



## The Use of Medical Informatics as a Management Tool for Community Health Services during the 2006 Israel-Lebanon War

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**Key words:** war, medical informatics, management tool, health management organization

### Abstract

**Background:** During war the health management organizations have tremendous difficulty monitoring members' needs according to geographic spread.

**Objectives:** To describe how an HMO used its health information technology in a way that enables its management to receive updated online information on the needs of the insured, according to their distribution throughout the country during the time of the war in Lebanon in July-August 2006.

**Methods:** Data were derived from the computerized medical records of Maccabi Healthcare Services – the second largest HMO in Israel, providing care to more than 1.7 million members nationwide. Data on healthcare utilization by northern members were compared to the geographic distribution of clinics.

**Results:** The war was characterized by the massive evacuation of citizens southwards. During this period there was an abrupt decline in the utilization of medical services by northern members in the northern region. This decline returned to normal 10 days after the ceasefire. A reciprocal increase was noted in the use of health services by citizens from the north in other regions. This increase returned to normal after the war. No such pattern was noticed during the same period in 2005.

**Conclusions:** Real-time surveillance of trends in consumption of health services by citizens in times of regular daily living as well as during emergencies and wars is a vital management tool for medical directors responsible for providing health services.

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One of the most crucial factors in the success of large organizations is their ability to control and manage medical personnel and services points [1]. Institutions build infrastructures in order to implement these tasks. Top and intermediate managers, bilateral communication between managers and providers, and medical informatics are essential to build an online picture to enable managers to optimally meet consumer needs [2]. Health services in Israel are provided through the National Insurance Law by four non-profit health management organizations. The Health Services Basket includes a variety of health services for

HMO = health management organization

the community, including the broad geographic spread from the north to the south of Israel. HMOs provide primary and secondary care in the community clinics, primary and secondary care nursing, as well as pharmaceutical laboratory, imaging, paramedic and administrative services.

Some of these health funds provide their services from in-house resources, while others are based on outsourcing including independent physicians in their own private clinics.

In each structure of the services one of the key elements of success is the proportionate adaptation of the number of medical staff per patient in each geographic area. Imbalance of any kind infringes on the ability to provide the service and reduces the satisfaction of the members.

Times of emergency of any sort are an extreme test of the ability of the organization to successfully manage and perform its tasks. War is the most extreme state of emergency [3,4]. In organizations built mainly on outsourcing, it is difficult to manage the providers since they are independent, so the organization has to create a real and online picture of the activities and the events. We describe here how Maccabi Healthcare Services, the second largest HMO in Israel, used its health information technology in a way that enabled its management to receive updated online information on the needs of its members, in accordance with their dispersion throughout the country at the time of the war in Lebanon in July-August 2006.

### Materials and Methods

Maccabi insures 1.7 million people in Israel (24% of the population). Services are provided throughout the country in six major regions: the northern region (from Metulla to Zichron Yaakov) consisting of 321,000 members [Figure 1]; the Sharon region with 326,000 members; the central region with 384,000; the Shfela (coastal) region with 379,000; Jerusalem with 144,000; and the southern region (Negev) with 160,000 members.

The health services are provided to members mostly by outsourcing and partially through in-house providers. The major part of the physician service (90%) is provided through

