

## Civil Identification as a Unique Patient Identifier for Hospitals in Kuwait

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**Abstract: Background:** A unified patient identifier is an essential item in improving the quality of health care delivery. This is the trend and major progress has been achieved in many developed and developing countries. In Kuwait each hospital had its own identifier and linking the patient data is rather difficult. The Public Authority for Civil Identification (PACI) Civil Identification number (CID) is the most promising candidate and all the hospitals have been instructed and persuaded to include the CID in the discharge forms, this was stressed since 1995. **Objective:** The aim of the study is to find out the availability of the PACI ICD on the hospital discharge forms. **Methods:** The data-bases storing hospital discharge data for the government hospitals were reviewed for the presence of CID number during the period 1996-2005. A retrospective approach using the discharge summary data-base of the Statistical and Medical Record Department, MOH, Kuwait was used. **Results:** The rate of inclusion of the CID was very small in 1996 (13.6%.) increased in 1997 to 30.2% and, remained approximately at that level until 2002. Since 2003 the rates increased substantially and amounted in 2005 to 68.1%. Marked variability was seen between the hospitals, Sabah and Ibn Sina were the least reporting, being around 7%, Mobarak and the Chest Hospital scored above 66%. Getting a unified patient identifier is not a goal by itself; it is a step on the road to improve the health services. A major advantage, which was not addressed in this survey, is the inclusion of the CID in the Death certificate. This will provide the potential of linking the 2 data bases at a later stage. **Conclusions:** PACI CID includes the basic information that can make it an appropriate deterministic identifier. The response of the hospitals is favorable and the system should be field tested.

**Key words:** Kuwait, hospital ID, Civil CID, PACI

### INTRODUCTION

Patient identifiers are vital for day-to-day operation of health care facilities; this includes the delivery of care, administrative processes, support services, record keeping, information management, follow-up and preventive care.<sup>(1)</sup> Continuity of care depends on the availability of complete health care information on which current and future

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care can be planned and implemented. Patients, however, may have multiple records - even within a single institution - often unknown by the institution or the individual care provider.<sup>(2)</sup> Today, one of the main objectives of the interfaced health information systems or networks is to be able to gather the different parts of the medical record of a patient without any risk of mixing them with those of another patient. This objective could appear easy to reach, but only in theory because in practice many names are misspelled or erroneous. Great attention has to be paid to define the best identifiers that would be used to link medical records. A linkage using less informative identifiers could lead to linkage errors: it is essential to quantify the information associated to each identifier.<sup>(3)</sup>

There are 2 commonly used

computerized record linkage approaches: namely, the deterministic and probabilistic.<sup>(4)</sup> The deterministic approach generates links on the basis of a full agreement of a unique identifier or a set of common identifiers. This method minimizes the uncertainties in the match between 2 databases at the cost of lowering the linkage rate. The probabilistic record linkage approach links 2 data bases based on calculated statistical probability of a set of common identifiers. The probability is used to determine whether a pair of records approximately refers to the same individual. This would maximize linkage theoretically but may result in uncertainty for some potential links. In all cases, it seems necessary to improve the quality of identifier collection as it could greatly influence linkage results.<sup>(3)</sup> The

combinations of four personal identifiers

were compared, the combination of surname, sex, and date of birth had the highest linkage rate of 88.0% and 93.1% adding the first name to the combination increased correct linkage by less than 1%, but at the cost of lowering the linkage rate almost by 10%.<sup>(5)</sup>

Health services are undergoing a large paradigm change: a shift from institution-Centered to patient-centered care.<sup>(6)</sup> Enterprise Master Patient Indexes (EMPIs) can serve as critical tools in improving operations, protecting medical record integrity, and improving patient service.<sup>(7)</sup> Historically, the health information systems community has viewed linking personal records as an easy task. The oversimplified view that routine database manipulation can accurately identify multiple records for a single individual is erroneous, an assumption based on a misperception of

the quality of the underlying data.<sup>(8)</sup>

The ability to share patient specific health data is essential to provision of care and facilitate research in biomedical information: at the same time it is necessary to uphold patient privacy rights.<sup>(9)</sup> The Privacy Rule of the Health Insurance Probability and Accountability Act<sup>(10)</sup> in the USA requires data holders to render personal health information anonymous. Until recently anonymity was assumed when data was stripped of explicit identifying information: however, de-identification methods do not guarantee the anonymity of health data.<sup>(11)</sup> A novel computational protocol that enables data holders to work together to determine records that can be disclosed and satisfy a formal privacy protection was described.<sup>(9)</sup>

The current method of patient identification in Kuwait is based on the

use of a medical record number, issued and maintained by the provider organization. This number is based on an institutional Master Patient Index (MPI), and the numbering system is specific to the organization. Different providers use different numbering systems: the same patient often receives several Medical Record Numbers, unique to the organizations. These numbers provide identification within the individual organization. Collection of data on hospital discharged patients was started in Kuwait during 1985 and has been managed since by the Vital and Health Statistics Section. Information from the medical record is recorded on an abstract form by hospital medical record department staff.

