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SESSION II: The role of IT in collecting health information

**SOME HOSPITAL FACILITY UTILIZATION INDICATORS**

Supporting paper submitted by the Croatian National Institute  
of Public Health<sup>1</sup>

According to WHO data and estimates, hospital expenditures absorb between 45 and 75% of the total funds intended for health care. Thus, understandably, all countries analyze and monitor trends in inpatient care and hospital facility utilization most attentively. Hospital bed capacity has, in the period 1980-95, been significantly reduced by nearly all West European countries, most also shortening the length of stay. Such trend is partly due to a reduced consumption policy, changes in medical technology and treatment, and to a greater reliance on primary care and welfare. In general, Central and Eastern European countries have more beds available per capita and longer hospital stays. Rationalizing hospital operation and hospital service utilization is one of the aims of the Croatian future health reform as well.

All health statistical data in Croatia is collected and analyzed by the Croatian National Institute of Public Health either directly or through its county level services.

The information gathered from hospital-type institutions may be divided into three groups:

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- **Utilization indicators.** They enable the monitoring and analysis of hospital utilization, including patient catchment area coverage, average length of stay, average percentage of bed emptiness, average patient flow per 1 bed and average length of turnover interval;
- **Medical indicators.** These involve an admissions analysis by diagnosis, age, sex, hospital ward, and length of stay;
- **Person-related data.** Computer system and the introduction of a unique patient identification permit individual data on readmissions, complications etc., to be monitored.

Until 1990, the follow-up in Croatia consisted mainly of aggregate data on persons receiving inpatient care. The individual-related data were directed only at monitoring through the National Registers on persons receiving inpatient treatment for malignant tumors, psychoses and drug addicts. These diagnoses continue to be monitored in the same way today. There is also data linkage between these registers and the deaths database in the National Institute of Statistics.

Since 1990, a gradual transition in hospital statistics has been made towards a uniform method of submitting data on a magnetic medium. The introduction of a unique population identity number for all citizens in health statistics data has enabled a changeover from the monitoring of aggregate data to the monitoring of an individual. After implementation of ICD-10 th revision in the health system in Croatia, a diagnosis control system by relevant WHO rules and an internal control of the reporting of hospital discharge diagnosis have been developed.

This paper describes and analyzes certain indicators of hospital facility utilization obtained from the Croatian National Institute of Public Health's health statistical routine, which in work analysis and planning can be equally analyzed and planned (beds, manpower, and even equipment) in individual institutions and on the county and national levels.

Barber-Johnson-Yates' method was used for the following analyses:

1. **Length of stay;**
2. **Turnover interval** (expressed in terms of the average number of days elapsed between the discharge of the first and the admission of the next patient);

By their decisions and good planning physicians can exert a direct influence on both indicators.

The other two indicators are derived from the first two and show:

3. **The percentage of hospital beds that was empty on annual average;**
4. **The average annual utilization or "throughput" of a bed, i.e. the average number of patients treated on one bed annually.**

Shown in Fig. 1 are the clinics, clinical hospitals and clinical hospital centers, as well as general and county hospitals. With some exceptions, the Croatian hospital system (according to hospital progress reports 1996) is now consolidated. Most general and clinical hospitals are in the zones of 8-13 days' admission, of up to 3 days turnover interval and in the bed emptiness zone of up to 15% on average. The number of hospitalized per 1 bed varies between 25 and 40 annually. It can generally be noted that clinical hospitals show a longer length of stay, smaller turnover interval and, consequently, lower percentage of bed emptiness coupled with lower throughput, i.e. fewer patients per 1 bed annually.

Fig. 2 compares the status of the Croatian hospital system in 1995 and 1996, displaying its trend to densify or consolidate, shorten turnover intervals and, with greater bed fullness, increase the average number of the admitted.

The introduction of a unique patient identification number enables them to be followed through the hospital system, as well as the number, place and purpose of reprovided inpatient care.

A pilot study for 1997 looking at readmissions was done on a part of the admissions computer base. It analyzed the data from 12 hospitals, excluding as reasons the delivery of inpatient care for childbirth and abortion, and patients on long-term rehabilitation.