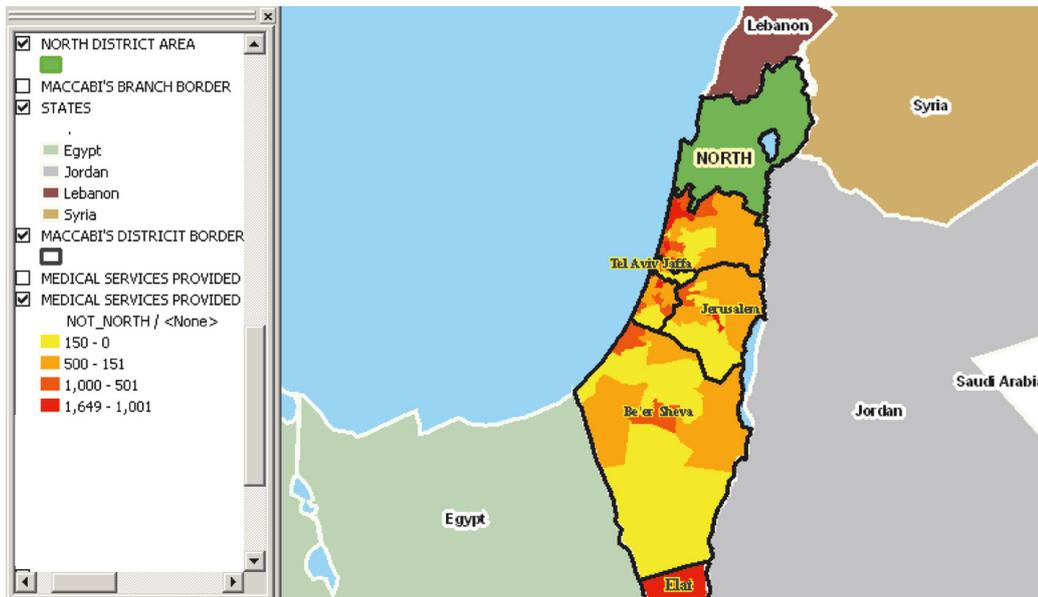


Figure 1. Geographic distribution of health services provided to northern members nationwide

**Computerized data records**  
 Maccabi has developed and implemented a computerized information system fully employed in all levels of the organization. A nationwide network of over 3500 independent physicians and 150 branches uses its medical practice computer system. Computerized patient consultation and prescription records are downloaded daily to a central computer. In addition, the database is automatically updated with every hospitalization, specialist visit, not over-the-counter drug purchase, laboratory test, imaging

outsourcing throughout the country via 3500 private clinics and 150 medical centers. Most of the administration services, nursing and laboratories are provided in these medical centers. The pharmaceutical services are provided in private pharmacies (50%) and by in-house pharmacies close to the medical services (50%).

It is important to note that every Maccabi member is entitled to receive the health services in any area during regular times according to his/her preference.

test, nursing visit, physiotherapy treatment and other treatment [5,6].

These data are aggregated to the level of the individual member using the member's unique identity number. Demographic data (age, gender, address, etc.) were obtained from the Maccabi administrative and clinical database [7]. Data extracted from the Maccabi database included physician visits, nursing visits and pharmaceutical purchasing according to the regional profile, from 9 July to 31 August 2006. This is a period characterized by

**The 2006 Lebanese War**

The 2006 Lebanese War began on 12 July and ended on the morning (8 a.m.) of 14 August 2006. More than 3900 rockets and mortars were launched into the northern part of Israel, which by chance closely overlapped the northern region of Maccabi. During those 33 days of war 5673 civilians and soldiers were wounded: 107 were severely injured, 183 moderately injured, 2442 had mild injuries, 2782 had mental trauma, and 159 died. Most of the casualties were civilians (reported by the Ministry of Health to the Knesset on 22 August 2006).

