to the rumor we receive". They explained "in crisis, we don't have time to check the accuracy of information". Even if there is some doubt about the accuracy (which indicates both reliability and validity) of this information, "you can't check it directly"; as the source is illegal and "the time is short".

Participants strongly agreed with an idea proposed by one to have a "full automated system in the hospital from A to Z". Through this you can "control everything and take the right action". Right action means right decision even when working in emergency. Of course in such cases there is "a big risk and probability" that have to be considered well and more than one alternative solution have to be taken in consideration .

The importance of using computers in all departments was clear throughout the entire discussion. Nearly all the participants were well aware of the cost and benefits "we have to manage our resources well to use computers and AMIS in all departments". As well, one of them noted "computers now are used just for word processing", which indicates the deep beliefs that they have towards the necessity of developing the use of computers, not just for "secretarial work" but also "to manage your hospital " through an efficiently, structured and reliable AMIS.

One participant pointed "emergency doesn't need information, it needs wisdom and knowledge". This was clarified by one of his colleagues "knowledge is information". From this, participants may be indicating that the concept of what is information itself is not sufficiently clear. Some of them considered the pure data

that is collected in their hospitals as information, while others recognized well the difference between terms; data and information. One of the participants pointed "what we need in our work is information not data".

This information is expected to have a great impact on the managerial staff of the hospital working in emergency and crisis. "It helps us to take informed decisions" which means to take decisions depending on the available data and information. The good piece of data at the suitable time "may save a life".

Managers perceived themselves as the hardest working as they have to be aware of almost everything within their hospitals and have to be "responsible for your decision" depending on the available information. "we work hard to save lives" even in normal conditions, this reflects the main mission of hospitals that work to save lives where "one minute can make a difference". This life can be saved if the manager was able to have the right information that helps him to take the right decision. This information may be from inside their hospitals or from the outside.

The overall findings from focus group work reflect many issues related to

- **Difficulties in traveling/Mobility** between cities and inside the city itself for employees and patients. Managers used to be involved in managing this issue and have to take the suitable decision relating to how to fetch employees, which ones have to be fetched and how to cover other employees absence (Transport Logistics).
- **Shortage in resources had its negative impact on hospital work**. As it forces hospitals and staff to be in a kind of crisis through which they have to ration: setting priorities, in allocating what they have, trying to find new resources to cover the shortages. Available information usually gives managers the ability to take effective and efficient decisions.

Perticipants expressed that employees are an important part of the hospital resources. Their absence have a similar and equal negative impact as a shortage in other resources

Expressed participants views showed a tendency to place more blame on MoH central stores when problems arise in stock shortages. MoH seems to bear a large responsibility towards problems that arise in health sector; lack of health professionals, over centralization.....etc

Preparedness plans are well known for all participants, as they used to work with emergency plans prepared by MoH since the beginning of Al-Aqsa intifada.

The findings from focus group discussions lend support to themes that have been described in the literature review that deal with the importance of information and AMIS for decision making process in crisis/conflict situations; since information a major input into any decision or reaction. While, development of computer use (not just for secretarial work but also for automated databases) and integration amongst available AMIS (to decrease redundancy and duplication or work) was clearly raised.

4.2 Results from In-Depth Interviews:

One of the interviews was interrupted and had to be completed next day, as during the interview a military attack took place, "this is crisis" the director expressed and began to activate the "Emergency Committee" that was established in the city of Nablus to work under such conditions. "I have to know everything happening, and receive information about what is going here and there". This expresses the direct and active communication between hospitals and those outside, which gives the director a good ground to take correct and suitable actions or "decisions" depending on the current needs.

The main issues in most of the interviews were about difficulties in moving and fetching the employees "we work as a taxi office, we have to bring employees from their houses and return them back". They can't house all the employees because of limited capacity, and can't fetch them all on time especially under curfews. To solve this problem, some implemented the idea of having continuous shifts for 3-4 days than to be "off" work for the rest of the week. "This is a kind of managing in emergency".

Unluckily, these crises have negative attitudes towards employing people from outside the city; "if you want your hospital to work in its full capacity, you have to

chose your staff from nearby". Taking care the nearby means inside the city, not even from the surrounding villages. Of course, this is not the appropriate solution as there are insufficient numbers of health professionals inside the city itself to support all hospitals.

By this, a new criteria for employment -not only in the health sector- was developed. This negativelly affected human resource management since WB is not that wide area and health professionals are not allocated in all districts. This criteria is expected to emerge new unexpected problems in employment process.