In all, 199,234 admissions were reported by the hospitals joining the study in 1997. Of this, multiple admissions accounted for 78,369 (34.4%), 27,977 persons having multiple hospitalizations, an average of 2.8 times per 1 person.

Applying the principle of identity or difference an analysis was made of discharge diagnoses. In Croatia, the three-digit ICD-10 has been accepted in morbidity coding and reporting. As in morbidity coding some hospital wards use four digits, the electronic data transfer enables a more detailed analysis. Table 1 shows 20 most common discharge diagnoses which were identical for all episodes of hospitalization by the frequency of occurrence. Malignant neoplasm of the breast ranked first, followed by acute or chronic drinking problems. Schizophrenia was third followed by angina pectoris, cerebral infarction and acute myocardial infarction. Interestingly, posttraumatic stress disorder appeared among the 20 most common diagnoses requiring multiple episodes of care, and this almost five years since the most violent war conflict in Croatia ended.

Table 2 illustrates the most common discharge diagnoses for the first stay of the persons with two or more hospitalizations, but who received different diagnoses at the first and subsequent admissions. On analysis the acute and chronic drinking problems were ranked first, followed by unestablished diagnosis. They were followed by angina pectoris, pregnancy maintenance-related problems, gall stones, essential hypertension, and underdefined diagnoses related to cardiac disorders. Subsequent patient follow-ups (e.g. of those with unestablished diagnosis at first admission) will facilitate the analysis of possible organizational or technical failures, and ultimately contribute to a most effective hospital facility utilization.

To rationalize hospital operation further and draw up hospital categorization and accreditation guidelines, it is planned to adopt a recommendation by WHO and World Bank professionals as well as introduce some additional indicators. They are: an estimation of individual ward workloads, monitoring of waiting lists, respectively of the length of interval between the making of a demand for service and service delivery, introduction of work quality measures and other. With further computerization and linking up of the public health system, the creation of an Admitted Cases Register should become a reality which would greatly facilitate the planning and assessment of inpatient care effectiveness.