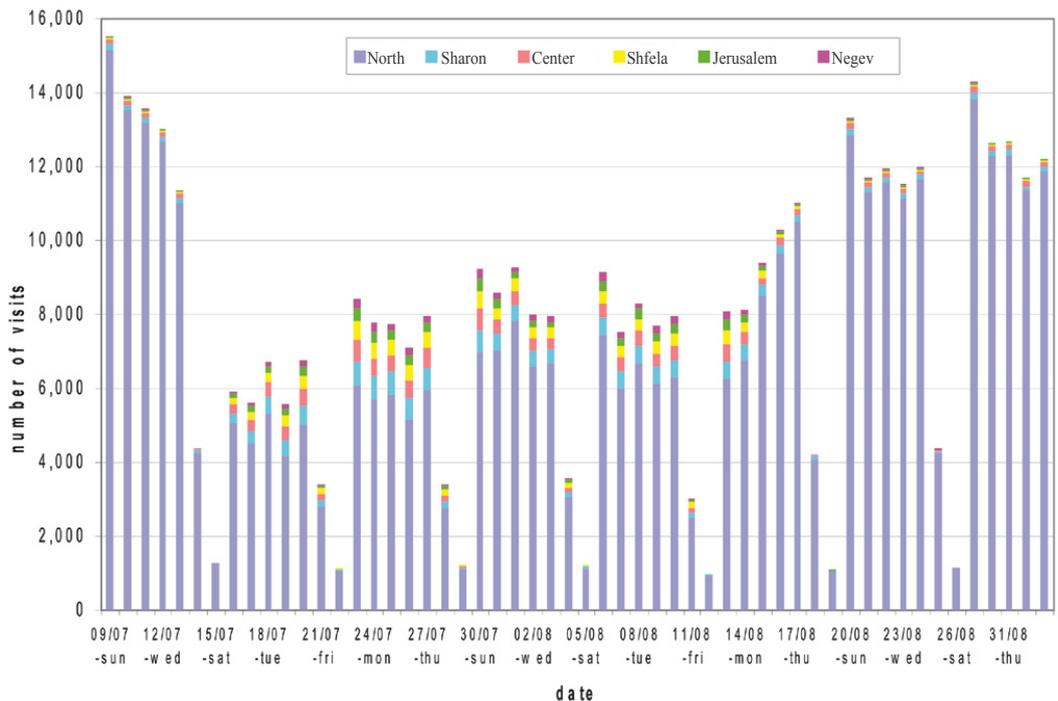
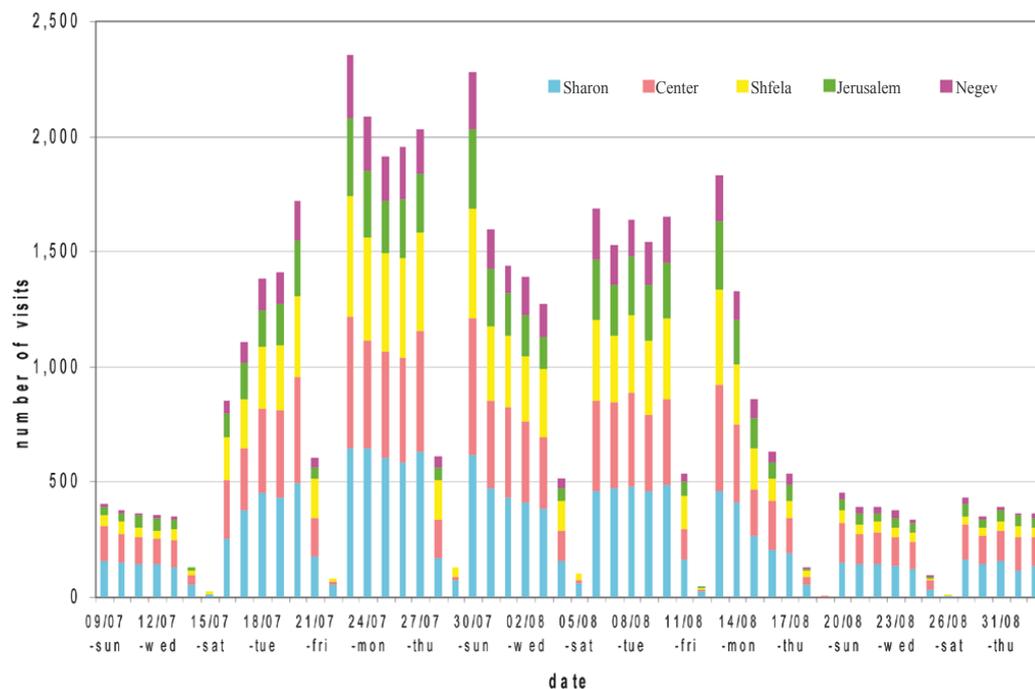


Figure 2. Medical services provided nationwide to northern region members during the period 9 July to 31 August 2006



**Figure 3.** Medical services provided in other regions to northern region members during the period 9 July to 31 August 2006

the summer and school vacations in which some of the citizens regularly reside away from home. In order to eliminate the affect of seasonal morbidity, we compared the results with the parallel period in 2005.