The "Emergency Committee" is a team consisting of all hospitals in Nablus city (governmental, private, NGOs), PRCS, Nablus municipality and Nablus governor. It works to assist the integration of necessary functions between the key stakeholders working to assist the community in Nablus during crisis and conflict. They aspire to have the most complete and detailed information about available resources that are emergency related. With the help of such information, managers succeeded many times in copping with problems faced in their hospitals. One of the Emergency Committee functions is deciding to which hospital the crime/injured has to be transferred (there is political decision spread amongst all health providers in Palestine says that PRCS is the only responsible for transferring the injured and in all cases –road accident, normal cases); "this saved lives of many injured people". For example, once, the Emergency Committee was able to supply one of the hospitals with the required Oxygen pump to save the life of an injured young man "nearly all the available stock of Oxygen in hospitals was collected ".

Shortages of resources were not as frequently referred to in Nablus interviews as in the Tulkarem focus groups, as it was resolved through the coordination efforts of the "Emergency Committee". Through this team, they were able to cover unexpected shortages and "keep in touch with other centers". The local community was mentioned in most of the interviews as "good supplier and resource in crisis" which was able to solve the shortage in resources like "food".

Throughout all interviews, there were references to the local community and its role "it can supply you with most of your needs even the information you want". But, the question that arises here is: "is this information accurate and trusted to the level that one can depend on in taking any decision?".

Participants were not sure about this issue, but they seemed to have a level of trust for such information "sometimes, we have to deal with such information as realities, we don't have another choice".

Most of the participants believe that getting ready doesn't cost them much, as "we are in continuous crisis", but ignoring such information may cost them much, "this is a big risk, who can do it?".

"Always we have to be ready for the worst", all interviewees expressed that they work under continuous emergency; "nothing changed for past 2 years, just the level of emergency". Nearly, all the managers agreed that they were able to make use of the good experience that they had from the previous Intifada (1988-1991). "It was a rich experience" as one of the interviewee pointed. It seems that they considered the two periods (previous Intifada and current Al-Aqsa Intifada (Sept. 2000-Present) to be similar. The only difference is in "the number. of crimes/injured we have to deal with at one time". Some times hospitals receive much more cases than their capacity. In these cases managers "have to share in managing such situations and take many direct decisions". In the last big attack on Nablus (April 2002), "we borrowed a big refrigerator car from a local company " to use as a temporary morgue.

Over centralization of the stores was often referred to by governmental hospital directors. They expressed the difficulties they face as a result of this over centralization. NGO hospitals have played a remarkable role in resolving this problem often referred to by "sometimes UNRWA and other NGOs act as the only way to bring stock from our central stores".

Directors in the two Nablus governmental hospitals agreed that "MoH has to find a solution for this problem". They mentioned that at the beginning of this Intifada or uprising (Sept 2000) MoH tried to establish sub-stores in Nablus to supply Northern Districts with needs, but a shortage in financial resources was a direct reason for its failure. In spite of this "MoH is responsible and has to resolve it". All the managers agreed. This issue seems to have negative impact on governmental health sector (they have to keep getting the supplies from the central stores in Ramallah with all the difficulties). It seems managers used to consider MoH responsible for some failures or problems they face; even in private or NGOs hospitals.

"Information" was frequently mentioned in interviews, a good level of support was also expressed toward having "Central Information Bank"; "by this bank you can get most of information you need".

This bank is expected to supply all information related to the current situation (from the perspective of the interviewees). Information about human resources, stock levels, political situations.....etc. Also, it is expected to be on a "large scale" not only for Nablus, but also for the north of Palestine. A wide and large computerized information system is expected to solve the problem of lack of nation-wide data and information that is accurate and timely (in the participants view and expectations). They pointed that "not only health data" but any other useful data they may need to manage their hospitals (demographic, economic, geographic.....etc).

From the ideas expressed by the interviewees, it was clear that they have "huge amounts of data", but they still feel that there is a "kind of shortage in information". This reflects the common problems in inefficient and ineffective information systems (like difficulties in data recording, inappropriate recording, inadequate data analysis and reporting procedures). (Data Toxicity: see section 2.1.5)

But, even when they have suitable information, the governmental directors complain that they can't take "the decision we want" because of what they view as over centralization in MoH and the resulting lack of authority at their decision-making levels. In private and NGOs hospitals, the situation was different as participants explained that "we are locally directed" indicating a level of authority and decision making that is more efficient

Donors' policies and types of donations were significant topics raised in all interviews and participants had a lot to say. "We just receive what they donate", which expressed the problem that the received donations don't go with the real need of the health sector; "donors send what they want" and the health sector in all its parts have to receive and accept; "some drugs are near the expiry dates and we have to accept". An interviewee explained "donors don't depend on our needs, or on information we pass to them" thus indicating the donor-driven type agendas imposed on local hospitals. Here, it is clear that pre-planning and need assessment is so essential in managing crisis. By well-prepared lists of hospital needs and setting priorities, managers can

make donors work within their real needs and provide essential needs of their hospitals.

