Continuous Quality Improvement through use of Perinatal Clinical Record and Agustina Database

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Abstract

This paper reviews the development of the field of medical informatics in Latin America. It also describes the results of a computer-based data management system, named AGUSTINA, which is comprised of maternal and infant data on 7570 deliveries that occurred between June, 1990 and December, 1996 in a hospital in the surroundings of Buenos Aires, Argentina. These data were fundamental for the instrumentation of preventive community-oriented activities in the area. Finally, this paper describes recommendations for future actions in the area of medical informatics in Latin America.

Abbreviations: PCR: perinatal clinical record; CLAP, Centro Latino-Americano de Perinato-logia; WHO, World Health Organization; PAHO, Pan-American Health Organization; E-Mail, electronic mail; WWW, world wide web; FTP, file transfer protocol

Keywords

Quality Indicators; Perinatal Mortality, Cesarean Section

Introduction

Medical informatics is a field that focuses on the creative use of computers in support of patient care, medical education, and biomedical research [1]. Its origins date back to the early 1970s, when the biomedical and computer sciences reached a common path and realized that they could complement each other. The development of medical informatics in Latin America, however, is more recent and irregular across countries. Mexico, Brazil, Argentina, and Cuba took the lead in this region, between 1975 and 1980, by developing the first networks that allowed some of their health care workers to access biomedical information [2].

The concept of networking is such that individuals "talk" to one another via computers and information is gained and sent via computer technology. Electronic mail (e-mail) is the primary basis for information interchange. Thus, within a hospital, or among different institutions, one can send notes to individuals electronically by typing a message on a computer and the message is then delivered almost instantaneously to the other person. Messages can be "broadcasted" to several people; e.g., the cardiology department in a hospital or a group of researchers in hospitals all over the world. Bulletin boards can be set up where one logs into the computer and can find out the events, which are occurring within that hospital or group of researchers today. Thus, within a hospital or a field of common interest, the e-mail system markedly improves the speed of information transfer.

With the support of both the World Health Organization (WHO) and the Pan American Health Organization (PAHO), medical personnel of several Latin American countries gathered at national and international meetings, where they exchanged important information and created new networks. Often, they would go back to their countries to find that, to their despair, no government collaboration could be obtained. The results of some of these efforts are summarized in a document entitled "Health, Information Society and Developing Countries" [3].

Prohibitive telecommunications costs impose a major barrier to the widespread access to on-line services. The communications are largely monopolized by international consortiums in most Latin American countries. Thus, it is not unusual to witness under-utilized software and hardware. Non-profit organizations, state, and academic institutions in the health field struggle to survive in economical systems that are rapidly turning to free-market [4].

Computer-based information systems (or informatics) and computer-based networking and communications (or telematics) reached the health sector in Argentina in the last ten years. With the collaboration of PAHO, a few groups have been actively seeking, providing and using telematics support to health care research and, to a lesser extent, services. The main purpose of this paper is to present the results of the data obtained using a computer system installed in the Department of Maternity in a hospital located in the surroundings of Buenos Aires, Argentina.

Materials and Methods

The Hospital

The Hospital Zonal General de Agudos "Manuel Belgrano" is located in the city of San Martín, a suburb of the province of Buenos Aires, Argentina. Its programmatic area covers a population of 120,000 inhabitants, embracing large areas of extreme

Table 1 - Perinatal information gathered using the Perinatal Clinical Records (PCR) and AGUSTINA in Hospital Manuel Belgrano in Buenos Aires, Argentina, between June, 1990 and December, 1996 (7,570 registered births)

year	Caesarian incisions (%)	Death during delivery (%)	Low birth-weight [1] (%)	Preterm deliveries [2] (%)	Late fetal death [3] (%)	Early neonatal death [4] (%)
1990	23.06	0.21	12.90	15.90	8.5	34.5
1991	23.68	1.53	9.20	11.20	13.5	25.3
1992	26.23	0.19	9.30	10.60	11.8	23.9
1993	28.52	0.18	10.00	12.40	12.8	23.2
1994	26.46	0.00	9.60	10.50	5.2	15.8
1995	22.79	0.00	7.64	9.00	6.7	11.9
1996	23.00	0.00	8.10	10.47	8.6	14.5

[1] low birthweight: <2500g; [2] births before 37 weeks gestation; [3] death between 28 weeks of gestation and expected delivery date; [4] death between birth and the 7th day of life

poverty. It has 176 beds, of which 120 are for adults and 56 for children, plus 24 additional maternity beds and 12 others for intensive and intermediate care. This hospital contains 265 medical workers (45 % of them nurses) and 81 administrative and maintenance personnel.

Additionally, 64 medical residents and 9 post-doctoral fellows are training in this hospital.

