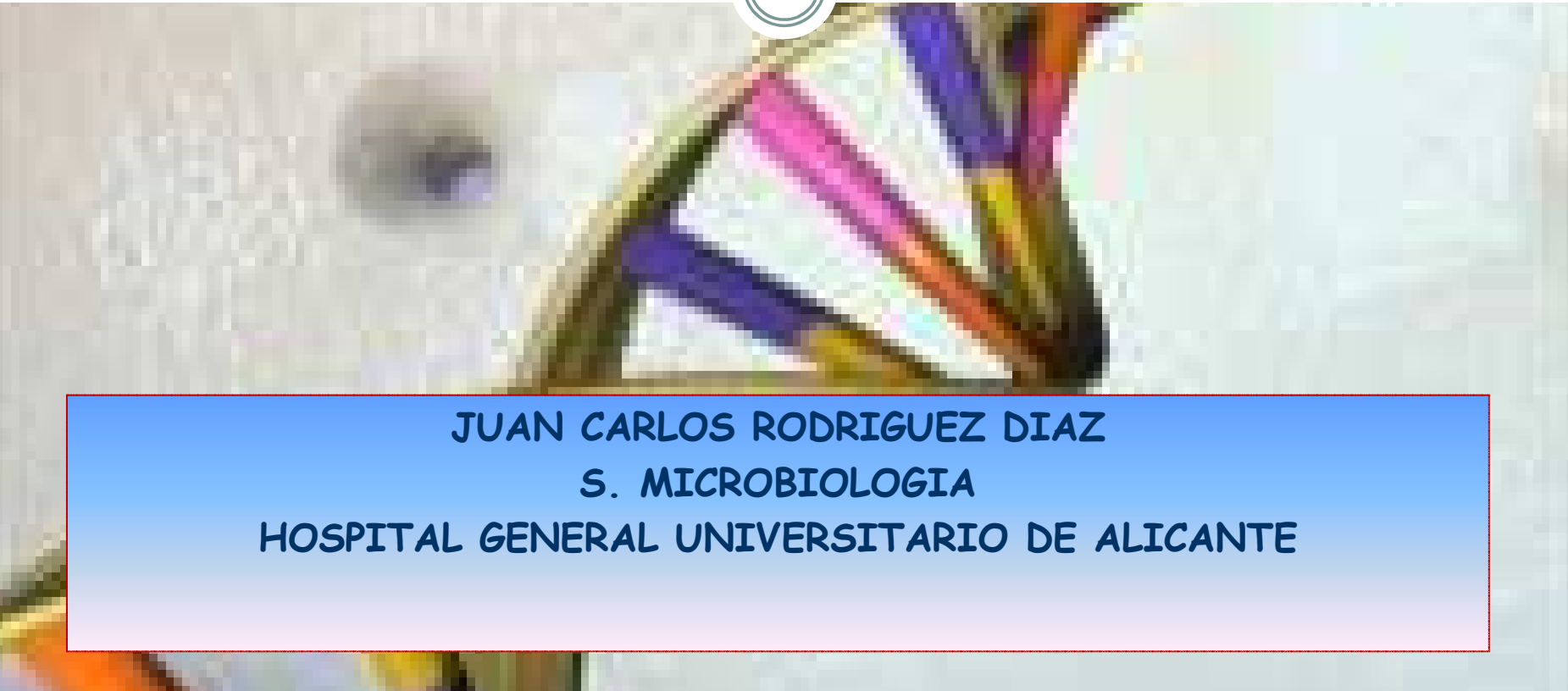


# Grupo PROA en un Hospital Universitario

The background of the slide is a photograph of a microscope slide. On the slide, there is a colorful, abstract pattern that resembles a stained glass window or a microscopic view of a biological specimen. The colors include shades of purple, pink, yellow, and green, set against a light, textured background.