Looking for a patient identifier for Kuwait was a lengthy endeavor that started since some years. Lengthy

discussions between MOH, Ministry of Planning (MOP), Ministry of Interior (MOI), and Public Authority for Civil Identification (PACI) were made. The civil identification (CID) organized and maintained by PACI was considered the most appropriate candidate on which to build the patient identification. It is an established system of high credibility and was running for years. The system is based on allocating a 12 digit unique number to each resident in Kuwait whether a national or a non-Kuwaiti. PACI CID numbering system is based on the date of birth in Century (1800-1899 =1), (1900 -1999 =2), and (2000-2099 =3). The year, month, and day of birth are given 2 digits each. A CID number is given another 4 digits and a check digit is added to the number. Additional information includes the nationality, sex, the Ministry of Interior residency number

for the non-nationals, home address, telephone number and blood group. For the nationals, the same number is kept until death and will never be used again. For non-nationals it is linked to the legal length of residency and suspended if the person would leave the country. On coming back the individual will get the same number. The civil ID is a recognized and accepted document, it should be updated regularly and there is a fine if it is not renewed in time. It is accepted as a document and is used in the banks, or in any encounter with any official organization. Great pressure was exerted by the Ministry of Health to include the civil ID in the discharge abstract sheets. This was started early in 1990s, however, the response was not good, a serious attempt was made in 1995 and it came with the MOH decision to collect certain nominal fees for certain

services from certain groups of the non-nationals.

**Objective:** The study was designed to determine the rate of inclusion of the CID in the discharge abstract forms of the government hospitals.

### **Methods**

The study employed a retrospective approach using the discharge summary data base of the Statistical and Medical Record department, MOH, Kuwait. Using a special algorithm all discharge abstracts from the government hospitals available at the data base were reviewed for the presence of Civil ID. There was no available recorded data regarding Civil ID before 1996 in the data base. The frequency of including the CID in the hospital discharge was sought through an extensive review of the hospital discharge abstracts in the 10 years 1996 to 2005.

## RESULTS

The availability of the CID according to the year for the government hospitals is summarized in **table 1**. The rate of inclusion was very low at the start of the period (13.6%) in 1996. A steady rise was seen all through the period. The proportion of the cases in which the CID was included in 1997 amounted to 30.2%. This was more than double that for 1996. The rate of reporting was similar starting in 1997; being slightly over 30% in all the years up to 2001. A distinct rise was seen in 2002 and the proportion of inclusion amounted to 42.8%, in 2003 the rate was 56.2%, it came up to 59.8% in 2004 and was somewhat higher in 2005 (68.1%). This was almost 5 times that for 1996, moreover, it represent two-thirds of the discharges.

The inclusion rate according to the hospital (**Table 2**) revealed much more variability. The availability of ID was very low for Sabah (7.1%) and Ibn Sina (7.5%): the first is a major general hospital and the second is a specialty hospital providing tertiary care for neurology, ophthalmology, neurosurgery and various other specialties. A much higher rate was reported for Mobarak (66.3%), Chest Hospital (66.2%) and the Maternity Hospital (74.2%). There was no consistent pattern for the general hospitals, Farwania had a rate of inclusion of 51.6%, this was higher than any other general hospital. The rates for Adan (22.9%) and Jahra (26.7%) were close, both were almost 50% of the rate of inclusion for Farwania.

Marked variability was also in the frequency of reported data for each hospital in the different years. The

results are shown in table 3. For Amiri Hospital, the proportions were less than 5% until 2001, the situation improved markedly after that. With Sabah Hospital, the proportion was less than 10% for the period 1996-2002, the overall reporting was low and was around 25% for 2005. Reporting was better for Farwania, Adan, the Infectious Diseases, and Chest Diseases hospitals. Data for the Allergy Hospital was only reported for 2005. The numbers reported for the Physical Medicine Hospital were quite small. No data was reported by Sabah Hospital in 1998, and Ibn Sina. The Chest Diseases Hospital failed to report in 2003.

