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The importance of risk of urine specimen's contamination in the diagnosis of urinary tract infection in a level 3 hospital

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The urine is the clinical specimen most frequently submitted to the microbiology laboratory for culture and antibiogram of ITU-producer microorganisms. Many hospitals use expensive automated systems for this, which intend to detect in a fast way those specimens lacking a significant amount of microorganisms and thus, are capable to issue the reports of the same, without clinical significance, the same day of reception in the laboratory. This is an ideal approach; however, it cannot be achieved if the urine submitted to the laboratory is contaminated with microorganisms. It is important to avoid this fact in order to decrease sanitary costs and morbidity, and since there are no similar studies in Spain (Medline 1987-1999), we wanted to know the effect of the reports on contaminated specimens issued by our laboratory over the costs.

We choose August (1999) to conduct the study since it shows more staff substitutions and warmer temperatures that might negatively affect, as mentioned below, the specimen quality in comparison with other months. The hospital is level 3 and attends the center-west hospital area of the Province of Granada (Autonomous Community of Andalucía) including a population of 270 000 individuals, and two Primary Attention districts. A total of 1249 urine specimens were processed through an automated system that detects the bacterial ATP (Coral, USA). Those specimens with ATP values lower than 2 arbitrary units were considered with less than 10^4 UFC/mL and, with some exceptions; the

report was produced that same day. Specimens with figures equal or greater than 2 were centrifuged at 3000 g during 10 minutes, and the sediment was visualized fresh (400x; cut point for significant leukocyturia: 4-5 leukocytes/field). This was plated in Columbia agar plates with lamb blood and MacConkey agar, and incubated during 24-48 hours at 37°C. The urine was classified as contaminated and we recommended to the clinician to submit a new specimen when more than one bacterial species develops in absence of leukocyturia, in individuals not immunosuppressed, in gestation, old, probed, or younger than 3 years-old. These cases were considered contaminated when more than two bacteria species occurs. The occurrence of *Staphylococcus aureus*, *Corynebacterium urealyticum* and *Candida* was assessed in all cases.

From the 1249 specimens included in this study, 949 (76%) were from ambulatory patients and 300 from hospitalized patients. In turn, from the 949 submitted specimens of ambulatory patients, 178 (18.8%) were considered as contaminated, while in the hospitalized group were 49 (16.3%). Then, 227 reports of contaminated specimens were issued, corresponding to 49 (21.6%) specimens from hospitalized patients and 178 (78.4%) specimens from non-hospitalized (out-patient department of the Hospital, Peripheral Centers of Specialties and Primary Attention Consultation). Table 1 shows the distribution of specimens reported as contaminated, in a hospital origin basis.

Two of them are particularly significant: 15 (75%) from Pediatrics corresponding to children younger than 3 years, and 22 (75.9%) specimens from adult females. Within the extra-hospital specimens 43 (79.6%) of the 54 children were younger than 3 years old. The origin of extra-hospital specimens was evenly distributed among the various patient's attention centers excepting those from the Peripheral Center of Specialties Zaidin, which reports 34 (19.1%) contaminated specimens.

The valuation of costs produced by the performed analysis was done in Value Relative Units (VRU) labeled by an VRUs coordination center and are calculated in accordance with three parameters: costs derived from the time used by the laboratory technician and specialist physician to perform the test, and materials cost, regardless other indirect costs. All the microbiological reports produced within August had an approximate cost of 22 700 VRUs, along with a probable increase in patient's morbidity.

The comparison between those specimens received and studied in this work with those from another season, such as March 2000, shows 1682 specimens, among which 1320 (78.5%) were extra-hospital with a ratio very similar to that for August 1999. From that group, 187 were considered as contaminated including 150 non-hospitalized patients and 37 hospitalized. The percentage of contaminated urine specimens in March, 2000 among ambulatory patients was 11.4%, while for August, 1999 was 18.8%, showing a higher, but not significantly, amount of contaminants. We still think that an inadequate specimen collection is one of the most frequent causes. The contamination percentages in specimens from hospitali-

zed patients were 16.3% in summer and 10.2% in March 2000.

There are two issues to be considered in order to avoid the causes producing this contamination. The first is an inadequate specimen collection that increases during the summer months since an extension of the staff substitutions, which does not comply with the standards for a correct collection of specimens (genitals wash, mid spurt collection, probe snapping before extraction). Likewise, the lack of urine refrigeration at 4°C increases the detrimental effect of summer temperatures. The second is the necessity of a fast and refrigerated transportation of the specimens. Concerning this point, it is worth to mention that the specimens from the Peripheral Center of Specialties Zaidin are the last in arriving at our laboratory (13 hours approximately). Although, they are submitted by the patient at this center as from 8:00 A.M. These issues account for the number of specimens reported as contaminated, the VRU losses, and the disturbance of the physician and patient when receives a useless result. Nevertheless, not all is lost. We think that once the situation, probably shared with other world hospitals,¹⁻⁴ is described, the main part is to implement the measures to avoid these situations. The staff substitution during summer must not imply a relaxation of standards for specimen collection and transportation. If there is not an adequate refrigeration, a specific urine transportation system with boric acid may be used, although is not trouble-free.^{5,6} Finally, it is essential that the specimen arrive before 11:00 A.M. to the laboratory in order that the specimen is the possible lesser time out of the body.

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Table 1. Hospital origin and number of contaminated specimens.

Services	Males	Females
Obstetrics	0	6
Cardiology	0	1
Surgery	1	2
Digestive	1	1
Hemodialysis	2	1
Internal medicine	1	3
Nephrology	0	1
Out-patient emergency	1	0
Rheumatology	0	5
Urology	1	1
ORL	0	1
Pediatrics	8	12

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