**BARBER - JOHANSON - YATES PERFORMANCE DIAGRAM OF CROATIAN  
CLINICAL AND COUNTY ACUTE HOSPITALS 1996**

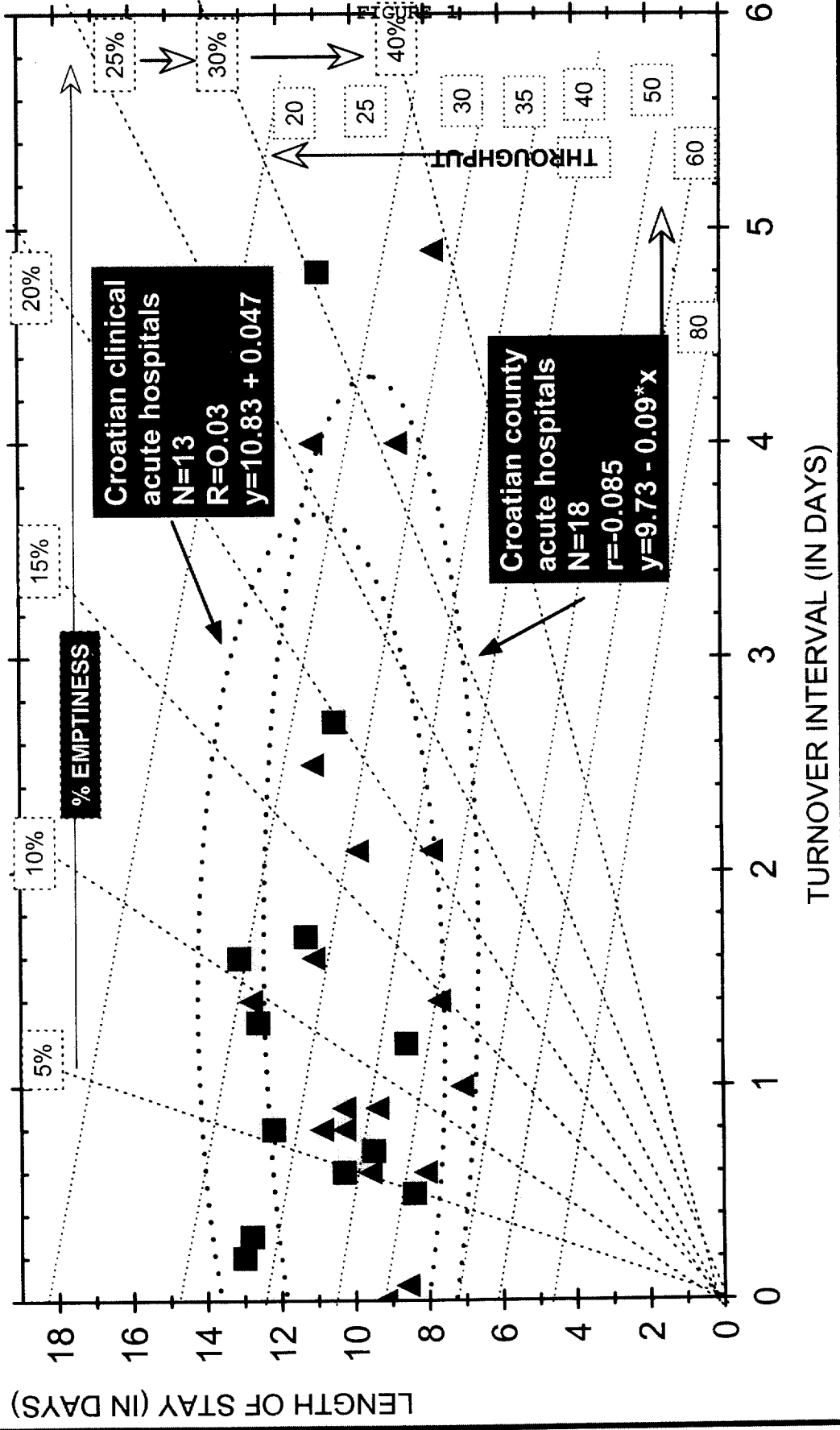


FIGURE A

**BARBER - JOHANSON - YATES PERFORMANCE DIAGRAM**

OF CROATIAN ACUTE HOSPITAL SYSTEM 1995 AND 1996

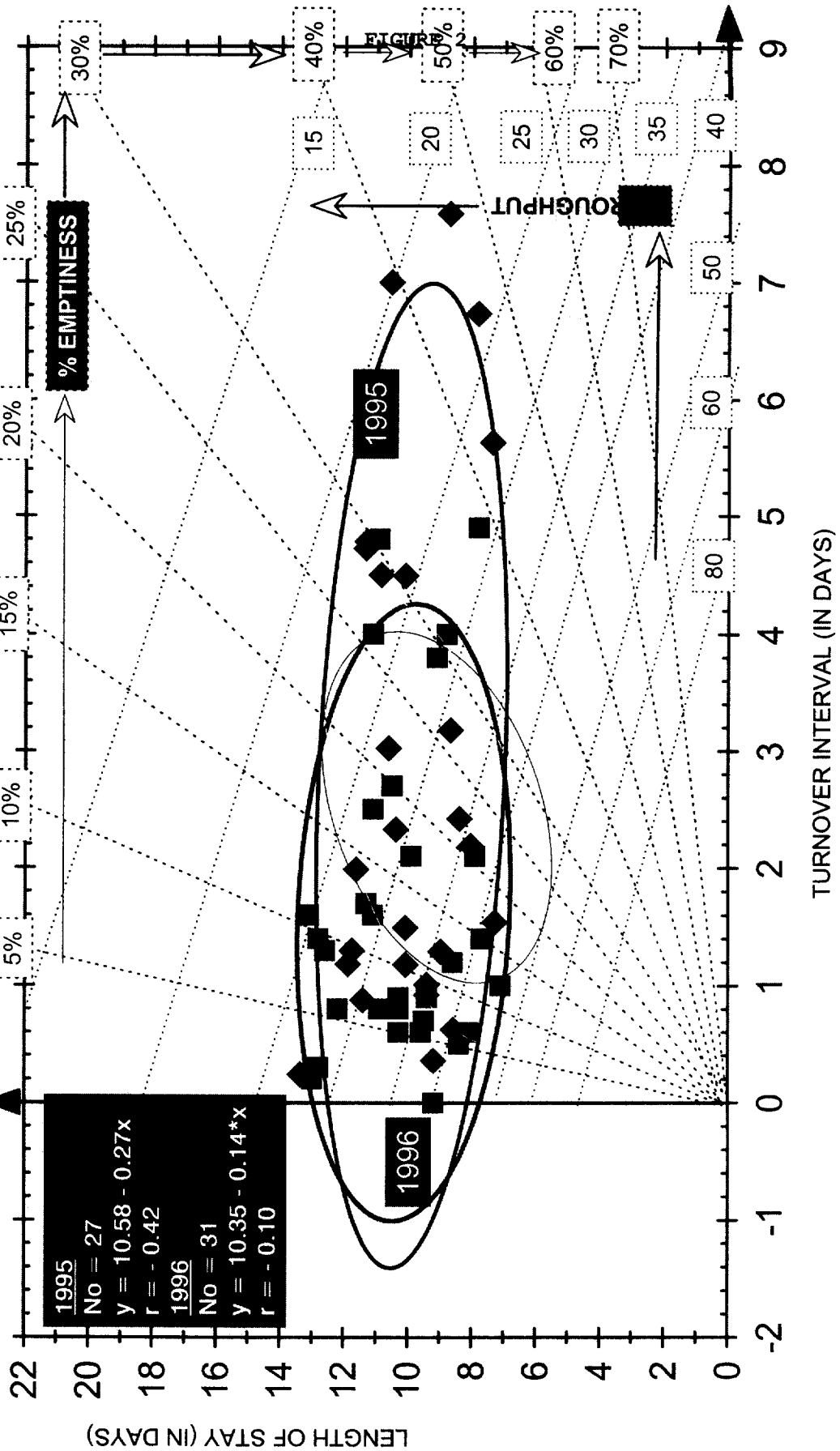


FIGURE 2

Table 1. The most frequent discharge diagnosis -  
 all diagnosis in all hospital treatment the same

Diagnosis	No of readmissions
1. Malignant neoplasm of breast	1.083
2. Mental and behavioral disorders due to alcohol	956
3. Schizophrenia	672
4. Angina pectoris	496
5. Cerebral infarction	424
6. Acute myocardial infarction	385
7. Unknown and unspecified causes of morbidity	378
8. Cholelithiasis	371
9. Atherosclerosis	308
10. Hyperplasia of prostate	279
11. Malignant neoplasm of trachea and lung	247
12. Malignant neoplasm of stomach	231
13. Varicose veins of lower extremities	210
14. Malignant neoplasm of of rectum	206
15. Malignant neoplasm of ovary	204
16. Reaction to severe stress and adjustment disorders	203
17. Cardiomyopathy	199
18. Senile cataract	195
19. Atrial fibrillation and flutter	190
20. Malignant neoplasm of brain	189

Table 2. The most frequent discharge diagnosis -  
different diagnosis of readmission

Diagnosis	No of readmissions
1. Mental and behavioral disorders due to alcohol	321
2. Unknown and unspecified causes of morbidity	266
3. Angina pectoris	213
4. Maternal care for known or suspected abnormality of pelvic organs	164
5. Cholelithiasis	157
6. Haemorrhage in early pregnancy	140
7. Essential hypertension	135
8. Cardiomyopathy	131
9. Heart failure	112
10. Senile cataract	105
11. Atrial fibrillation and flutter	100
12. Cerebral infarction	100
13. Acute myocardial infarction	96
14. Atherosclerosis	92
15. Abdominal and pelvic pain	87
16. Acute pancreatitis	81
17. Other abnormal uterine and vaginal bleeding	79
18. Insulin-dependent diabetes mellitus	77
19. Inguinal hernia	76
20. Pneumonia, organism unspecified	76