Data is available in all forms, even non-computerized departments "have good subsystems with well-designed output reports", but all expressed their strong feelings towards having a comprehensive computer system for all departments. These systems are expected to provide them with "daily reports to inform us with what we need". One of the interviewees expressed concern as at to the cost of implementing computer systems on a large scale in hospitals, "this is expensive, but we have to work with computers... it is unavoidable". Benefits of using AMIS were clear "it gives you everything you want to know" about the firm or hospital you work in. Certainly this statement doesn't work well unless the hospital has a well-designed AMIS that meets client needs with comprehensive need assessment, designed from bottom up, simple forms and data entry, non-repetitive, timely, customizable, etc. This AMIS has to be designed in a way that ensures on the accuracy and comprehensive of data entered so as to get expected outputs.

They tried to express the need to explore an agreement on minimum data sets to be collected that meet the health information requirements of all stockholders working in health sector, mainly managers.

Overall, the main topics in interviews can be summarized as follows:

- **Traveling inside the city and outside** is a big problem which (as mentioned in the focus group) results many difficulties for all Palestinians.
- **A new criteria for employment** was suggested, that is to choose the employee just from the same area of the hospital to avoid the difficulties in traveling.
- **Emergency Committee** was established in Nablus city. The aim is to enhance the cooperation between different health centers and the local community, with wide sharing of available information
- **Local community** has remarkable function in limiting the problems of current emergency especially for limiting the shortage of some

resources that can be supplied locally. Local community represents a source of information (the issue is to trust or not?) and a local resource

- **A comparison** between current Al-Aqsa Intifada or uprising (Sept 2000 to present) and the previous Intifada (1988-1991) in the greater number of deaths and injuries in the current Intifada which requires a better readiness and preparation from the hospital.

- In general, they are usually **ready for the worst** as many unexpected things may take place during the current crisis; so hospitals are usually in their complete readiness (in stocks, human resources.....etc).). Given their existing constraints and challenges

- **MoH responsibilities** towards health sector are not functioning as expected. The health sector is suffering from many problems (lack of financial resources, lack of professionals, Al-Aqsa Insurance, lack of supplies and equipment in hospitals) –especially governmental-.

- **Central information Bank** is mentioned as a useful source for data in normal and crisis conditions. They expect it to play a good role in providing reliable, accurate and on time data.

- **Large amounts** of data are available, but the difference between the terms "data and information" was not clear for all.

- **Donations**, which do not match with the real needs of hospitals and in many cases, were discussed widely as a problem that the health sector faces.

4.3 Main themes from both techniques:

As a result, ideas and issues from focus group and in-depth interviews did not vary widely from each other, but In-depth interviews raised certain ideas (bold and underlined in the following table) that were not mentioned in focus group discussion. The table below summarizes the main themes that were discussed throughout the discussions.

Table 4: Comparison Table

Focus Group	In-depth interview
Curfew and closure that resulted in paralysis of Public's daily life and work. Shortage in resources; food, drugs, medical needs, was one of the key themes that have to be pre-planned and organized well. Data cross-sharing among health centers to be able to solve problems of shortage in all resources for example. Lack of adequate information that can result in wrong decisions especially in crisis; no time to check. Centralization at MoH stores in Ramallah city, caused some troubles as the north usually suffer from lack of stocks. Although importance of information for decision makers in crisis was clear in	• Difficulties in traveling influenced resources like staff and stocks. • **An employment criteria** that considers the place of residence to play a role in the process of choosing new employees. Managers have a strong attitude towards preferring new employees who live in the city of their work. • **Emergency committee** functioned well in the current crisis by arranging to have the most completed and detailed information about available resources that are emergency related, it works as information clearing house and decision making body . • Local Community viewed as a resource and stakeholder given its ability to share its resources despite the effects of curfews and closures. • Participants worked under the condition "being ready for the worst", for this they tried to get ready within their available resources. • MoH is responsible for the difficulties that appear from working with central stores at Ramallah, so an idea of establishing sub-stores in the north and south regions of WB was strongly expressed.

the discussion some participants were aware of before the the discussion. Information Systems working in and between hospitals are not integrated; they work as separate islands.	• **Central Information Bank** is expected to play a positive role in managing health data and providing the needed and accurate information on time. • **Health sector is donor driven** in terms of supplies received seemingly regardless of its actual needs. (ie. Inability of recipients to influence type of donations to match needs)

Chapter Five

Discussion and Conclusion

5.1 Discussion and Conclusion:

Senior level managers (medical and administrative) from nine different hospitals (governmental, private and NGOs) were included in this qualitative study. The results and analysis were based on the content of the transcripts resulting from both techniques.

