



ORIGINAL ARTICLE

Impact of a multifaceted educational intervention including serious games to improve the management of invasive candidiasis in critically ill patients

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KEYWORDS

Invasive candidiasis;
EPICO project;
Critically ill patients;
Interactive games;
Multifaceted
educational
intervention;
Quality improvement;
Recommendations

Abstract

Objectives: Infections caused by *Candida* species are common in critically ill patients and contribute to significant morbidity and mortality. The EPICO Project (Epico 1 and Epico 2.0 studies) recently used a Delphi approach to elaborate guidelines for the diagnosis and treatment of this condition in critically ill adult patients. We aimed to evaluate the impact of a multifaceted educational intervention based on the Epico 1 and Epico 2.0 recommendations.

Design: Specialists anonymously responded to two online surveys before and after a multifaceted educational intervention consisting of 60-min educational sessions, the distribution of slide kits and pocket guides with the recommendations, and an interactive virtual case presented at a teleconference and available for online consultation.

Setting: A total of 74 Spanish hospitals.

Participants: Specialists of the Intensive Care Units in the participating hospitals.

Variables of interest: Specialist knowledge and reported practices evaluated using a survey.

The McNemar test was used to compare the responses in the pre- and post-intervention surveys.

Results: A total of 255 and 248 specialists completed both surveys, in both periods, respectively. The pre-intervention surveys showed many specialists to be unaware of the best approach for managing invasive candidiasis. After both educational interventions, specialist knowledge and reported practices were found to be more in line with nearly all the recommendations of the Epico 1 and Epico 2.0 guidelines, except as regards de-escalation from echinocandins to fluconazole in *Candida glabrata* infections ($p = 0.055$), and the duration of antifungal treatment in both candidemia and peritoneal candidiasis.

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PALABRAS CLAVE

Candidiasis invasiva;
Proyecto EPICO;
Paciente crítico;
Juegos interactivos;
Intervención
educativa múltiple;
Mejora de la calidad;
Recomendaciones

Conclusions: This multifaceted educational intervention based on the Epico Project recommendations improved specialist knowledge of the management of invasive candidiasis in critically ill patients.

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Impacto de una intervención educacional múltiple incluyendo juegos interactivos para la mejora del manejo de la candidiasis invasiva en pacientes críticos

Resumen

Objetivos: Las infecciones por *Candida* son frecuentes en los pacientes críticos y conllevan un incremento de la morbimortalidad. Nuestro objetivo es evaluar el impacto de una intervención educativa múltiple fundamentados en las recomendaciones de los proyectos basados en metodología Delphi Epico 1 y Epico 2.0.

Diseño: Especialistas respondieron anónimamente 2 cuestionarios a través de Internet antes y después de una intervención educativa múltiple que consistió en: sesiones educativas de 60 min, distribución de kits de diapositivas y guías de bolsillo, y un caso virtual interactivo presentado en una teleconferencia y disponible para su consulta a través de Internet.

Ámbito: Setenta y cuatro hospitales españoles.

Participantes: Especialistas de las unidades de cuidados intensivos de los hospitales participantes.

Variables de interés: Conocimientos y práctica clínica valorada a través de un cuestionario. El test de McNemar se empleó para comparar las respuestas entre los periodos pre y postintervención.

Resultados: Un total de 255 y 248 especialistas completaron ambos cuestionarios en los 2 periodos, respectivamente. Los cuestionarios preintervención mostraron que muchos especialistas desconocían el mejor tratamiento de la candidiasis invasiva. Después de las 2 intervenciones educativas, el conocimiento de los especialistas y las prácticas reportadas estaban más próximos a las recomendaciones de las guías Epico 1 y 2.0, excepto para el desescalado de equinocandinas a fluconazol en las infecciones por *C. glabrata* ($p=0,055$) y en la duración del tratamiento antifúngico en la candidemia y en la peritonitis candidiásica.

Conclusiones: Esta intervención educativa múltiple basada en las recomendaciones del proyecto EPICO mejoró el conocimiento de los profesionales acerca del manejo de la candidiasis invasiva en el paciente crítico.

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Introduction

The Extended Prevalence of Infection in Intensive Care (EPIC II) study highlighted the importance of infections by *Candida* species in patients in intensive care units (ICU). In this point prevalence study including critically ill patients in 1265 ICUs worldwide, *Candida* species were isolated in 17% of all positive cultures,¹ and the prevalence of candidemia was 6.87 episodes per 1000 patients admitted to an ICU.² The prevalence of invasive *Candida* infections varies with place and time, and methodological differences make it difficult to compare epidemiological reports. Thus, the real prevalence of *Candida* infections in non-neutropenic critically ill patients is unknown.

Invasive *Candida* infections are associated with high morbidity and mortality, especially in ICU patients. The crude mortality rate of patients who develop candidemia ranges between 40% and 60%.³⁻⁶ A French study found no significant differences in mortality (45.9%) between patients with

invasive *Candida* infections without candidemia and those with candidemia.⁷ An Italian study found 40.2% overall mortality and pointed out that mortality varied widely with the species causing the infection, from 26.5% for *C. parapsilosis* to 77.8% for *C. tropicalis*.⁸ Nevertheless, underlying disease and comorbidities make it difficult to determine mortality directly attributable to *Candida* infection. Moreover, early detection and early appropriate treatment have an important impact on mortality.⁹⁻¹¹

Although antifungal drugs approved in recent years may improve effectiveness against invasive candidiasis, scientific societies' recommendations vary widely,¹²⁻¹⁴ and the best management strategy remains controversial. For this reason, five scientific societies in Spain collaborated in the EPICO Project, program of continued improvement in the quality of care of critically ill patients, in which the Delphi method was used to elaborate consensus guidelines for the diagnosis and treatment of invasive candidiasis in critically ill patients, developing twelve recommendations focused

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