## **DISCUSSION**

The increased availability of large scale health care data sets has improved the ability to assess the quality of health care delivery. Linking data sources

allows for richer and more revealing analysis of health care.<sup>(12,13)</sup> The use of PACI CID was based on the assumption that it would be a way out, the CID has the essential information thought to uniquely identify the subject. It is based on the inclusion of the birth date and the name, these are the major items recommended by many scholars in the field<sup>(6)</sup>. The usefulness of the CID needs to be verified for validity, and tested for accuracy. The system was initiated keeping in mind assigning a unique identifier for the people residing in Kuwait. Though the system did not have the hospitals or patient identity in mind at its conception, yet the availability would be very beneficial to the health services. Moreover, the use of the system should be considered very cost effective and the merits would be exploited and validated regularly in the years to come.

In recent years there has been a tremendous need among health care professionals to assess the effectiveness, efficiency, and appropriateness of the patient care services being provided through criteria-based outcome and program evaluation. Although the need for a tool which could evaluate the effectiveness of patient care is widely recognized, such an undertaking has been severely limited due to the lack of any automated means to collect and analyze patient data on a routine, continuous basis within a clinical setting.<sup>(14)</sup> Having a unified patient identification is only a step on the way, the system management should incorporate expert rules, dynamic data entry forms, quantitative models, and user-defined access control.

Mortality is an accepted measure of the quality of health care. Linkage of

hospitalization to death records is already performed usually on an as needed basis for research purposes. A significant weakness of many data linkage projects and subsequent use of such data is lack of knowledge regarding the magnitude of potential bias due to missing data.<sup>(13)</sup> It is worth noting that the CID in Kuwait is included in the death certificate. A study to assess the feasibility to combine the data from hospital discharge with the cause of death on the death certificate would be a step in the right direction.

The utilization of the CID would not be limited to hospital or other health care facility day-to-day operation, it would extend to the post hospital period. This includes provision of rehabilitation care. This is essential to prevention of disability, to promote patient autonomy and to avert the need for long-term



care<sup>(14)</sup>. The home care is also relevant in view of the trend that more people with terminal conditions prefer to stay at home.<sup>(15)</sup>

The developed system produces patient-specific reports with many dimensions. It provides the framework for continually capturing data at a practical, work-flow level. The incorporation of a dynamic patient database as the driving force of an integrated, rule-based administration, financial and patient data system will provide the tools for health care.<sup>(14)</sup> The system would check up on several other health components like vital statistics. Considerable discrepancy was found between death certificate and corresponding hospital discharge records. It was found that the underlying cause of death and the main condition differed at basic tabulation list level in

54% of the deaths. One-third of the differences could not be explained by ICD selection procedures.<sup>(16)</sup> Adding hospital discharge data changed the underlying cause in 11% of the deaths, and for some causes the effect was substantial.<sup>(16)</sup>

An integrated electronic patient record (EPR) was developed by the hospital authority in Hong Kong to meet the high tempo health care environment; the model was further developed to extend the longitudinal EPR to include fetal data as entered in the mother record, the intention was to build a true womb-to-tomb EPR for the patient.<sup>(17)</sup> Further development was described. This was to implement a web based electronic patient record system to allow integrated real time patient based information to be shared in clinics, private, and public hospitals; such

sharing aims at insuring that complete and accurate healthcare information is available to citizens' multiple points of care through system. The challenge is to share this information whilst ensuring privacy and security. It was also noted that Hong Kong already achieved its initial goal and pioneered building a territory wide Electronic Health Record (HER).<sup>(18)</sup>

PACI record number is a deterministic indicator. The next step is to apply a linkage algorithm. Several algorithms are available commercially and MOH would pick up the most appropriate. Testing the accuracy of each would be undertaken; sensitivity and positive predictive value<sup>(19)</sup> would be followed. Though it is a deterministic indicator, the accuracy may be compromised by wrong entry of data, thus the PACI number should be

supplemented with other demographic indicators.