The literature and experience of many health care organizations document the advantages that an AMIS can provide in aiding decision-making. A well-designed and functioning AMIS provides timely, accurate and focused information in the format of targeted reports usually upon request. A well-designed AMIS assumes proper needs assessments are conducted and the software is suitably customized to meet the needs of health workers and various layers of management.

The overall findings support the notion that AMIS can have a positive impact on decisions taken by managers working at hospitals especially at times of crisis and conflict. As in high stress emergency settings, people act to satisfy an immediate objective without necessarily a thorough examination of all options, and all consequences in other situations (Elsharkawi, 2000), in which longer term decisions are made in which people may be more rational and examine all alternatives.

It was clear that senior level hospital managers perceive themselves to be the central and most important figures needed to make decisions during crisis conditions. Crisis conditions by definition require a constant flow and immediate information. Senior level managers expect to have their information needs met from either manual or automated MIS.

The findings lend support to theories about decision-making and the importance of both centralizing and rapid processing of information especially in crisis/emergency situations. These two key and essential functions could only be effectively achieved via AMIS.

The application of information in a specific context, becomes knowledge. Through experience stakeholders learn to understand the significance of information and use it to make informed decisions. Those decisions often lead to an action that is taken with the goal of having a positive impact (Agamalian and others, 2002). This impact may influence the entire hospital. Thus, an AMIS can serve as a tool for improvement by providing reports (information) that assist managerial monitoring and control of organizational functions. However, one must note that managers make daily decisions which are often rooted in local culture, organizational policy, past experience, available accurate and trusted information, and intuition (Elsharkawi, 2000). Thus information is to be viewed as one of many components that affect decision-making.

Participants has good beliefs towards information and the effect it may result on their decisions while managing their hospitals in abnormal circumstances (crisis). This means that managers can play a good role in supporting the process of implemeting AMIS at their hospitals

The view of most of the participants tends to blame external factors that may be perceived to deny them authority and/or access to resources, and thus hinder decision-making

One of the two districts in this study seemded able to resolve some of the unexpected challenges by setting up an "Emergency Committee". The committee served as an information clearing house and decision making body amongst different parts of the health sector and local community. This simple structure enabled effective and efficient decisions to be taken and assisted hospitals to function at an acceptable level while coping with crisis conditions. The Emergency committee would have benefited from automation of information flowing within it through use of a database that would have enabled rapid sorting and analysis.

Attention has to address a rush to establish AMIS within and/or between hospitals and thus create a series of scattered MIS subsystems that act as "islands" without possibility of integration., Working with information systems under such cases may negatively affect hospital management because of the possibility of duplicating work and effort.

Pre-planning needs of the hospital sector plays a vital role in guiding donors. Such pre-planning minimize the probability of receiving unwanted supplies.

A difference in how the two districts in this study coped with the crisis and information needs is evident. Nablus employed a simple committee approach, while, Tulkarem opted for a more informal consultative process. While it is clear that more than one solution can address a particular information related challenge, it is also clear that various levels of pre-planned automation would have enabled hospitals in both regions to work more effectively and efficiently. It is evident that culture, personal skills, level of education, level of awareness of each organization towards the importance of information and AMIS all of the previous are factors that have influenced the decision making strategies.

Key findings can be summarized as follows:

- Managers do know the type of information required in crisis scenarios, however the culture of pre-planning information needs is not practiced.
- Managers do recognize the importance of information sharing within hospitals and with the external environment and other stakeholders and attempt to find mechanisms to address such needs. Automation can add value if such a process is followed.
- Managers do recognize the usefulness of automation; with high level of expectations from automated systems. It is therefore imperative that institutions recognize the limitations of such systems and the key prerequisites to have these systems function well.
- Pre-planning is vital for improved decision making efficiency and effectiveness.
- Over centralization of authority in various critical functions can severely restrict management abilities to make effective decisions at time of crisis. It results in a one way flow of information in which managers send requests up the ladder to a system that is not able to respond to needs in a timely manner.
- Automation and MIS systems must follow well-conceived needs assessments that not only define needs, but also sets priorities rooted in national and regional policies, defined roles, and availability of human, material and financial resources.

- Automation can aid decision making if all prerequisites are met (proper needs assessments are conducted and the software is suitably customized) to meet the needs of health workers and various layers of management by providing rapid access to required information.

5.2 Conceptual Diagram:

The figure below (figure 2) is designed to conceptually aid in envisioning the differences between various types of MIS and their influence in decision-making efficiency and effectiveness.

By ploting the two variables; "decision making efficiency/effectiveness" (on the Y axis) against "improvements in information systems attributes" (or effort and resources put into these attributes – proper needs assessments, software suitably, user friendly interfaces) on the X axis, a curve is generated.