JUAN CARLOS RODRIGUEZ DIAZ  
S. MICROBIOLOGIA  
HOSPITAL GENERAL UNIVERSITARIO DE ALICANTE

# Equipo PROA

Comisión de Infecciones

Infecciosas

Microbiología

**PROA**

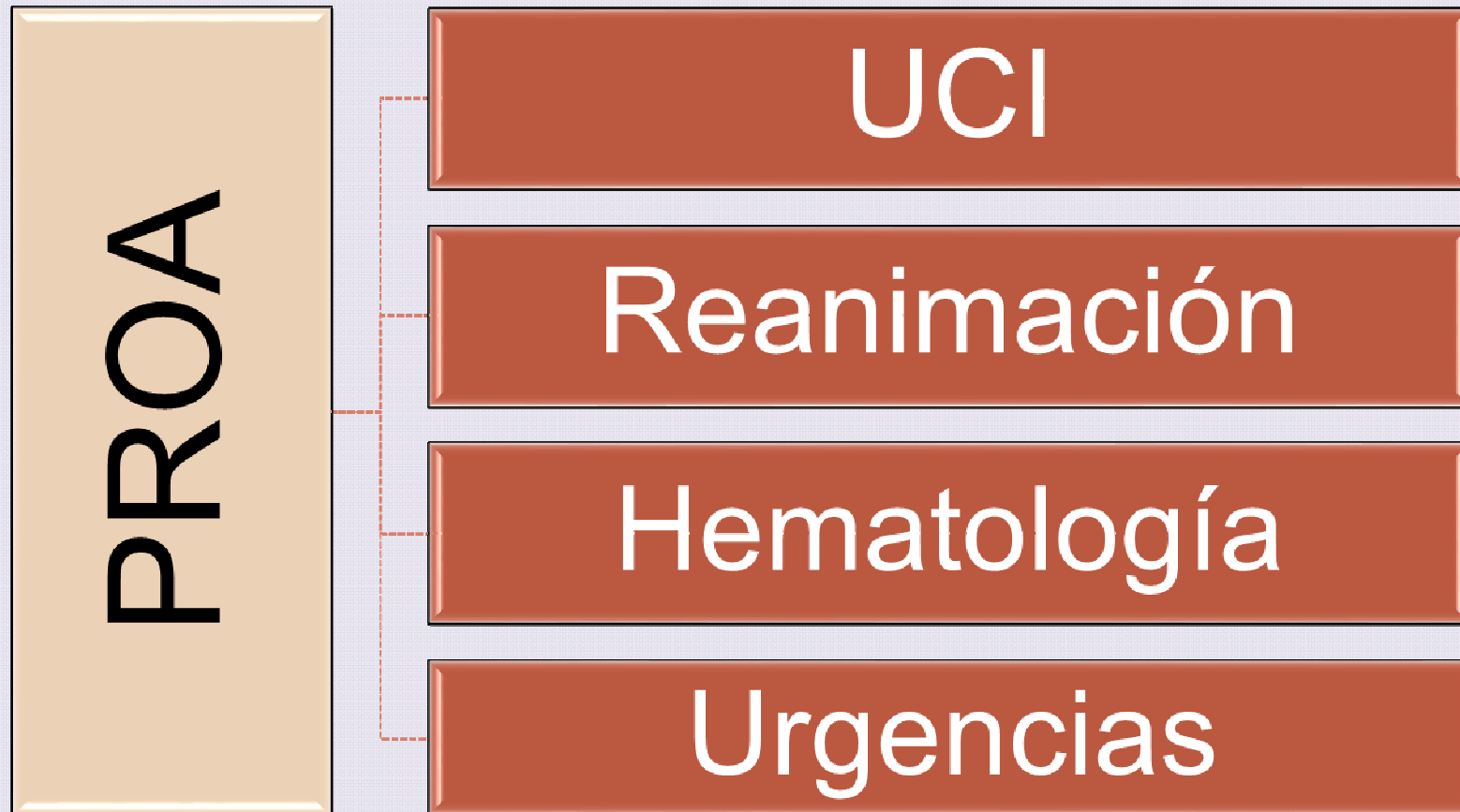
Farmacia

Preventiva

Gerencia

Creación y desarrollo del PROA

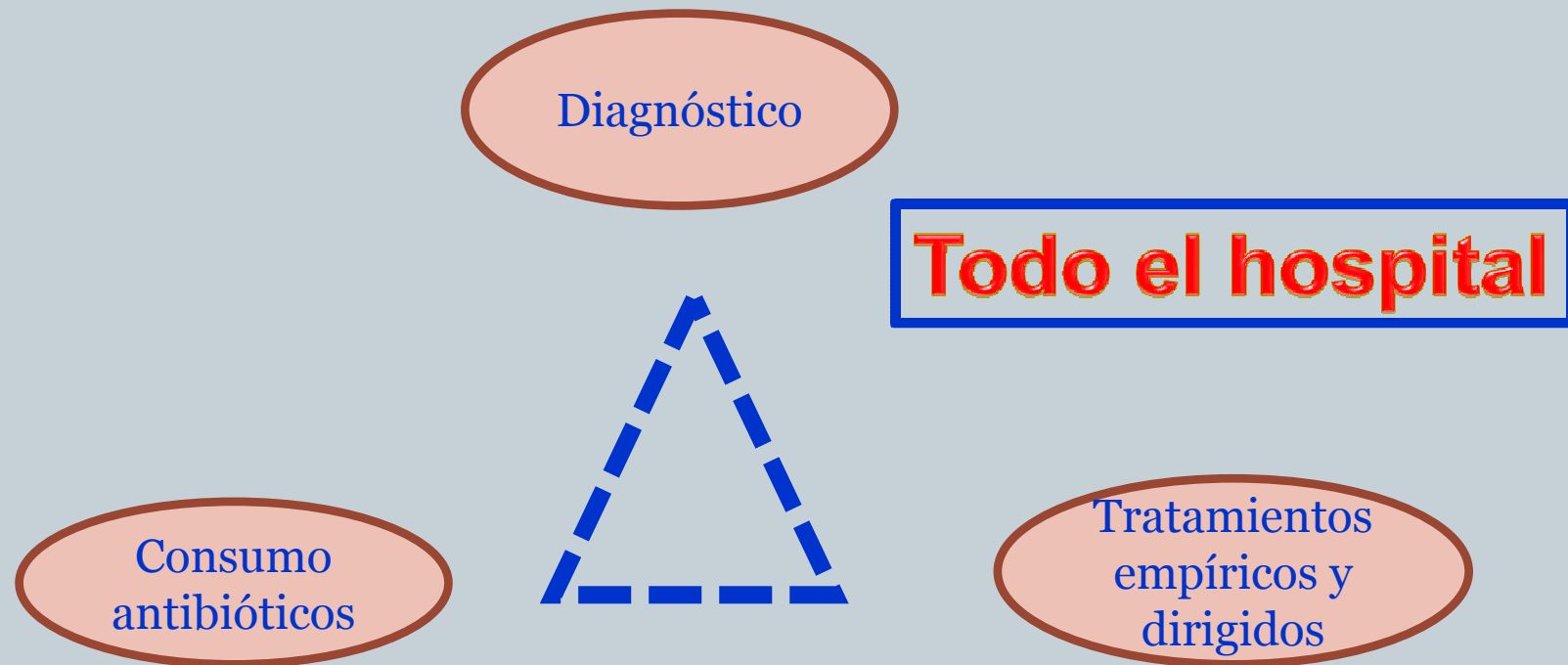
# PROA: Referentes



# OBJETIVOS DEL GRUPO PROA



Mejorar la calidad en la atención a la patología infecciosa en HGUA.



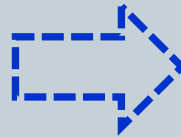
# PROA



## VENTAJAS MAS IMPORTANTES

- ✓ Relación con los clínicos
- ✓ Se pone en valor nuestro trabajo
- ✓ Estímulo para mejorar a nivel interno
- ✓ Justificación para aumentar la Cartera de servicios

Experiencia  
después de 2 años



# RAPIDEZ DIAGNÓSTICA

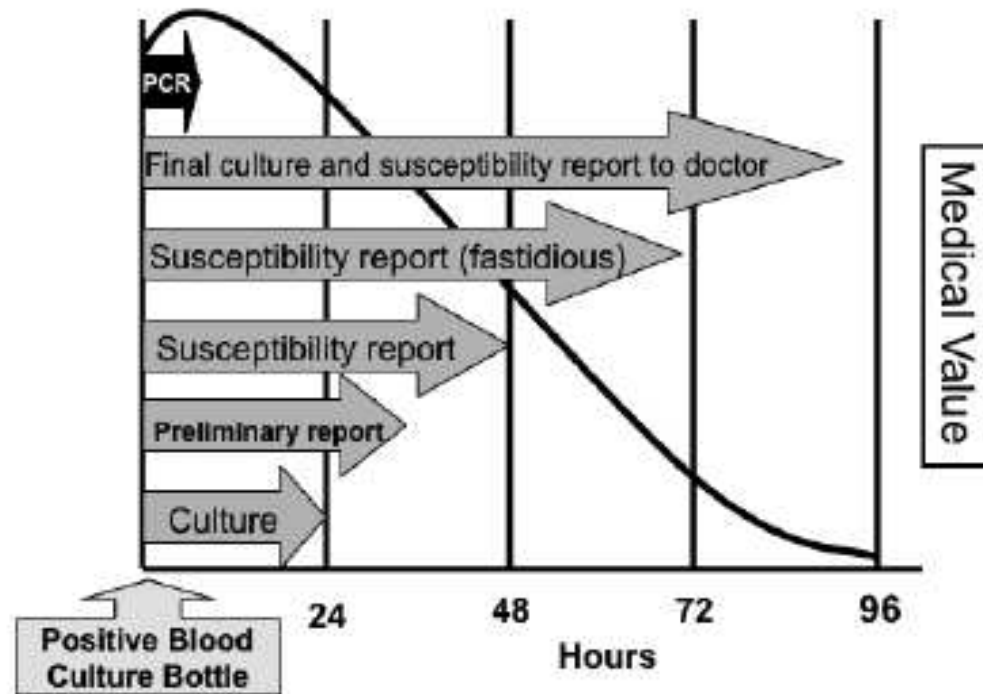


Figure 1. Time required to deliver final results of routine bacterial culture and antimicrobial susceptibility testing versus polymerase chain reaction (PCR) assays.

