Utilization of diagnostic services in the primary care

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ABSTRACT

Objectives: To analyze the pattern of utilization of diagnostic tests by the Primary Care Services of the National Guard Housing Complex at Riyadh, Kingdom of Saudi Arabia and to correlate this pattern with other variables (age, gender, problem or diagnosis).

Methods: This is a retrospective cross-sectional medical record of the use of laboratory and x-ray facilities in the primary care setting using International Classification of Primary Care (ICPC-2) for encoding of data. The study was carried out at King Fahad National Guard Hospital covering a period of one year from January 1998 to December 1998.

Results: Two hundred and forty-five diagnostic tests were ordered at 2290 patient visits. At least one test was requested for 6.5% encounters. Ten tests were ordered per hundred encounters. The total problems managed were 2592 and at least one test was ordered for 6% of problems managed. Sixty-five percent of the tests were ordered for females while 35% of the tests were ordered for males. Age-wise, the maximum number of tests was requested for children aged <3 years.

Conclusion: Compared to different international figures a lower rate of diagnostic testing has been found and the majority of tests were requested for children. Females rate was significantly higher compared to males.

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The purpose of testing is to validate the physician's hypothesis, and bring to light new and unexpected clues.[1] The word "test" embraces history, physical examination, laboratory and imaging investigations.[1] Diagnostic tests are ordered by primary care physicians in the course of clinical examination of a patient. They are associated with increasing cost and the physician's role is central to reducing the economic consequences and improving the quality of care.[2-6] Review of international literature showed that there have been multiple studies on individual tests or one category of tests,[3-5,7,8] but few studies were conducted on the pattern of utilization of all diagnostic tests in general practice.[1] This study attempts to analyze the utilization of all categories of tests requested in the primary care. Data collection and encoding were performed using the second edition of International Classification of Primary Care (ICPC-2). In the Kingdom of Saudi Arabia (KSA), few studies have been conducted on the utilization of laboratory services in the primary care. For Instance, a study was conducted in the Eastern Province to assess the knowledge of primary care physicians on x-ray tests.[7] But we have not come across any study conducted to analyze the pattern of utilization of all diagnostic tests in general practice.

The objectives of this project include the analysis of the utilization pattern of diagnostic tests by the

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Primary Care Services in KSA and the correlation of this utilization pattern with other variables (age, gender, problem or diagnosis).

Methods. This study is a retrospective cross-sectional review and forms part of the morbidity and therapeutic survey of medical encounters using ICPC-2 coding system, conducted at Primary Health Care Clinics of National Guard Housing Complex suburb of Riyadh, KSA over a period of one year from January 1998 to December 1998. The total population at National Guard Housing Complex is 42,000. The majority of the population is under 15 years of age. Adult males are military personnel. They usually present initially to their doctors at primary care clinics at their worksites (outside the housing complex). The females and children usually present initially to their doctors at the Housing Complex Primary Care Clinics (which are covered by non-board certified staff physicians). Data under study were drawn from these clinics. Healthcare is also provided for the population at family medicine clinics covered mainly by family medicine consultants at King Fahad Hospital. This hospital also provides tertiary healthcare for the population. The family medicine morbidity database was created using ICD-9. During the year 1998, 200,000 patient encounters took place. The data obtained from these patient encounters were subjected to simple computerized randomization and a random sample of 2290 encounters was drawn for the study. This sampling process will provide point prevalence proportion with 95% confidence interval with expected prevalence of 50% and marginal error of 2%. After training for one week, 9 residents doctors collected data from medical records of primary care into a datasheet, which was specifically designed for the survey. The datasheet included the following variables: date of visit, patient's status vis-à-vis the clinic (newly registered or previously registered patients coming for review), patient's age, gender and nationality, reason for encounter for each diagnosis or problem, problem or diagnosis, status of each problem (new/old), drugs or other treatments given, laboratory and x-ray tests requested and referrals, if any, and follow-up planned within 3 months.

All tests ordered excluding the urine dipstick were recorded. Each test was recorded under the problem or diagnosis with which it was associated. If a test was requested for multiple problems, it was recorded under the problem for which it was most required. The tests were recorded in ICPC-2 terms. Data collected were verified and corrected by the residents before entering it onto the computer. Analysis was performed using Epi-info 6.04.