Three output curves are shown. The shape of curve that initially rises at a particular slope value then platues relates to the fact that improvements will have a limit at which point decision making may be considered optimal for an organization for the type of information system present. Thus further desired improvements in decision making would require a change in the system itself.

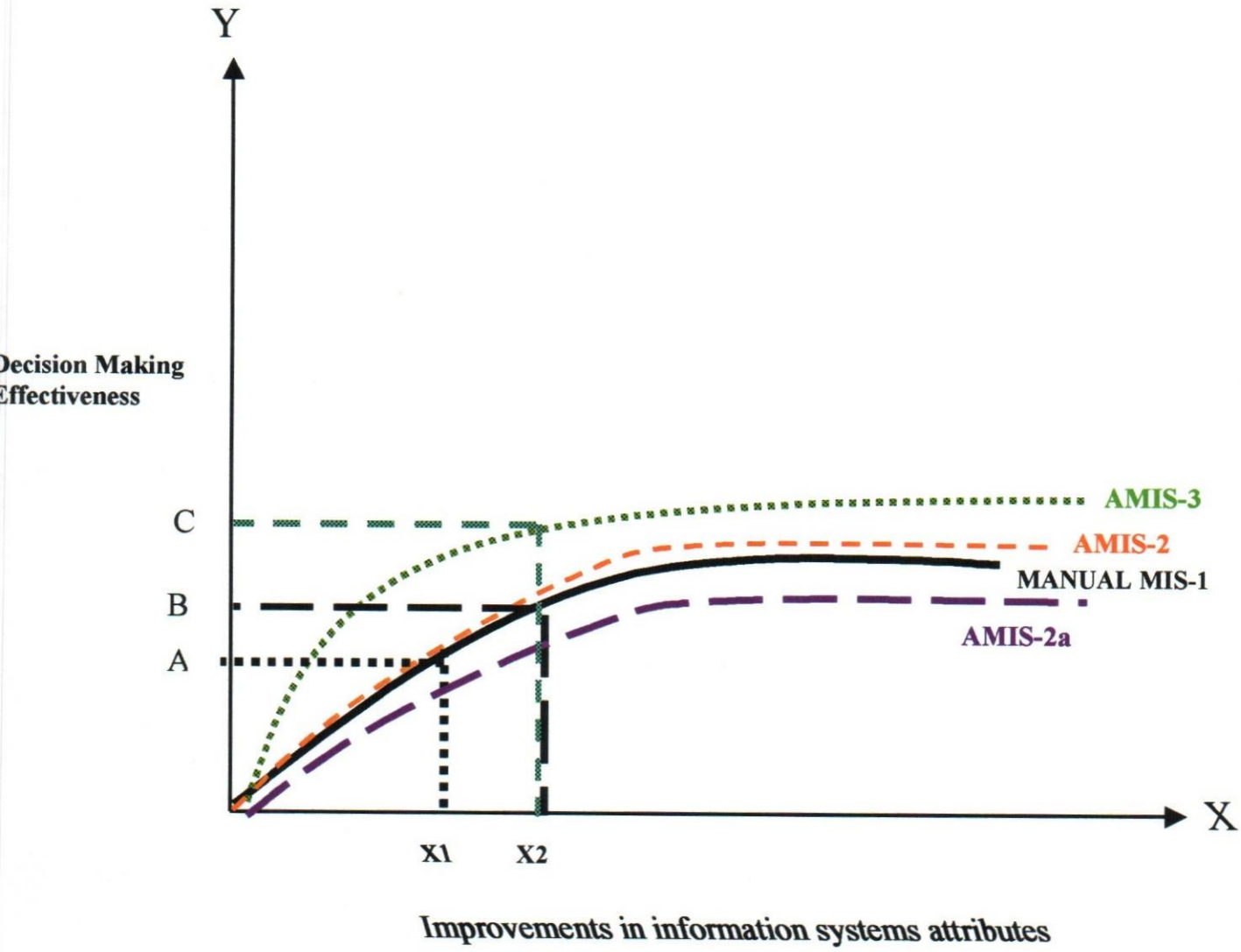

Figure 2 : Conceptual Diagram of Decision Making VS. Information System Improvements

- Manual MIS-1: (black & solid curve)
- AMIS-2 : not well-designed (red & small dashed curve)
- AMIS-3: a well designed and all the pre-requisites are achieved (green & doted curve).

Manual MIS-1: no automation is used, all the steps are done manually but in well structured steps that may satisfy user needs in all cases. It outputs accurate and reliable information in desired formats (reports). These reports help managers in taking decisions and doing their job. Suppose we increase the utilization of information via improvements in some attributes in this manual system thus moving from point X1 to point X2, then the corresponding effect on decision making process (Y axis) will be from point A to point B which is a better level where efficiency and effectiveness of decision making process are increased.