Using Rapid Diagnostic Tests to Optimize Antimicrobial Selection in Antimicrobial Stewardship Programs

Debra A. Goff, Pharm.D., FCCP, Christopher Jankowski, Pharm.D., and Fred C. Tenover, Ph.D.

# RAPIDEZ DIAGNÓSTICA



## Medical News & Perspectives

### IDSA: Better, Faster Diagnostics for Infectious Diseases Needed to Curb Overtreatment, Antibiotic Resistance

Bridget M. Kuehn, MSJ

#### SAVE LIVES

Better tests can speed the diagnosis of sepsis, a severe and sometimes fatal response to infection. Currently, 20-30% of patients receive inadequate antibiotic therapy for the condition — often leading to death — because it can take 1-5 days to diagnose.<sup>1</sup>



#### REDUCE SIDE EFFECTS

Rates of *Clostridium difficile*, an infection caused by inappropriate antibiotic use, rose 200% from 1996 to 2009.<sup>2</sup> With improved diagnostics, doctors would be better able to target antibiotics to specific infections, potentially reducing the existence of the disease.



#### CURB RESISTANCE

50% or more of people with upper respiratory infections receive antibiotics although most do not need them.<sup>1</sup> Better tests will help doctors prescribe antibiotics only when necessary.



#### DETECT INFECTION

62% of patients with encephalitis — inflammation of the brain often caused by viral infection — remain undiagnosed.<sup>1</sup> New tests for central nervous system infections are desperately needed.



#### LIMIT THE SPREAD

Improved diagnostics could more quickly identify the cause of food-borne illnesses, which currently takes days to weeks.<sup>1</sup>



#### CUT COSTS

Rapid testing for methicillin-resistant *Staphylococcus aureus* (MRSA) has been shown to save \$21,387 per patient.<sup>1</sup> Integration of successful testing protocols into care may be able to reduce the financial burden of healthcare.



<sup>1</sup> IDSA, "Better Tests, Better Care: Improved Diagnostics for Infectious Diseases"

<sup>2</sup> CDC, "Rates of *Clostridium difficile* Infection Among Hospitalized Patients Aged ≥65 Years"

# MICROBIÓLOGOS EN EL PROA

## FUNCIONES

Toma y transporte de muestras

Interpretación correcta resultados

Epidemiología local de resistencias

Estudio in vitro sensibilidad ab

Diagnóstico rápido



CHICAGO JOURNALS



Guidance for the Knowledge and Skills Required for Antimicrobial Stewardship Leaders  
Author(s): Sara E. Cosgrove, MD, MS; Elizabeth D. Hermesen, PharmD, MBA; Michael J. Rybak, PharmD, MPH; Thomas M. File Jr, MD; Sarah K. Parker, MD; Tamar F. Barlam, MD  
Source: *Infection Control and Hospital Epidemiology*, Vol. 35, No. 12 (December 2014), pp. 1444-1451  
Published by: [The University of Chicago Press](#) on behalf of [The Society for Healthcare Epidemiology of America](#)  
Stable URL: <http://www.jstor.org/stable/10.1086/678592>  
Accessed: 17/01/2015 08:46

# ACTIVIDADES PROA



- Programas de Bacteriemias
- Antibióticos restringidos
- Interrupción programada de quimioprofilaxis en cirugía
- Reducción contaminación de los hemocultivos
- Evaluación de secuenciación de antibioterapia parenteral a oral
- Evaluación sistemática de alergias a beta-lactámicos
- Protocolización de nuevas pruebas diagnósticas en Microbiología
- Vigilancia de microorganismos multirresistentes (ESKAPE)
- Programas educacionales

# PROGRAMA BACTERIEMIAS



## DIAGNOSTICO MICROBIOLÓGICO RÁPIDO

- ✓ Tinción de Gram
- ✓ Si BGN o estreptococo: MALDITOF directo del medio líquido
- ✓ Antibiograma por microdilución directamente del frasco positivo
- ✓ **INFORME POR TELÉFONO MÓVIL A INFECCIOSAS Y A UCI**
- ✓ Si es BGN. Ab en 6 horas a CTX y MER
- ✓ Si es pertinente, PCR de SARM (GeneXpert)

**Amplia aceptación  
por todo el centro**

# PROGRAMA BACTERIEMIAS

## DIAGNOSTICO BACTERIEMIAS ASOCIADAS A CATÉTER

- ✓ Diseño de un nuevo volante
- ✓ Tiempo de crecimiento diferencial entre sangre periférica y catéter
- ✓ Actividades formativas

Dificultades  
técnicas

**HEMOCULTIVO EN PORTADOR DE CATÉTER**  
Sección de Microbiología y Parasitología  
Debe llegar URGENTE a Microbiología

ETIQUETA PACIENTE

ESPACIO PARA MICROBIOLOGÍA

PRIMER DE LA TUBA: \_\_\_\_\_ SEGUNDO DE LA TUBA: \_\_\_\_\_

1.-VIA PERIFÉRICA ( x 1 ) :  
Aerobio: Etiqueta frasco \_\_\_\_\_ Anaerobio: Etiqueta frasco \_\_\_\_\_ OBSERVACIONES: \_\_\_\_\_

2.-VIA CENTRAL ( x 3 ) :  
Aerobio: Etiqueta frasco \_\_\_\_\_ Anaerobio: Etiqueta frasco \_\_\_\_\_ Luz/localización: \_\_\_\_\_  
Etiqueta frasco \_\_\_\_\_ Etiqueta frasco \_\_\_\_\_  
Etiqueta frasco \_\_\_\_\_ Etiqueta frasco \_\_\_\_\_

TIPO DE CATÉTER CENTRAL (Marcar tipo de catéter y nº luces del catéter):