Results. A total of 245 diagnostic tests were ordered for 2290 patient visits. At least one test was requested for 6.5% encounters. Ten tests were requested per 100 encounters. The total problems managed were 2592 and at least one test was ordered for 6% of problems managed. Sixty-five percent of tests were requested for females while 35% of the tests were requested for males. Age-wise, the maximum number of tests was requested for children aged <3 years.

Blood tests accounted for approximately half of all tests and complete blood counts accounted for approximately half of blood tests requested. Blood test rate was 25 per 100 test encounters for males compared to 58 per 100 test encounters for females.

Orders for urine tests made up 19% of all tests. The most frequently requested tests were urinalysis and urine culture. The average rate of urine testing was 13 per 100 test encounters for males compared with 18 per 100 test encounters for females.

Orders for feces accounted for 15% of all tests. The rate of feces testing for males was 11 per 100 test encounters compared with 13 per 100 test encounters for females.

X-rays accounted for 6% of all tests and the most frequently ordered tests were plain x-rays (4.8%) of total tests) and antenatal ultrasound (1.2%). The rate of x-ray testing for males was 3 per 100 test encounters compared with 7 per 100 test encounters for females.

This group includes microbiology tests (0.4% of all tests); electrical tracing and others (0.4% of all tests).

Figures 1 shows the age-gender specific rates for diagnostic tests requested for males and females. Blood tests accounted for approximately half of tests ordered for both sexes for this age group.

Figure 2 shows the systems that were over-represented at test encounters included blood, general, digestive, locomotor, reproductive and so forth.

Discussion. The diagnostic testing rate according to our study was 10.6 per 100 patient encounters and at least one test was ordered at 6.5% of encounters. This study has shown that there have been low rates of diagnostic testing compared with other international studies.[2-6] An Australian study that was conducted in 1992 on morbidity pattern in primary care showed that the rate of testing was 22 per 100 patient encounters.[2] In other international studies the rate of testing varied between different countries.[3] The lower rate of testing in our study might be explained by the following factors. The organization of health system: The primary care clinics in our study were located near a big Hospital with 3 emergency rooms. Several military primary care clinics are situated in the vicinity of the housing complex. A Swedish study showed that

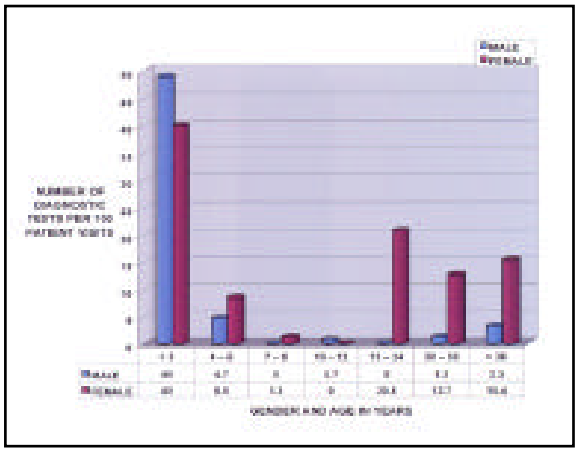

Figure 1 - Age and gender-specific rates for utilization of diagnostic services.

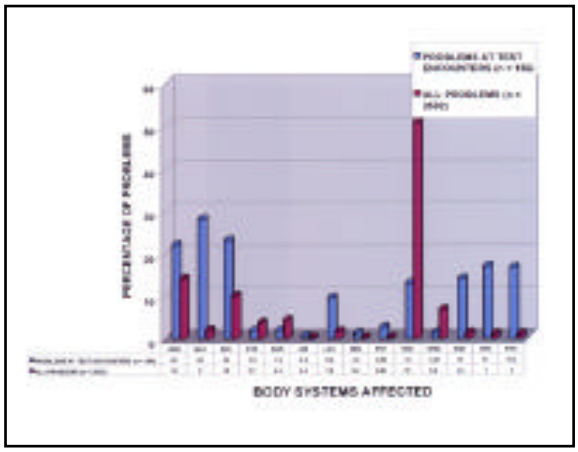

Figure 2 - Comparison of problems managed at all encounters and at test encounters. GEN - general, BLO - blood, DIG - digestive, CIR - circulatory system, LOC - locomotor system, NEU - nervous system, PSY - psychiatry, RES - respiratory, END - metabolic / endocrine, URO - urological, PRG - pregnancy

general practitioners working in the vicinity of hospitals tend to order less tests compared with general practitioners based far from hospitals.[4] Another practice factor is the heavy workload on the staff physicians that may result in lack of time and lower rate of testing as shown in a collaborative study conducted in 8 European countries on the use of blood tests in general practice.[5] This study also showed that more frequent contact with the same patient might be another contributing factor for greater number of requests for investigations.