Data collection, software and hardware

Beginning in June, 1990, the Department of Maternity has collected data using the Perinatal Clinical Record (PCR), developed by the Latin American Perinatology Center (CLAP), in Montevideo, Uruguay, in 1984 [5-8]. The PCR records maternal demographic and health information, data on controls and vaccinations during pregnancy, and details on delivery and health status of the newborn. The PCR is administered in a step-wise fashion [9] by trained health care workers [10]. The information is then stored on a PC using AGUSTINA (v5.0/1) [11], a data base software designed to store the data obtained using PCR. AGUSTINA has been linked to EpiInfo [12] for data analysis. Fifty-five personal computers were installed in 33 sectors of the hospital, connected to each other by a local area network (LAN).

Results

Between June 1990 and December 1996, there were 7570 registered deliveries (mean: 95 deliveries per month). Ten percent of the women giving birth (n=758) were 17 years of age or younger and 59 percent (n=4501) were out-wedlock, either living with their partners (n=2730) or without them (n=1771). Mothers who reported no prenatal visits had the highest perinatal mortality, 65.5/1,000 liveborns while mothers with 9 or more prenatal controls had no perinatal deaths. Additionally, mothers who were 35 years-of-age or older had a three-fold increase in perinatal mortality compared to those 18 years-of-age or younger (62.2/1,000 liveborns). Table 1 summarizes perinatal fin-dings obtained using the data base system.

Subrecording was evaluated by cross-checking with other records systems used in the hospital. Additionally, it was possible to determine that maternal height and weight and prenatal visits were the data most likely to be unevenly recorded. Maternal height was missing between 14.32 to 47.44 percent of the times, maternal weight was unrecorded 8.50-34.06 percent of the times, and number of prenatal visits was absent 0.63-33.28 percent of the times, depending on the year. Cesarean incisions, Death during delivery, Low birthweight, Preterm deliveries, Late fetal death, and Early neonatal death has zero percent of sub recording.

Discussion

The interaction and the increased performance of computer-based systems have allowed health management officials and the medical community to achieve benefits that may eventually translate into positive actions for the community they serve. By using the AGUSTINA peri-natal system, the Department of Maternity has collected the records corresponding to all deliveries performed in the Hospital Manuel Belgrano between June, 1990 and December, 1996, and identified the main needs of its patients. Additionally, the hospital has standardized its recording system and opened the possibility for data exchange with other institutions in Argentina and in Latin America [13].

Data showed that this hospital is covering an extensive programmatic area, comprised mainly of low income and underemployed individuals [10]. The proportion of young and out-wedlock mothers is remarkably high. Thus, a Pediatric Gynecology Clinic was implemented in Colombo-ration with the Family Planning Clinic, and an intensive outreach program in local schools and health centers was organized and is currently being conducted.

Since the data suggested that mothers who received no prenatal care have the highest perinatal mortality, all hospital primary care physicians were encouraged to identify and educate pregnant women on preventive measures. In addition, perinatal mortality rates showed an increase in again mothers; therefore, a specialized clinic for older mothers was created and imple-

mented. As a consequence of these preventive activities, and supported by other social measures taken by the local authorities, fetal, maternal, and early neonatal death rates have been steadily decreasing in the last years.

Conclusion

In recent years, it has been recognized world wide that poor health of a country affects economies. However, maintaining the health of a community is expensive; the health care expenditure in Argentina represents 8 % of the Gross National Product, which is over US $ 5 billion [4]. The concern produced by these expenditures impose a need for a better use of the existing resources and for the implementation of cost-effective programs in health care. Tools such as computer-based systems, therefore, will be more frequently available in Latin American hospitals and, consequently, previously unrecorded data will become readily accessible for planning and research.

The clinical side of medical inform-tics spans a broad spectrum, from basic research in how to model medical knowledge to the real-world problems of building a comprehensive computer-based patient record [1]. In Latin America, the challenge is to develop surveillance report systems to identify the needs and characteristics of the population being served by the various health care providers. AGUSTINA, as presented in this paper, was instituted in a local hospital immersed in a low-class area of the surroundings of the province of Buenos Aires. The availability of health information in this hospital allows the authorities and professionals to delineate the demographic and epidemiological characteristics of their patients and to conceive and implement specific measures of disease prevention and control.

Additionally, the installation of networking services, such as E-Mail, World Wide Web (WWW), and File Transfer Protocol (FTP), vigorously triggered the enthusiasm for more inter institutional collaborations.

Just as Homer Warner recommended at the American College of Medical Informatics (ACM) Distinguished Lecture, in 1988 [4], that medical informatics needs to become an established part of academia, we subscribe to the idea that medical informatics must be a part of all levels of health care. Therefore, hospitals must: 1) establish formal departments of medical informatics where there are now just foci of record-keeping; 2) encourage participation by health care workers from other departments on the assumption that they will get hooked once they experience the intellectual challenge of this discipline; 3) define training opportunities for health professionals and biomedical students to dedicate time to this field; and 4) establish relationships between industry, government, hospitals, and academic institutions that will lead to support and encouragement of research.

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