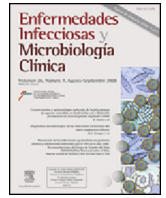




# Enfermedades Infecciosas y Microbiología Clínica

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Original article

## Training should be the first step toward an antifungal stewardship program



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### ARTICLE INFO

#### Article history:

Received 30 October 2013

Accepted 27 April 2014

Available online 24 July 2014

#### Keywords:

Antifungal use

Invasive aspergillosis

Candinas

Fluconazole

Antifungal stewardship

### ABSTRACT

The frequency of use of systemic antifungal agents has increased significantly in most tertiary centers. However, antifungal stewardship has received very little attention. The objective of this article was to assess the knowledge of prescribing physicians in our institution as a first step in the development of an antifungal stewardship program. Attending physicians from the departments that prescribe most antifungals were invited to complete a questionnaire based on current guidelines on diagnosis and therapy of invasive candidiasis and invasive aspergillosis (IA).

The survey was completed by 60.8% (200/329) of the physicians who were invited to participate. The physicians belonged to the following departments: medical (60%), pediatric (19%), intensive care (15.5%), and surgical (5.5%). The mean ( $\pm$ SD) score of correct responses was  $5.16 \pm 1.73$ . In the case of candidiasis, only 55% of the physicians clearly distinguished between colonization and infection, and 17.5% knew the local rate of fluconazole resistance. Thirty-three percent knew the accepted indications for antifungal prophylaxis, and 23% the indications for empirical therapy. However, most physicians knew which antifungals to choose when starting empirical therapy (73.5%). As for aspergillosis, most physicians (67%) could differentiate between colonization and infection, and 34.5% knew the diagnostic value of galactomannan. The radiological features of IA were well recognized by 64%, but only 31.5% were aware of the first line of treatment for IA, and 36% of the recommended duration of therapy. The usefulness of antifungal levels was known by 67%. This simple, easily completed questionnaire enabled us to identify which areas of our training strategy could be improved.

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## La formación debe ser el primer paso en el desarrollo de un programa de optimización del uso de antifúngicos

### RESUMEN

El uso de antifúngicos sistémicos se ha incrementado significativamente en los grandes hospitales. Sin embargo, la experiencia en el desarrollo de programas de optimización del uso de antifúngicos es muy limitada, pues la mayoría de los esfuerzos se han centrado en el control de los antibacterianos. El objetivo de nuestro estudio fue evaluar el conocimiento de los médicos prescriptores en el diagnóstico y tratamiento de las micosis invasivas en nuestra institución como parte de un programa de optimización del uso de antifúngicos. Se invitó a los médicos prescriptores de los distintos departamentos a completar un cuestionario de 20 preguntas cuya puntuación global fue de

#### Palabras clave:

Uso de antifúngicos

Aspergilosis invasiva

Candinas

Fluconazol

Control de antifúngicos

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◇ See Appendix A.

<http://dx.doi.org/10.1016/j.eimc.2014.04.016>

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0–10 puntos. Las preguntas se elaboraron de acuerdo a las recomendaciones de las guías de práctica clínica actuales para el diagnóstico y tratamiento de la candidiasis invasiva y la aspergilosis invasiva.

La tasa de respuesta fue de un 60,8% (200/329), de los cuales el 60% correspondió a departamentos médicos, 19% pediátricos, 15,5% unidades de críticos y 5,5% quirúrgicos. La puntuación media obtenida ( $\pm$  DS) fue  $5,16 \pm 1,73$ . Respecto a los conocimientos evaluados sobre candidiasis invasiva, un 45% de los médicos no fue capaz de distinguir entre colonización e infección, y solo el 17,5% conocía la tasa de resistencia local a fluconazol. Las indicaciones para profilaxis antifúngica y tratamiento empírico solo fueron correctamente identificadas por el 33% y el 23% de los médicos. Sin embargo, la mayoría identificaron correctamente el tratamiento empírico de elección (73,5%). Respecto a la aspergilosis invasiva, el 67% de los médicos diferenció correctamente colonización de infección y el 34,5% identificó la utilidad clínica de la detección del antígeno galactomanano. El diagnóstico radiológico de la aspergilosis invasiva fue correctamente evaluado por el 64% de los médicos, pero solo el 31,5% y el 36% identificaron correctamente el tratamiento de elección y su duración. La utilidad clínica de la monitorización de antifúngicos solo fue identificada correctamente por el 67% de los médicos. Un cuestionario como el propuesto en este trabajo permite identificar, de una forma ágil, las áreas de conocimientos que deben ser objetivo prioritario de una estrategia educativa dirigida a mejorar el uso de antifúngicos.