AMIS - (inadequately designed) : suppose we change from manual MIS to an automated one; but this new sytem is not well designed (improper needs assessment, non-user friendly interfaces), doesn't satisfy user needs and is not functioning well (reports do not meet the needs of clients). This change will not much affect efficiency and effectiveness of decision making process. Indeed it may lower efficieny and effectiveness (line AMIS-2). It is therefore not a valuable change for such a large investment in resources to manipulate an AMIS. As a result we can say that an AMIS which is not functioning well may cause negative impact by diverting vital resources of time and money and causing duplication of work without having an impact on decision making.

AMIS-3 : (well designed system) it is an automated MIS that uses computers for storing and quick data retrieval. It produces information that adds relevant knowledge, reduces uncertainty and supports the decision-making process.

In addition to providing the timely, clear and accurate information, it empowers managers by acting as a decision making tool.

On the graph (figure 2) line AMIS-3, on the same point of information attributes (X2) the result will be point C. The difference between points B and C measures improved positive impact on efficiency and effectiveness of decision making process that corresponed to the effort or changes in the X axis from X1 to X2. Note that for the same amount of this effort, the Manual System Decision Making curve (Manual MIS-1) changes only slightly in comparison (from A to B) and/or requires further investment in effort to reach point C (if reachable at all due to limitations in manual processing).

This conceptual model is not desgined to be understood empirically, but rather to illustrate that a well designed AMIS that meet the necessary prerequisites outlined in this study will assist decision makers.

5.3 Recommendations:

This has been the first such study conducted in hospitals in West Bank. It can be used as a base for further investigations. Moreover, it can be helpful for decision makers working at hospitals. For this, the following recommendations should be taken in future researches:

1. The research methodology used (Focus Group and Indepth Interviews) is broad and general indicator, but they are good basis for further more statistical investigations utilizing appropriate indicators.
2. A similar study with a larger number of participants (senior level managers) can also be conducted to further examine the subject..

In conclusion, Palestinian hospitals can benefit from investigations and research ot assess AMIS and its impact on decisions taken. This type of research may benefit hospital managerial decision outcomes.

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Appendixes

Appendix I : Focus group discussion transcripts

Note taker: Miss. Maysoon Abu Shanab.

Facilitator: Mr. Mohammad Salameh.

All session notes were taken in Arabic

1. How was the readiness of the hospital during the last emergencies that Tulkarm lived?

- ☒ Shortage in equipment and drugs.
- ☒ Difficulties in movement for employees and patients.
- ☒ You can't reach a specialized hospital in another city or country.
- ☒ Creation of emergency plans.
- ☒ Difficulties in implementation because of shortage in resources.
- ☒ No enough budgets.
- ☒ Problems in communication between health centers.
- ☒ Lack of information about others.
- ☒ Public sector, financial problems.
- ☒ There are 3 levels of readiness; we usually choose the suitable level.
- ☒ Local TV stations work as good communication tools.
- ☒ Difficulties to get to your work.
- ☒ Good management is as important as good medical services.
- ☒ Travelling was sometimes impossible even in ambulances.
- ☒ Uncertain information from local society affected our response.
- ☒ Working in the private sector has a negative impact on public sector, as our doctors don't work with the same standards in health sector.

2. Was it possible to improve the level of readiness under such conditions?

- ☒ Increase the amount of stock.
- ☒ Have enough information about available resources; public and private centers.
- ☒ Good communication tools between the staff.

- ☒ Solve the problems of far living employees; by housing them in the nearby.
- ☒ The centralization in resources especially for drugs, resulted some problems.
- ☒ Dividing the area into two parts; north and south.
- ☒ I expect giving more importance to the technical preparations.
- ☒ Increase no of well-equipment ambulances.
- ☒ The staff is not enough, doctors and technicians.
- ☒ Shortage of specialized doctors.
- ☒ Private health centers have more resources to provide good services and up-to-date equipment.
- ☒ Increase health awareness of the public dealing with the victims of the emergencies.
- ☒ Patients have to be transferred from one center to another to get needed medical care.
- ☒ Without enough resources nothing could be done.
- ☒ MoH can play a more efficient role than it does now.

3. In managing hospitals under crisis conditions, what information you were in need and how did you feel that they might affect your decisions?

- ☒ What's the difference between data and information?.
- ☒ Lack of information about available professional in the city (phones, addreses ....)
- ☒ In private sector, no information was available about people with rare blood groups.
- ☒ Information about available resources, in other centers at specific time was absent.
- ☒ If I know their stock, I can make use of it.
- ☒ Details about suppliers.
- ☒ No details about current balances of the stock in central stores.
- ☒ Decision can be taken depending on processed data.
- ☒ Having information without authority.
- ☒ Crossing data between different health centers is more than important.
- ☒ Can you clarify what do you mean with "right decision"?