## Results

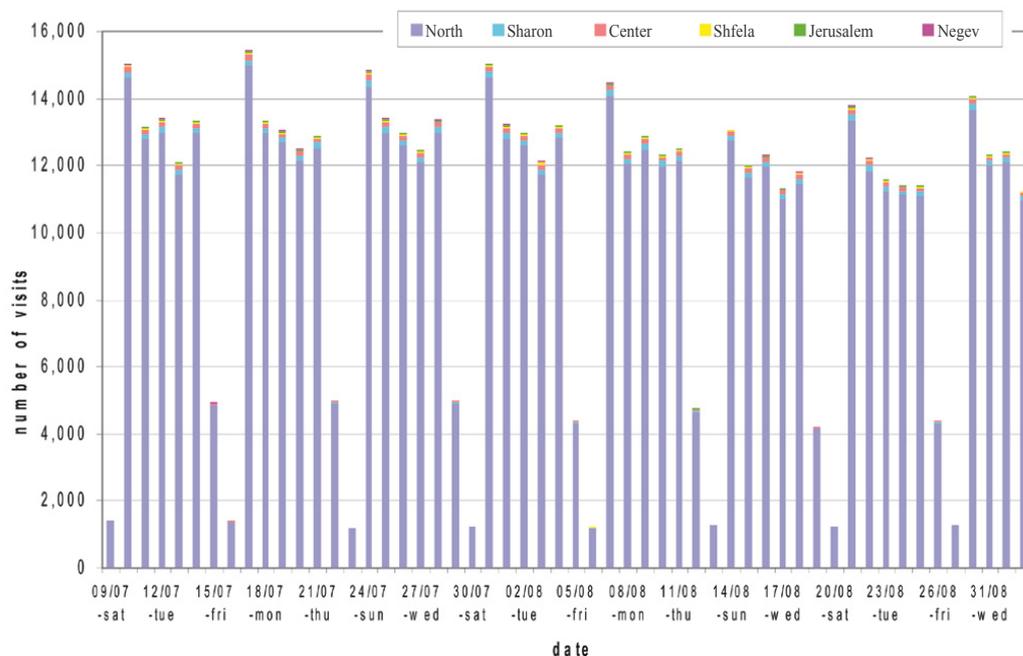
Figure 2 presents the number of visits to any medical service of Maccabi. There was an abrupt decline of 45% in the number of patient/medical service interactions in the northern population that received its health services in the northern region. This decline persisted throughout the period of the war. Upon termination of wartime bombardment, we see a gradual increase in health service consumption by northern members returning to normal activities 10 days after the ceasefire. Parallel to this decline, we see in Figure 3 the increase in health services utilization by northern civilians in other regions since some

of the population was evacuated southwards. The increase began on 16 July, 4 days after the war began, and stabilized on 20 July. After the ceasefire we see a gradual decrease in consumption of medical services by the northern citizens in other regions. A comparison of these activities to the comparable period last year [Figure 4] showed that most of the health services consumption by the population of the northern region was in the medical centers in the north and only a small number of patients used health services outside their natural residential area. The geographic distribution of health services provided to the northern

population in other cities and towns all over the country is shown in Figure 1.

## Discussion

The ability to appropriately coordinate and control health services resources and distribution is a crucial prerequisite to maximize



**Figure 4.** Medical services provided nationwide to northern region members during the period 9 July to 31 August 2005

the efficiency in providing medical treatment. The medical directorate must be aware and knowledgeable of both the needs and resources available [8]. This includes the number of medical services and staff, including physicians, nurses and paramedical staff, that are available in a defined geographic area. This is important in order to eliminate undesirable situations of possible insufficiency in medical services that may lead to inefficient provision of health services, extended waiting times, and dissatisfaction of members. On the other hand, surplus of medical staff and administration could lead to waste of resources. In order to meet such a challenge every health organization should operate a constant and online process of control and feedback, adjusting the number of service locations and the number of attending medical staff to the number of patients. The health funds have developed mechanisms that supply continuous information on various parameters, such as the number of patient-HMO interactions, waiting lists, patient complaints, etc. As a matter of routine, the HMOs also gather information on population growth, the establishment of new residential areas, etc., in an effort to meet the ever-changing needs of their members, adjusting and coordinating the number of medical centers, clinics, physicians, nurses and pharmacies to the changing number of beneficiaries. These mechanisms are particularly important during emergencies.