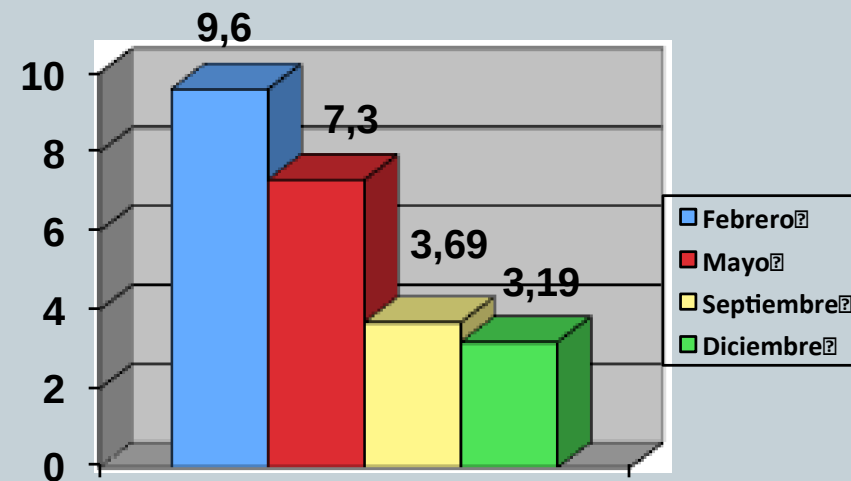
|                | Nº LUCES |
|----------------|----------|
| CVC            | 1 2 3 4  |
| C. ARTERIAL    | 1 2 3 4  |
| HICHMAN        | 1 2      |
| PORT-A-CATH    | 1        |
| C-HEMODIALISIS | 1 2 3    |

# PROGRAMA BACTERIEMIAS



## CONTAMINACIÓN DE HEMOCULTIVOS

- ✓ Charlas a la enfermería de todos los servicios hospitalarios
- ✓ Resultado espectacular pero de corta duración
- ✓ Se están preparando una nueva ronda de charlas formativas



# Programa Bacteriemias



|                         | Período 2011 (%)<br>N = 164 | Período 2013 (%)<br>N=164 | p     |
|-------------------------|-----------------------------|---------------------------|-------|
| Sexo (varones)          | 58                          | 57                        | ns    |
| Edad media              | 67                          | 66                        | ns    |
| I. Charlson>3           | 40                          | 54                        | 0.015 |
| Inmunosupresión         | 55                          | 54                        | ns    |
| Servicios quirúrgicos   | 16                          | 27                        | 0.01  |
| Origen                  |                             |                           |       |
| Nosocomial              | 28                          | 32                        | ns    |
| Comunitaria             | 46                          | 44                        | ns    |
| R. Asistencia sanitaria | 26                          | 24                        | ns    |
| Factores extrínsecos    |                             |                           |       |
| Catéter central         | 25                          | 28                        | ns    |
| Sonda urinaria          | 18                          | 24                        | ns    |
| Cirugía previa          | 20                          | 24                        | ns    |
| Foco clínico            |                             |                           | ns    |
| Clínica                 |                             |                           |       |
| Sepsis/shock séptico    | 23                          | 35                        | 0.015 |
| Tto empírico adecuado   | 69                          | 68                        | ns    |

# Programas Bacteriemias



|                            | Período 2011 (%)<br>N = 164 | Período 2013 (%)<br>N = 164 | p      |
|----------------------------|-----------------------------|-----------------------------|--------|
| P. diagnósticas            | 54                          | 61                          | ns     |
| Cambio Ab (Hemocultivo)    | 38                          | 68                          | 0.001  |
| Tratamiento final          |                             |                             |        |
| Elección                   | 52                          | 70                          | 0.0001 |
| Adecuado                   | 21                          | 23                          | ns     |
| Inadecuado                 | 17                          | 7                           | 0.001  |
| Medidas control del foco   | 39                          | 44                          | ns     |
| Tiempo control foco (días) | 9 (4, 16)                   | 3 (1,6)                     | 0.005  |
| Estancia media (días)      | 16                          | 17                          | ns     |
| Complicaciones             | 18                          | 16                          | ns     |
| Mortalidad                 | 12                          | 11                          | ns     |
| Episodio                   | 18                          | 19                          | ns     |
| 30 días                    |                             |                             |        |

# PROGRAMA BACTERIEMIAS

## FUTURO

Vamos a iniciar un proyecto de investigación para evaluar la utilidad clínica de:

- ✓ MALDI TOF
- ✓ PCR de SARM (Genexpert)
- ✓ Antibiógrama rápido en 6 horas (Vitek, BioMerieux)
- ✓ Microarray de detección de CGP, BGN, levaduras y mecanismos de resistencia

## Sepsis Flow CHIP

A diagnosis kit for nosocomial infections based on multiplex PCR and reverse dot blot hybridization: simultaneous detection of bacteria, fungi and the major resistance genes in a single assay .



### 1.1. Pathogens panel

#### Gram positive:

*Staphylococcus:*  
*S. aureus*  
*Staphylococcus coagulase negative* (CoNS)

- *S. epidermidis*
- *S. haemolyticus*
- *S. capitis*
- *S. hominis-hominis*
- *S. intermedius*

*Enterococcus spp.:*

- *E. faecalis*
- *E. faecium*

*Streptococcus spp.:*

- *S. pasteurianus*
- *S. dysgalactiae*
- *S. gallolyticus*
- *S. macedonicus*
- *S. mitis/oralis*
- *S. salivarius*
- *S. infantarius*
- *S. pyogenes*

*Streptococcus pneumoniae*  
*Streptococcus agalactiae*  
*Listeria monocytogenes*

#### Gram negative:

*Pseudomonas aeruginosa*  
*Acinetobacter baumannii*  
*Stenotrophomonas maltophilia*  
*Escherichia coli*

*Klebsiella pneumoniae*  
*Serratia marcescens*  
*Enterobacter spp.:*  
- *E. aerogenes*  
- *E. cloacae*  
*Proteus mirabilis*  
*Neisseria meningitidis*

#### Fungi:

*Candida spp.:*  
- *C. tropicalis*  
- *C. glabrata*  
*C. albicans*

### 1.2. Antibiotic resistance markers

#### Gram-positive:

- *mecA*: for *S. aureus* (MRSA)
- *vanA* y *vanB*: for *Enterococcus spp.* (VRE)

#### Gram-negative:

- Extended spectrum  $\beta$ -lactamases (ESBLs):  
- *blaTEM*  
- *blaSHV*  
- *blaCTX-M*

#### Carbapenemases:

- *kpc*
- *sme*
- *nmc/imi*
- *ges*
- *vim*
- *gim*
- *spm*
- *ndm*
- *sim*
- *imp*
- *oxa23* like
- *oxa24* like
- *oxa48* like
- *oxa51* like
- *oxa58* like