The educational programs provided by the Department of Family Medicine include education on better utilization of diagnostic tests, which might result in a decrease in unnecessary testing. On the other hand, education of physicians might decrease the rate of indicated tests as shown in a study on the effect of educational programs on reducing unnecessary testing by residents, published in Academic Medicine in 1989.[8] Not ordering investigations, which are indicated, for the proper management of a patient is likely to cause potential harm to the patient.

The morbidity pattern at these primary care clinics, where a high proportion of the population is less than 15 years of age, includes to a great extent common problems such as upper respiratory tract infections and preventive procedures such as vaccinations, which do not need any investigations.

It was shown in the Collaborative European Study that physicians trained in academically oriented schools tend to use more tests.[6] Our study was conducted in a non-academic setting and the primary care clinics are covered by non-board certified physicians.

The source of our data was the medical records. The data might have been more reliable if it was obtained from face to face doctor-patient encounters as shown in another Australian study comparing 2 methods of data collection. In this study, data were simultaneously recorded in a standard data sheet from medical records and at the time of face-to-face contact between doctors and patients. The study showed that testing rate was 24 per 100 face-to-face encounters compared with 16 per 100 encounters when data were obtained from the medical records.[9] Another possible factor for this low rate of testing may be selection bias. The higher rate of testing for females who accounted for 44.4% of all patient encounters (65% of all tests) when compared with 35% for males (who accounted for 55.6% of all encounters), may be explained by the tests ordered for pregnancy. In the Australian morbidity study the rate for females was 66% of all pathology tests (which formed 66% of all tests) and the females made up 58% of all encounters. For both sexes in the age group <3 years, the rate of testing is similar and formed the peak rate of testing compared with other age groups where 49 per 100 test encounters were ordered for males compared with 40 per 100 test encounters for females. The ongoing screening program for iron deficiency anemia might explain this peak for infants <1 year at the primary care clinics of the housing complex. Orders for blood tests (52% of all tests) showed similar rate to that in the Australian Primary Care, which accounted for 55% of pathology tests, which formed 66% of all tests.[2] Orders for complete blood count in our study accounted for approximately half of blood tests, which will be explained again by the ongoing screening program for iron deficiency anemia. Urine testing rate was not far from the Australian figure. In our study, urine tests accounted for 19% of all tests compared with urine testing rate of 17%

of pathology tests in the Australian study. Urine tests were ordered more often for females (18 per 100 female encounters compared with 13 per 100 male encounters). This might be explained by the fact that urinary tract infection is more common in females especially during pregnancy. The percentage of urological problems of total problems (17% of problems at test encounters compared with 10% of total problems) means that more urine tests were gathered for the less frequently presented urological problems. Feces tests (15% of all tests) were requested more for females (13 per 100 female encounters compared with 11 per 100 male encounters). Most of the stool tests were ordered for children. This might be explained by the frequency of gastroenteritis in this group. X-ray tests (6% of all tests) which were requested more often for females (7 per 100 female encounters compared with 3 per 100 male test encounters) is explained by the more frequently requested antenatal ultrasound scans. The low rate of x-ray testing may be explained by patient morbidity or physician knowledge regarding the use of x-ray tests as was shown in a local study which was conducted in Dammam, KSA on the knowledge of primary care physicians regarding the use of x-ray films.[7] Only 15.9% of them have good knowledge on the use of x-ray films. Yet, another reason may be the guidelines, which were set out by a group of consultants at the Department of Medical Imaging at King Fahd Hospital on the appropriate use of x-ray tests.[10] These guidelines were distributed to all primary care physicians and again although they might reduce unnecessary testing, they may have decreased the rate of indicated x-ray tests due to lack of knowledge.

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