War is the extreme point of national emergency. This is a time when the capabilities of management and control are put to the test to accurately direct medical services. In the 2006 Lebanon war we witnessed a situation never before confronted in our country – the relentless bombardment of massive civilian populations in the north and the temporary migration of large populations from the north of the country to other regions for a long period. It is important to emphasize that there is no current information available from government or municipal sources on this population shift, no recording of citizens' movements and relocations – information that is critical for regulating services. If, for instance, 50% of our citizens left the north and migrated to the central regions of the country, leaving all the medical staff at their original location, without reinforcing and redirecting our health service providers (clinics, hospitals, etc.), the result would be a surplus of services in the north and a shortage in other areas, the south and central areas in particular. This would create problems in the provision of health services, with the imbalance leading to frustration in many areas.

Since the health funds did not receive real-time reports on population movements during the war, the development of tools to supply real-time information on the consumption of health services in different areas is an essential tool to administer the distribution of resources. The computerized informatics system at Maccabi was developed with tracking capabilities presenting real-time information on the interaction between health funds and their beneficiaries at all levels – administrative, economic and medical. Furthermore, different behavioral patterns can be portrayed on the basis of the availability of these online data, for instance the types of diagnoses and diseases prevalent among Maccabi members, pharmaceutical

prescription patterns [9], the ability to create different disease registries, etc. [10].

During this war Maccabi's computer system supplied new utilities as dictated by necessity, providing feedback to management on the daily utilization of health services by residents originally from the north. Some of these northern members continued to receive health assistance in the north while others received services outside of their residential area in other parts of the country. The computerized system enabled pinpointing geographic resolutions to specific cities, towns and even roads [Figure 1] so that health services could be balanced accordingly. With the aid of this information on the consumption of health services by the population from the north, including population movements, information could then be passed on to regional management throughout the country, highlighting the need to reinforce available staff and increase the level of preparedness of health service providers to help cope with the temporary population influx at their clinics.

During the war physicians in the central and southern areas of Israel were called upon by Maccabi's regional headquarters to prepare for the new alignment. Since, according to Maccabi regulations, each person insured by Maccabi is entitled to receive treatment anywhere in the county without the need for any pre-authorization, it was unnecessary to create new conditions or new bureaucratic regulations to enable the provision of health services.

As can be noted from the results according to data gathered, Maccabi was undoubtedly highly appropriately aligned throughout the county to match the changing health service needs created by the war status. Figure 2 demonstrates that immediately after the war erupted (13–16 July 2006) there was a drop in the consumption of health services by residents in the north without a comparable rise in the use of services by northern residents in other areas. These results match the period of the outbreak of the war. Delays in receipt of medical services that are not considered to be essential were noted. This delay can be attributed to uncertainty of the duration of the war. At the outset of the war, migration to the central areas of the country was negligible or on a small scale; there was no reciprocal rise in receipt of health services by northern members in either the central or southern regions of Israel. During this initial period of the war accessibility to health services was relatively low (due to the danger of continual bombardment). As the war continued, the migration of residents southwards increased. This led to a state of stabilization in health service consumption in the north and a gradual rise in consumption of such services by northern residents in other areas. The distribution of healthcare service utilization in other areas was similar, reflecting the dispersal of northern residents in other areas. It is interesting to note that there was a relatively large increase in the utilization of health services in Eilat – also corresponding to common knowledge available from non-medical sources.

Yet the question arises: perhaps this is a behavioral process correlating to the regular summer vacation period during which large numbers of our citizens are on vacation for a few days away from home. Figure 4 depicting a parallel period in 2005 shows

that there was not a similar trend during the preceding year and that the consumption of health services by residents of the north in other areas was negligible.

When the war ended with enactment of the ceasefire, from 14 August 2006 a significant change in trends was apparent. With the gradual return of the northern residents to their homes, the use of health services in the south and in central Israel declined and health service utilization in the north returned to familiar norms.

## Conclusion

The informatics system in Maccabi Health Services enabled the enhanced utilization of a broad spectrum of data gathered online in real time. The surveillance of trends in consumption of health services by citizens in times of regular daily living as well as during emergencies and wars is a vital management tool for medical directors responsible for providing health services.

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