# CONTROL DE AB RESTRINGIDOS



## PROCEDIMIENTO

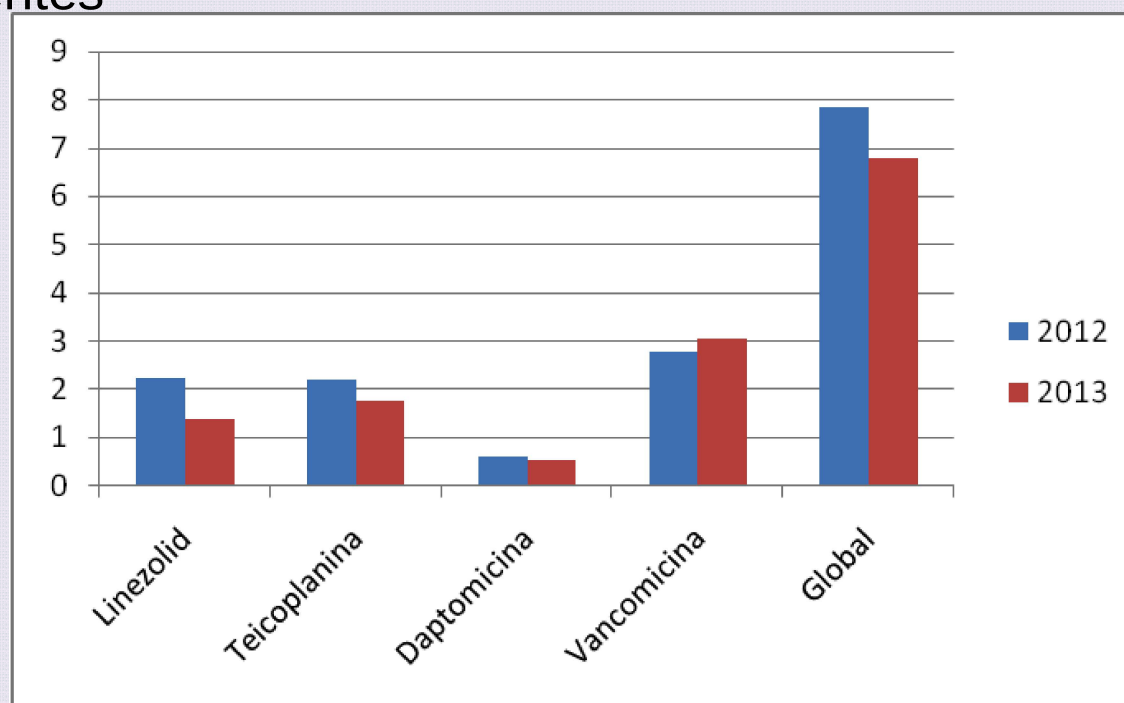
- ✓ Farmacia informa de los antibióticos restringidos
- ✓ Infecciosas valora su idoneidad en función de los datos microbiológicos, etc.
- ✓ Se seleccionan en función de:
  - ✓ Impacto ecológico: desarrollo de resistencias
  - ✓ Restringir Ab con indicación "selectiva"
  - ✓ Abordable
  - ✓ Coste económico.

Linezolid  
Teicoplanina  
Ertapenem  
Daptomicina  
Tigeciclina  
Antifúngicos

# Programa Ab restringidos



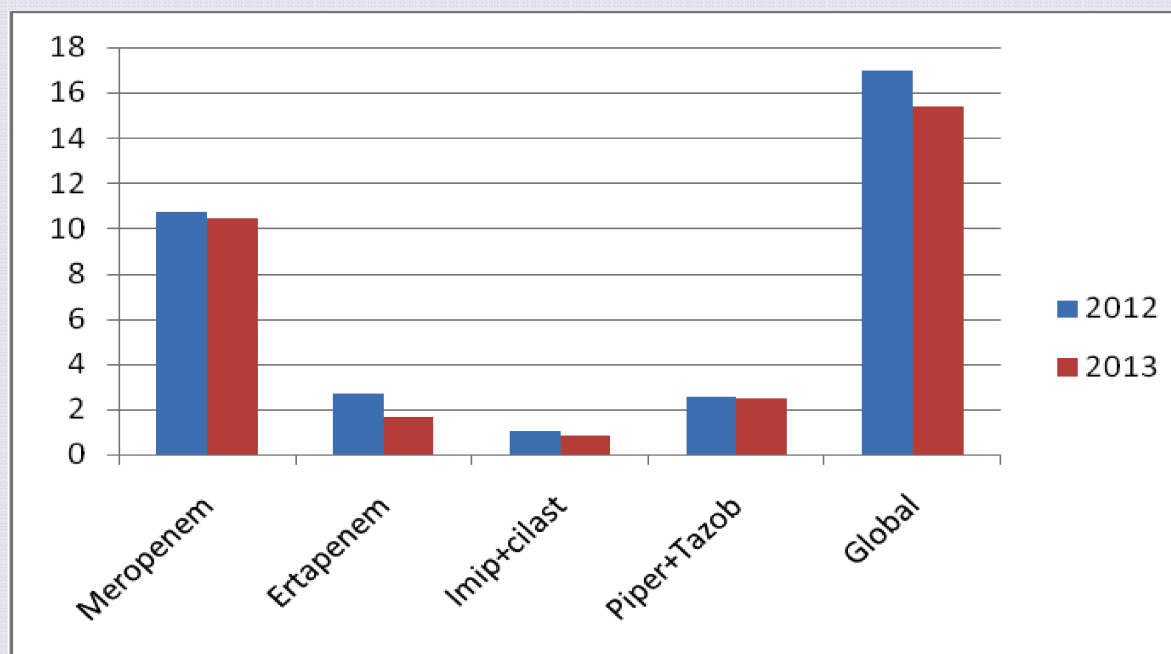
Evolución del consumo de ATB (DED) frente a Gram (+) resistentes



# Programa Ab restringidos



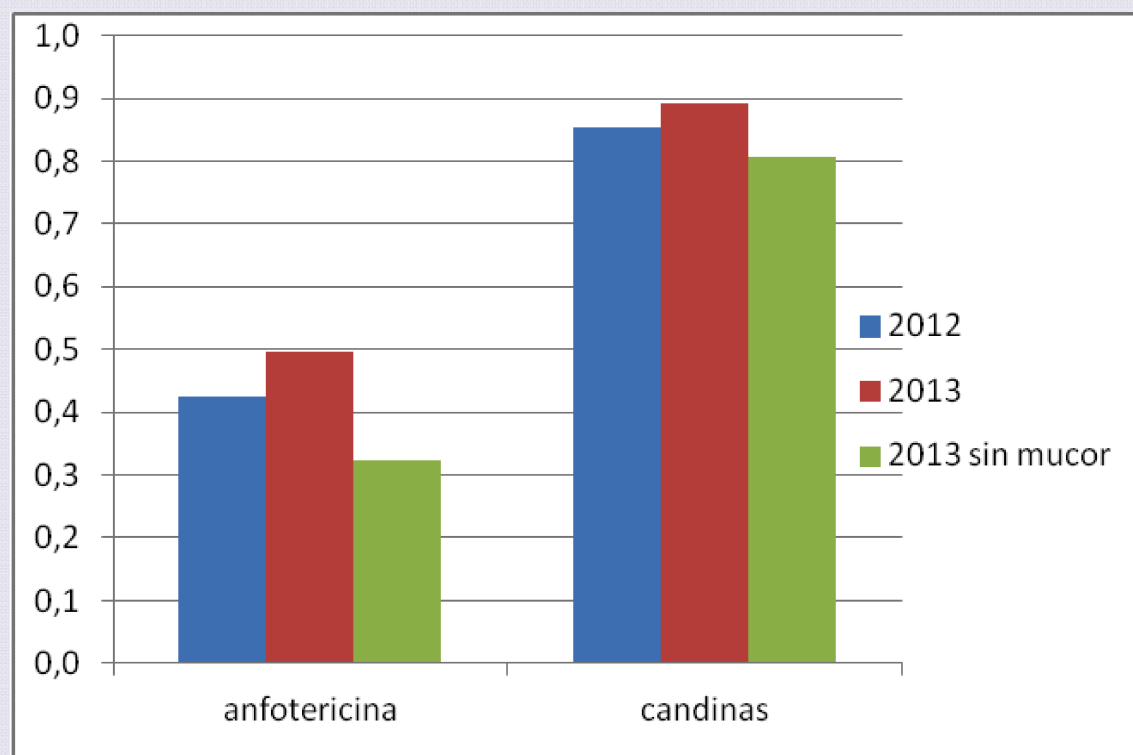
Evolución del consumo de beta-lactámicos de amplio espectro (DED)