#### **CONCLUSION AND RECOMMENDATIONS**

It could be concluded that there was marked improvement in the rate of inclusion of the civil ID in the study period; however several hospitals were still lagging behind. These include one general hospital (Sabah) and Ibn Sina a member of the specialty hospitals. The progress in inclusion is encouraging but the persistence is an item that would be followed-up. The progress in the inclusion after 1995 points to the decisive role of the hospital administration in enforcing the rules that have been issued by MOH. The clerks (Receptionist and Abstractors) should be educated about the importance of the inclusion of the CID, persuaded, and supervised. Every body has a CID and

the receptionist would ask for it and record in any encounter

Improvement in data quality should be an on-going issue for data collection. Training of the technicians feeding in the data should be considered the corner stone for any progress, they should be persuaded and close supervision should be provided. The importance of the data

should be explained to the medical record departments within the hospitals

and a sense of pride in the job impeded. The technicians should be aware of the importance of their work. The use of a unified CID is a tool of very high potential, the example of Hong Kong is eye opening, a similar system would be eventually sought.

**Table 1: Availability of CID according to the Year (1996-2005)**

<b>Year</b>	<b>No. of discharge abstracts</b>	<b>% Abstracts including CID</b>
1996	23960	13.6
1997	53000	30.2
1998	52948	33.7
1999	55592	31.8
2000	64513	35.4
2001	62877	34.1
2002	79868	42.8
2003	91318	56.2
2004	109131	59.8
2005	129033	68.1

**Table 2: Availability of CID on Patient discharge abstracts according to the Hospital type**

<b>Hospital</b>	<b>No. of discharge abstracts</b>	<b>% Abstracts including CID</b>
<b>General Hospitals:</b>		
Amiri	44156	34.6
Sabah	13291	7.1
Mobarak	126342	66.3
Farwania	67596	51.6
Adan	77821	22.9
Jahra	77821	26.7
<b>Specialized Hospitals:</b>		
Chest	32941	66.2
Maternity	161421	74.2
Psychiatric	10483	40.8
KCCC	10944	58.3
Al-Razi	29369	54.4
Physical Medicine	2811	79.5
Infections	23670	63.4

**Table 3: Availability of the Civil ID according to the year and hospital (1996-2005)**

year		Amiri	Saba h	Mobara k	Farwan	Ada	Jahra	Ibn Sina	Chest	Matern	Psych	KCCC	Alraz	Phys M	Infec
1996	No.	251	1242	4486	5128	1542	1234	1713	1581	4381	271	110	591	13	1417
	%	1.9	8.0	23.4	21.3	5.3	5.0	19.5	34.9	18.7	10.1	7.3	12.4	4.1	30.6
1997	No.	107	751	9803	10516	2420	1965	142	4028	16671	622	557	2526	304	2588
	%	0.8	4.8	52.8	44.1	8.4	8.2	1.5	79.4	73.6	24.4	41.3	84.7	81.1	54.1
1998	No.	1		9777	11003	3333	1922	0	3994	16848	606	624	2389	366	2085
	%	0.0		52.7	46.2	12.3	7.8	0.0	79.9	78.2	23.4	37.8	46.3	85.9	54.3
1999	No.	30	184	9734	1174	4417	2738	79	3658	17020	783	835	2731	311	1898
	%	0.2	1.1	56.2	45.4	16.3	10.6	0.9	78.8	78.7	28.3	46.6	51.9	86.9	52.1
2000	No.	5	182	11389	12758	4664	4830	4	3236	17905	1279	1248	3065	328	1811
	%	0.0	1.0	67.1	51.7	22.2	17.4	0.0	82.1	81.8	53.7	65.4	59.4	86.1	61.6
2001	No.	16	24	12503	13702	5647	3365	32	3071	17898	1336	1515	1113	312	2443
	%	0.1	0.1	72.6	54.3	18.8	11.3	0.3	72.9	82.1	56.4	76.6	21.1	86.0	55.9
2002	No.	7691	551	13658	11412	5542	9630	0	3852	18051	1120	1541	3524	269	3027
	%	60.2	2.9	80.0	44.7	18.6	31.4	0.0	77.1	81.9	46.8	79.7	62.5	86.5	77.7
2003	No.	11138	2331	13568	16504	7163	13736			17513	1187	1310	4491	314	2036
	%	92.0	12.6	83.9	76.5	24.6	49.4			81.8	48.2	64.9	82.8	90.0	79.6
2004	No.	12105	3233	13742	16888	13101	18190	17	4133	17248	1323	1488	4170	297	3196
	%	94.2	16.5	86.1	69.8	44.1	61.9	0.2	70.9	82.8	49.2	74.5	73.7	95.2	83.3
2005	No.	12812	4793	14902	17257	17985	20211	5091	5361	17886	1956	1716	4769	297	3142
	%	96.2	24.2	88.6	70.6	58.8	64.4	52.6	86.3	82.7	67.9	89.2	84.7	93.4	84.6

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