4. What data is available now about the hospital (medical and food stock, staff.....)?

- ☒ Yes, enough available information.
- ☒ Data about drug stock.
- ☒ Blood bank (governmental.
- ☒ Staff
- ☒ We have scattered data bases that can inform us with most of our needs.
- ☒ Financial details (private)
- ☒ Fuel stock and its supplier
- ☒ Food stock and its supplier
- ☒ Inpatient, outpatient, bed capacity
- ☒ Emergency plan for staff.

5. In what form are they available (manual, automated), can they be retrieved easily?

- ☒ In both manually and computerized
- ☒ According to the department; " PRCS manually or in minds"
- ☒ Financial in Zakat is computerized
- ☒ Blood bank at governmental hospital
- ☒ Personnel
- ☒ Pharmacy
- ☒ Can be reached through the responsible employee.
- ☒ Computerized systems can be modified by the staff.
- ☒ We can ask for new reports.
- ☒ There are different backups in different places.
- ☒ It is better in accuracy and speed to have computerized systems.
- ☒ Scattered subsystems
- ☒ MoH do some mistakes in dealing with funded projects.
- ☒ I like to hear from the chief of the department, not to read reports as I like to have the result.
- ☒ Crisis makes each one of the employees a decision-maker.

6. Are they analyzed in a good way that helps in taking decisions?

- ☒ Managers analyze output reports.
- ☒ We receive data, not information.
- ☒ Directors of some departments analyze data and inform managers with information.
- ☒ Increase/decrease the stock of some drugs according to information that seasons, occasions.....
- ☒ We need to analyze the data by an information specialist.

7. In your opinion, how can MIS/AMIS be employed to achieve the goal of having information taking the right decisions?

- ☒ Daily update for manual/computerized system.
- ☒ Once the suitable information saved a person's life.
- ☒ Publish information to have well cross between different centers.
- ☒ Implementing computers at hospitals is not easy while it must be realized.
- ☒ Continuous follow up for the data, to active accuracy.
- ☒ We all work with systems, the question is "are we satisfied with the result of these systems?"
- ☒ There is no integration between the subsystems with each other, so we prefer to have comprehensive system for all departments in our hospital.
- ☒ What about the cost of implementing computers? Who will cover this as we are in crisis?
- ☒ Monitoring of staff working with systems (data entry)
- ☒ Having clear procedures to get the needed data.
- ☒ Centralization of data for all health centers.
- ☒ Following the hierarichal structure helps in taking efficient decisions.
- ☒ We don't pay much attention to computerization.

Appendix II: In Depth Interviews discussion transcripts

1. How was the readiness of the hospital during the last emergencies that Nablus lived?

- ☒ Shortage in equipment and drugs.
- ☒ To describe the last period, you have to deal with each attack from the Israel army separately.
- ☒ It is so difficult to move from home to work.
- ☒ As a result of curfew and closures we had to house most of our employees.
- ☒ Nearly, we were able to work under the shortage of stock.
- ☒ Some times the staff has to work different continuous shifts to cover the absence of their colleagues.
- ☒ Being in the north of W.B. is a problem, as most of the suppliers are from the south.
- ☒ There is no CT scan machine in Tulkrarm, so we have to accept all the patients in Rafidia hospital.
- ☒ You can not ask for online service from any of the agent companies to maintain our machines, because of curfews and closures.
- ☒ Housing the employees cost us very much.
- ☒ We have a limited capacity in our stores.
- ☒ Housed employees consume the most of our food stock.
- ☒ Oxygen is one of our most important problems.
- ☒ There is a shortage in professional doctors.
- ☒ We deal with the problem at its time.
- ☒ Fetching the employees to their hospitals is one of the most important problems.
- ☒ We do our best to make use of the available resources.
- ☒ Our central stores are in Ramallah, in closure we ask for help from Red Cross and UNRWA.
- ☒ We live in continuous emergencies, so we have to be ready for the worst.

- ☒ Local society played an effective role facing shortage especially in food.
- ☒ We got a good experience from the previous Intifada working under crisis.
- ☒ Food stock is under control, as it can be supplied from the local society.
- ☒ Shortage in financial resources results negative impact on other resources.