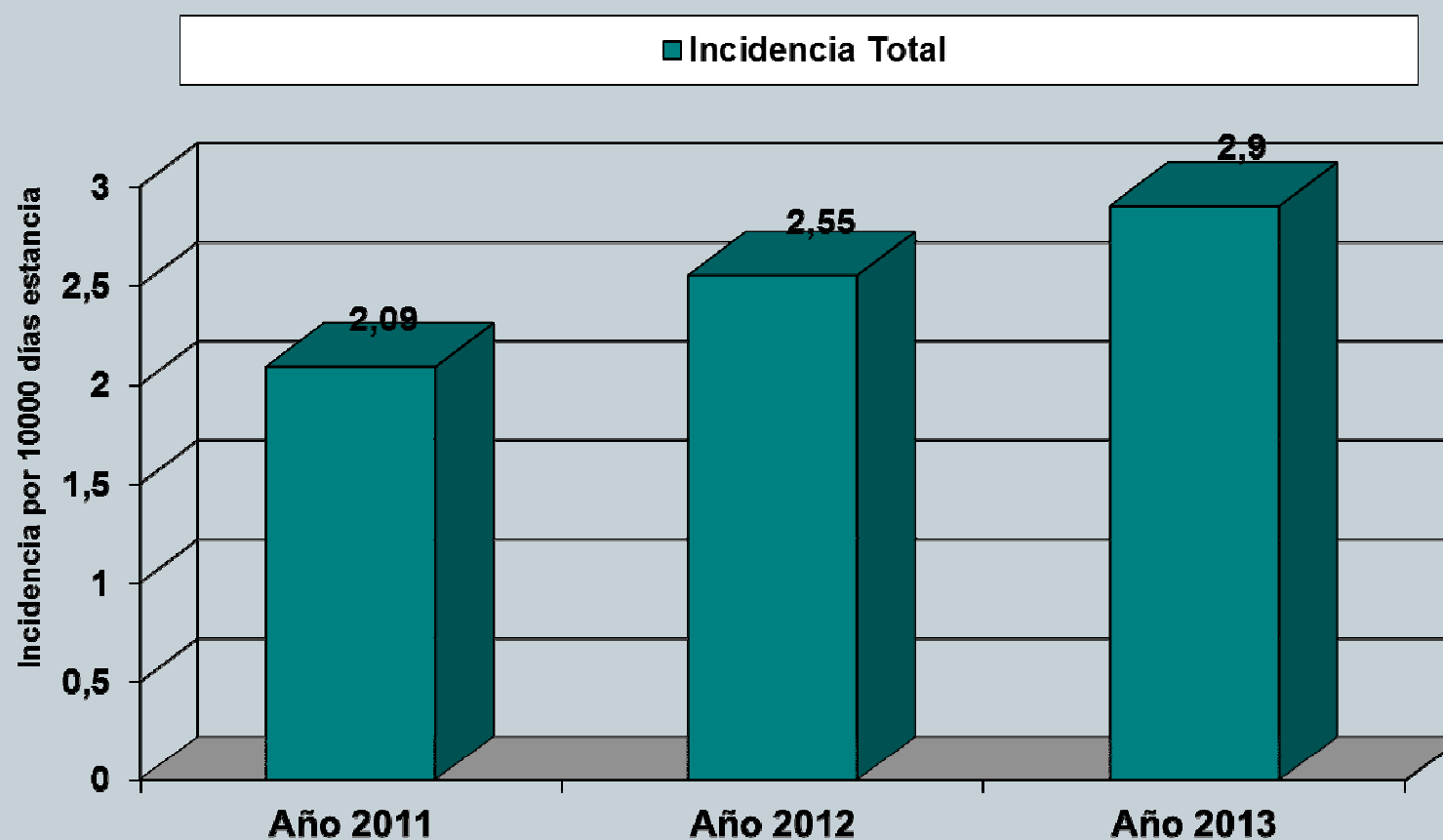
# Programa Ab restringidos



## Evolución del consumo de antifúngicos amplio espectro en DED



# CLOSTRIDIUM DIFFICILE



# UNIDAD DE ANTIBIÓTICOS



## UNIDAD DE ANTIBIÓTICOS

- ✓Instauración de los criterios EUCAST
- ✓Creación de la Unidad de antibióticos con un facultativo responsable
- ✓Revisión de todos los protocolos
- ✓Inclusión de controles de calidad periódicos en todos los microorganismos
- ✓Confirmación sistemática de resistencia a carbapenems y a colistina
- ✓Informe local de la epidemiología de la resistencias: **DIFUSIÓN**

### Epidemiología de resistencias a antimicrobianos 2013

Hospital General Universitario de Alicante  
S. Microbiología. Unidad de Antibióticos  
A. Sánchez Bautista

|                                                                                |                                 |
|--------------------------------------------------------------------------------|---------------------------------|
| H.G.U. Alicante – S. Microbiología y Parasitología                             | Página 1 de 36                  |
| Sección: <b>PNT de Antibiogramas</b><br><b>1.- ATB por Métodos de Difusión</b> |                                 |
| Incluido en: <b>PNT DEL LABORATORIO</b>                                        | Texto original : Julio de 2013  |
| Aprobado por : <b>Dr. Rodríguez</b>                                            | <b>Dra. A. Sánchez Bautista</b> |

# GRUPO ESKAPE

## INTERVENCIÓN

- ✓ Detección rápida
  - ✓ MALDI TOF
- ✓ Confirmación de la resistencia:
  - ✓ Protocolizada
    - Carbapenems
    - Colistina
  - ✓ Con controles de calidad