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## Introduction

Invasive fungal infections (IFIs) are a major problem in tertiary care hospitals. They affect several types of patient and are cared for by several types of physician. The difficulties in confirming a diagnosis, the excellent tolerance of new drugs, and the impact of early therapy have led to extended use of empirical antifungal agents.

Previous studies, however, have shown that up to 67–74% of antifungal drugs are used inappropriately in tertiary care hospitals.<sup>1–3</sup> A recent multicenter study performed in French intensive care units (ICU) revealed that 7% of all patients admitted on a single day were receiving antifungals, and 65% patients included had no proven IFI.<sup>4</sup>

International societies have recommended implementation of institutional antifungal stewardship programs.<sup>5</sup> When antifungal costs surpassed €3 million and while our incidence of proven fungal infection remained stable, we decided to initiate an antifungal stewardship program that included training initiatives. We performed a knowledge survey in order to identify areas requiring specific attention.

## Material and methods

### Setting and participants

Our institution is a 1550-bed tertiary care hospital attending a population of 715,000 inhabitants. It is a referral center for solid organ transplantation, heart surgery, stem cell transplantation, and HIV-AIDS care.

Ours was a prospective study in which we invited 329 physicians to complete a questionnaire. Hospital areas were ordered according to spending on antifungals by the Pharmacy Department. The participating hospital departments were those that accounted for 85% of antifungal prescription. The participating physicians from these departments were given 15 minutes to complete a brief questionnaire, which was then collected by one of the authors. The study was approved by the Ethics Committee.

### Questionnaire

The questionnaire was anonymous and included 20 multiple-choice questions on the diagnosis and management of IFIs (see Appendix B available online). We specifically included questions to identify inadequate indication of antifungals, such as the clinical interpretation of positive cultures or current recommendations for

preemptive therapy. Each correct answer was scored as 0.5 points and each incorrect answer as 0 points (maximum score, 10 points).

The correct answer was selected by the steering committee of the Collaboration in Mycology Study Group of our institution (COMIC) according to current international guidelines.<sup>6,7</sup>

### Statistical analysis

Our endpoint was the median knowledge score obtained by physicians prescribing antifungals in our institution. We also decided to compare the performance of different groups of physicians (residents vs. staff physicians) and hospital departments (intensive care, pediatrics, medical, and surgical). Hematology and oncology were considered as medical departments.

Qualitative variables are reported with their frequency distribution. Quantitative variables are reported as the mean and SD and range (minimum-maximum). We used the *t* test or ANOVA to compare how scores differed according to the participants' characteristics. Multiple linear regression analysis was performed to detect differences in knowledge between different departments and types of physician after adjusting for sex and postgraduate education. Statistical significance was set at  $p \leq 0.05$ . The statistical analysis was performed using SPSS® 16.0 and EPIDAT®.

## Results

The questionnaire was completed by 200 of the 329 physicians invited to participate (60.8%; 115 staff [57.5%] and 85 residents [42.5%]). The percentage of responders was higher than 50% for all the departments involved, except for general surgery (40.8%), oncology (20.0%), and pneumology (12.5%). The distribution by departments was as follows: medical (including oncology and hematology) (60%), pediatrics (19%), intensive care unit (15.5%), and surgery (5.5%). The mean age of the responding physicians was  $35.0 \pm 9.7$  years, and 57% were women. Median duration of postgraduate training was 6 years (3.0–18.0).

The overall mean score was  $5.16 \pm 1.73$  (ICUs,  $5.40 \pm 1.50$ ; medical wards,  $5.37 \pm 1.76$ ; pediatrics,  $4.62 \pm 1.75$ ; and surgery  $4.09 \pm 1.30$ ). The results of the survey by hospital department are shown in Table 1. No statistically significant differences were found between the different departments in the simple linear regression analysis; however, differences were found between the medical departments and the remaining departments after adjusting for sex, postgraduate training, and physician category ( $p = 0.017$ ) (Table 1).

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