2. Was it possible to improve the level of readiness under such conditions?

- ☒ It would work better if the employees were from the same area to avoid travelling.
- ☒ Increase the level of strategic stock.
- ☒ We arranged to have one specialist doctor in the Emergency Committee.
- ☒ Develop the equipment and machines in hospitals.
- ☒ Decentralization of the central stores.
- ☒ Find local agents for medical equipment.
- ☒ MoH has to solve the problem of shortage in professional medical doctors.
- ☒ Establish a big general hospital in high-density areas while small hospitals in other areas will work well.
- ☒ The insurance of "Al-Aqsa Intifada" has a negative impact on the work of private hospitals; it was a big mistake from the MoH.
- ☒ There is a shortage in professional specialist doctors working in the public sector.

3. In managing hospitals under crisis conditions, what information you were in need and how did you feel that they might affect your decisions?

- ☒ First, we have to understand the difference between data and information.
- ☒ In Nablus, the local society formed an "Emergency Committee" which established a manual information center.

- ☒ PRCS teams plays an active role in choosing the suitable hospital for each case.
- ☒ We do not depend much on the information as we are usually in emergency.
- ☒ Information from the Blood Bank is so essential.
- ☒ There is a real need for a Central Blood Bank to inform us with all reports we need about blood.
- ☒ To have information you need is not difficult, but to take the action is sometimes the problem.
- ☒ You have to work by yourself to be sure that the available information is right and accurate.
- ☒ Information about available stock in other centers is important.
- ☒ Sometimes, we know what others have in an informal way by friends.
- ☒ We don't have any information about donations and donors; we just play the role of receiver.
- ☒ Donors don't depend on our real needs, no information about our needs.
- ☒ There is no continuous communication between donors and receivers.
- ☒ Sometimes we don't have time to ask for data, as saving life is our main goal.
- ☒ We sometimes receive expired medicines.

4. What data is available now about the hospital (medical and food stock, staff...)?

- ☒ You can have any information you need.
- ☒ Daily and weekly reports are available.
- ☒ Pharmacy and drug stocks are well managed.
- ☒ Every day, I ask "What is the situation in the pharmacy, oxygen and nitrous stock and other essential?".
- ☒ Staff addresses is clear with their phones,
- ☒ In private, financial systems are clear and well controlled

5. In what form are they available (manual, automated), can they be retrieved easily?

- ☒ Some subsystems in our hospitals are manual and others are computerized.
- ☒ We don't have complete databases, but we can say that we store our data on computers.
- ☒ Most of our computers are used for secretarial works.
- ☒ I do my best to computerize most of all the departments in the hospital.
- ☒ Computerized reports are easier and faster.
- ☒ The well-designed system will work well whether manual or automated.
- ☒ We hope to computerize the medical records.
- ☒ Financial departments are well computerized.
- ☒ You can have the information you need from the related department.
- ☒ Data is available for all.
- ☒ To have a specific data you need to know where to go.
- ☒ Personnel departments are computerized.
- ☒ Excel sheet is used to save and restore data.
- ☒ I hope I can use the computer to do my work.

6. Are they analyzed in a good way that helps in taking decisions?

- ☒ As an administrative manager, I have to work with data in reports by my self.
- ☒ Daily reports give me the chance to think of "cost opportunity"
- ☒ Each department is responsible for collecting and analyzing its data.
- ☒ Yes, an efficient decision really results from accurate right data.
- ☒ I have no time to analyze, I just hear from the director of the departments, and than take the decision.
- ☒ If I have a specialist whose job is to analyze collected data, things in my hospital will be much more better.
- ☒ Data represents the core of our daily life.
- ☒ How can you work without information, manual or automated?
- ☒ Sometimes, I have to find an informal way to get the data I need.
- ☒ You can't take the right decision unless you work with the right accurate data.

7. In your opinion, how can MIS/AMIS be employed to achieve the goal of having information taking the right decisions?

- ☒ Working in any organization means having a system with good output information.
- ☒ What kind of information you mean to get from AMIS?
- ☒ You have to say accurate and right information that is the mile stone in decision making process.
- ☒ AMIS is the system we can depend on in emergency.
- ☒ We have to spend more efforts to enlarge the use of computers in our hospitals.
- ☒ I don't say I have taken the right decision until I see the results, even if I depend on trusted data.
- ☒ In my opinion, a good information system is the one which we need. It doesn't make difference if it is computerized or manual.
- ☒ Every employee is a decision-maker in his position especially in emergency.
- ☒ As a medical director, I feel that I am responsible for the life of my patient. For this I care much for the feedback from my staff.
- ☒ Feedback is a vital source for information.
- ☒ Also it is cost to move from manual system to automated one, I do my best to achieve this and develop my hospital.
- ☒ Easy, clear, accurate and right information is the result of well-designed AMIS.
- ☒ Even if some of my staff doesn't like to work with computers, I have to force them towards this.
- ☒ User friendly systems are the one we need and the one we can work with.

6.3 Appendix III: Geographic Map of West Bank