## COMUNICACIÓN ONLINE iGESTLAB INFECCIOSAS

- ✓ Paciente

### MICROORGANISMOS

*Escherichia coli* resistente a  
cefalosporinas de tercera o  
carbapenems

*Stenotrophomonas maltophilia*

*Klebsiella pneumoniae* resistente a  
cefalosporinas de tercera o  
carbapenems

*Acinetobacter baumannii*

*Pseudomonas aeruginosa*  
multirresistente

*Enterobacter multirresistente*

# FUTURO



Disminuir el tiempo de  
respuesta

Diagnostico de las  
infecciones fúngicas  
invasoras

# FUTURO



- ✓ Detección rápida de microorganismos y mecanismos de resistencia en muestras clínicas o hemocultivos positivos
- ✓ Mejorar la fiabilidad de los estudios de sensibilidad
- ✓ Mejorar las vías tecnológicas de comunicación

## Review of Rapid Diagnostic Tests Used by Antimicrobial Stewardship Programs

Karri A. Bauer,<sup>1</sup> Katherine K. Perez,<sup>2,3,4</sup> Graeme N. Forrest,<sup>5</sup> and Debra A. Goff<sup>1</sup>

<sup>1</sup>Department of Pharmacy, The Ohio State University Wexner Medical Center, Columbus; Departments of <sup>2</sup>Pharmacy, and <sup>3</sup>Pathology and Genomic Medicine, Houston Methodist Hospital, and <sup>4</sup>Center for Outcomes Research, Houston Methodist Research Institute, Texas; and <sup>5</sup>Division of Infectious Diseases, Portland Veterans Affairs Medical Center, Oregon

## Molecular Detection of Antibiotic Resistance Genes from Positive Blood Cultures

Musa Y. Hindiyyeh, Gill Smollan, Shiraz Gefen-Halevi, Ella Mendelson, and Nathan Keller

Abstract

## Real-Time PCR-Based Identification of Bacterial and Fungal Pathogens from Blood Samples

Madeleine Mai, Iris Müller, Daniela Maneg, Benedikt Lohr, Achim Haecker, Gerd Haberhausen, and Klaus-Peter Hunfeld

# ¿ES UTIL NUESTRO TRABAJO?

## PARÁMETROS A CONTROLAR

Hemocultivos contaminados

Tiempo de transporte de las muestras

Tiempo de respuesta preliminar

Tiempo de respuesta definitivo

Curr Infect Dis Rep (2014) 16:433  
DOI 10.1007/s11908-014-0433-x

HEALTHCARE ASSOCIATED INFECTIONS (G BEARMAN AND D MORGAN, SECTION EDITORS)

### Antimicrobial Stewardship—Qualitative and Quantitative Outcomes: The Role of Measurement

Ed Septimus

**Table 2** Suggested measures for antimicrobial stewardship

- Antimicrobial consumption
  - Defined daily dose (DDD)
  - Days on therapy (DOT)
  - Days present
- Process measures
  - An indication is provided with each antimicrobial start
  - Appropriateness of therapy
  - De-escalation process in place
  - A process is in place to review positive blood cultures to ensure optimal antimicrobial therapy
  - Antimicrobials not prescribed to treat asymptomatic bacteriuria
  - Appropriate cultures are obtained before starting antibiotics
  - Adherence to hospital-specific guidelines
  - Acceptance of ASP recommendations
- Outcome measures
  - Length of stay
  - Cure of infection
  - Risk-adjusted mortality
  - Adequacy of initial therapy
  - Reduced duration of therapy
  - Reduced hospital readmissions for select infections
  - Reduced hospital-onset *Clostridium difficile* infections
  - Reduced adverse event
  - Reduced antimicrobial resistance
- Financial
  - Antimicrobial cost per patient day
  - Antimicrobial cost per admission

# COMUNICACIÓN

## PROCEDIMIENTOS

Gestlab

Teléfono

4 grupos de whatsapp

Programa Quip (en nube)

(1) Bacteriemias - Quip <https://quip.com/>

Escritorio

Una Gimeno ha creado el documento

Una Gimeno ha editado el documento a las 15:15 por la Web - [Revertir](#)

### Bacteriemias

| A          | B       | C                  | D        | E     | F                | G                                | H                    |
|------------|---------|--------------------|----------|-------|------------------|----------------------------------|----------------------|
| Fecha      | SIP     | Nombre             | Servicio | Cama  | Hemocultivo +    | Tinción Gram                     | Microorganismos      |
| 28/12/2015 | 5302534 | memio canto f      | cva      | 4092  | 2 de 3           | bgn                              | no id                |
|            | 5587419 | moreno gomez e     | c.gral   | 9271  | 3 de 3           | bgn                              | e.coli               |
|            | 1332930 | fernandes verde mc | uel      | 874u  | vc1 (no hay vp)  | estaf                            |                      |
|            | 639224  | navarro perez e    | rog      | 6072  | lor x2 (rand)    | bgn y estreptos no identificados | s.marcescens+moraxel |
|            | 730665  | cago castaño i     | onc      | 7472  | vc               | bgn y estaf                      | s.aureus+e.coliaceae |
|            | 1636205 | ramos miquel g     | uic      | 11009 | 2 de 2           | estaf                            |                      |
|            | 691008  | lloret morato a    | uro      |       | 1 de 2 110 horas | bgn                              |                      |
|            | 546237  | Mila Vicedo, E     | UEI      | 869   | 2 de 2           | BGN                              |                      |

Una Gimeno ha añadido a Esperanza Memio, Javier Cos, Pedro Luis Garzañu Chiriquy y Vicente Bos al documento

Una Gimeno ha editado el documento a las 15:15 por la Web - [Revertir](#)

| A             | B   | C      |
|---------------|-----|--------|
| Fecha         | SIP | Nombre |
| 28/12/2015    |     |        |
| 5302534       |     |        |
| memio canto f |     |        |
| cva           |     |        |
| 4092          |     |        |
| 2 de 3        |     |        |

1 de 1 29/01/2015 10:01



# Nuevas tecnologías de la información

- ✓ Sistemas expertos de comunicación con el clínico
- ✓ Automatización total del Laboratorio
- ✓ Telemicrobiología
- ✓ Bases de datos multicéntricas: REDMIVA

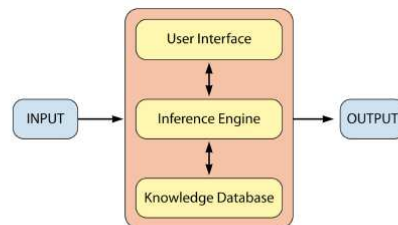
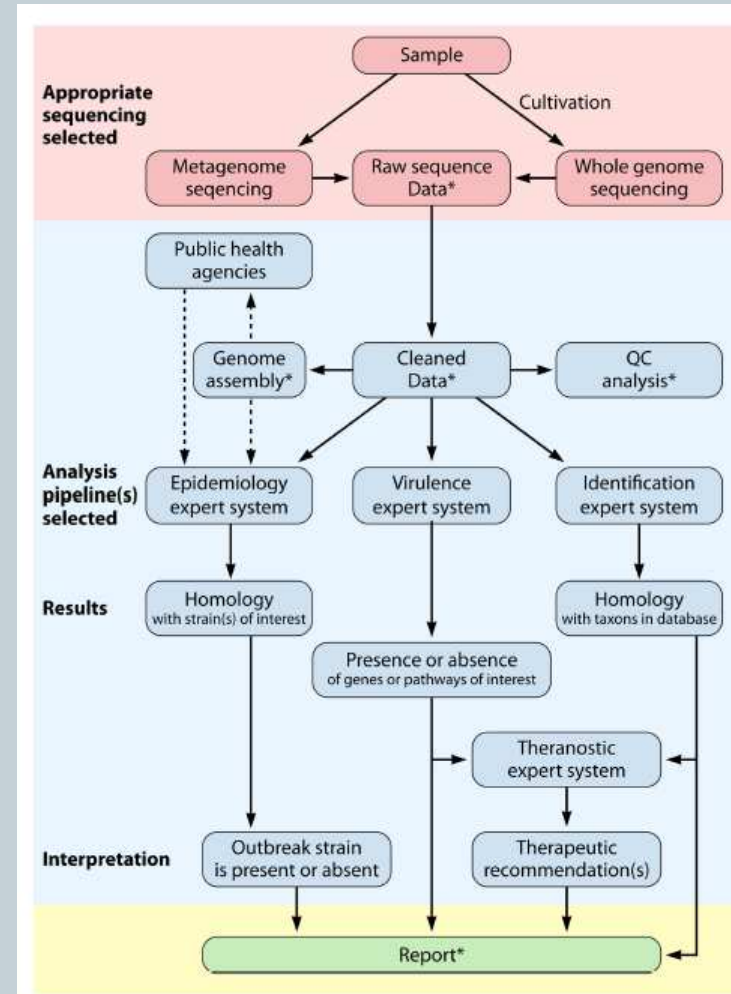


FIG 2 Schematic representation of an expert system. An expert system is a form of artificial intelligence that allows a user to use software rules (inference engine) together with a knowledge database to make a conclusion (output) about an input.



## Clinical Microbiology Informatics

Daniel D. Rhoads,<sup>a</sup> Vitali Sintchenko,<sup>b,c</sup> Carol A. Rauch,<sup>d</sup> Liron Pantanowitz<sup>a</sup>



# Nuevas tecnologías de la información



**Table 1. Electronic Health Records and Clinical Decision Support Systems Currently Available in the United States**

| Feature                                             | EHRs       |                             | CDSSs              |                            |                       |                               |                       |
|-----------------------------------------------------|------------|-----------------------------|--------------------|----------------------------|-----------------------|-------------------------------|-----------------------|
|                                                     | Epic       | Cerner                      | TheraDoc (Premier) | SafetySurveillor (Premier) | QC PathFinder (Vecna) | Sentri7 (Pharmacy OneSource)  | MedMined (CareFusion) |
| EHR integration                                     | NA         | NA                          | Yes                | No                         | Yes                   | Yes                           | No                    |
| Treatment guidelines                                | Order sets | Order sets                  | Yes                | No                         | No                    | Yes (via embedded hyperlinks) | No                    |
| Real-time alerts                                    | Yes        | Yes (with IT customization) | Yes                | Yes                        | Yes                   | Yes                           | Yes                   |
| Delayed alerts*                                     | Yes        | No                          | No                 | Yes                        | Yes                   | Yes                           | Yes                   |
| Customizable alerts                                 | Yes        | Yes (with IT customization) | Yes                | Yes                        | Yes                   | Yes                           | Yes                   |
| Clinical information                                | Yes        | Yes                         | Yes                | Yes                        | No                    | Yes                           | Yes                   |
| Infection control software                          | Yes        | No                          | Yes                | Yes                        | Yes                   | Yes                           | Yes                   |
| Institutional antibiogram                           | Yes        | No                          | Yes                | Yes                        | Yes                   | Yes                           | Yes                   |
| Unit antibiogram                                    | Yes        | No                          | Yes                | Yes                        | Yes                   | Yes (available in June 2014)  | Yes                   |
| Prescriber metrics                                  | Yes        | No                          | Yes                | Yes                        | No                    | No                            | Yes                   |
| Patient outcome tracking and reporting capabilities | No         | No                          | No                 | No                         | No                    | No                            | No                    |
| Product cost                                        | ++++       | ++++                        | ++++               | +++                        | +++                   | +++                           | +++                   |

Abbreviations: +++, >\$100K; +++, >\$500K; CDSS, clinical decision support system; EHR, electronic health record; IT, information technology; NA, not applicable.

\* With the delayed-alert feature, alerts do not occur in real time but 2–3 times a day, depending on how data from the hospital warehouse are uploaded to the server.

## Use of Electronic Health Records and Clinical Decision Support Systems for Antimicrobial Stewardship

Graeme N. Forrest,<sup>1</sup> Trevor C. Van Schooneveld,<sup>2</sup> Ravina Kullar,<sup>3</sup> Lucas T. Schulz,<sup>4</sup> Phu Duong,<sup>5</sup> and Michael Postelnick<sup>6</sup>

<sup>1</sup>Division of Infectious Diseases, Portland Veterans Affairs Medical Center, Portland, Oregon; <sup>2</sup>University of Nebraska Medical Center, Omaha; <sup>3</sup>Global Medical Affairs, Cubist Pharmaceuticals, Lexington, Massachusetts; <sup>4</sup>University of Wisconsin Hospital and Clinics, Madison; and <sup>5</sup>Northwestern Memorial Hospital, Chicago, Illinois

# FUTURO



*J Antimicrob Chemother* 2013; **68**: 2421–2423  
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**Journal of  
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## **Antimicrobial stewardship: English Surveillance Programme for Antimicrobial Utilization and Resistance (ESPAUR)**

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**Infrautilización  
Redmiva**

# INFORMACIÓN ADICIONAL



**Table 1**

Institutions with an open-access antimicrobial stewardship website

| Institution                              | URL                                                                                                                               |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Johns Hopkins (Baltimore)                | <a href="http://www.hopkinsmedicine.org/amp/about/">http://www.hopkinsmedicine.org/amp/about/</a>                                 |
| The Nebraska Medical Center              | <a href="http://www.nebraskamed.com/careers/education-programs/asp">http://www.nebraskamed.com/careers/education-programs/asp</a> |
| University of Miami                      | <a href="http://ugotabug.med.miami.edu/">http://ugotabug.med.miami.edu/</a>                                                       |
| University of California San Francisco   | <a href="http://clinicalpharmacy.ucsf.edu/idmp/">http://clinicalpharmacy.ucsf.edu/idmp/</a>                                       |
| University of Pennsylvania Health System | <a href="http://www.uphs.upenn.edu/bugdrug/">http://www.uphs.upenn.edu/bugdrug/</a>                                               |

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Initiatives and resources to promote antimicrobial stewardship

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