Spectrum of *Clostridum difficile* infections: Clinical situations in real life

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Disclosures

Participation in meetings and advisory boards with:

Pfizer, Novartis, Janssen, Baxter, McDonalds, Astellas, Wyeth Lederle, Optimer

Several Scientifc Societies and non-profit

Nothing to disclose for this conference

Pfizer, Astra-Zeneca, Novartis, Schering-Plough y and other pharmaceutical companies. Covidien

FIS, CIBER Enf Respiratorias, REIPI, Mutua Madrileña, European Community funds. Fundación del Pino

Payment for conferences:

Pfizer, Novartis, Astellas, Wyeth Lederle, Cepheid and other private and public sources

To deliver a talk

Clinical issues

My own experience

Real life

A prospective study at HGUGM

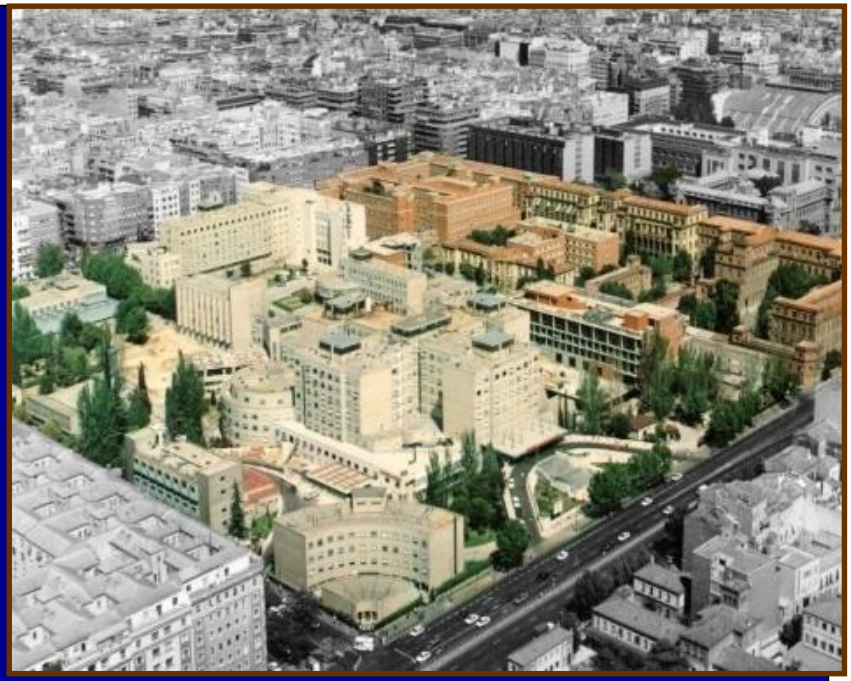
CDI: Gregorio Marañon (HGUGM) Study

Large Teaching Hospital
1500 beds

Area of service
715.000 inhabitants

Jan-Jun 2013
Follow up Oct 2013

All diarrheic samples.



Reigadas E, Bouza E. J.Infect. 2015; 70:264-272

HGUGM Study

Study period:January-June 2013

All unformed stool samples

- HGUGM (1,550 beds)
- 13 Outpatient centers (Area 1 Madrid)

4098 Samples

308 C.dif

59 (Children < 2 y, excluded)

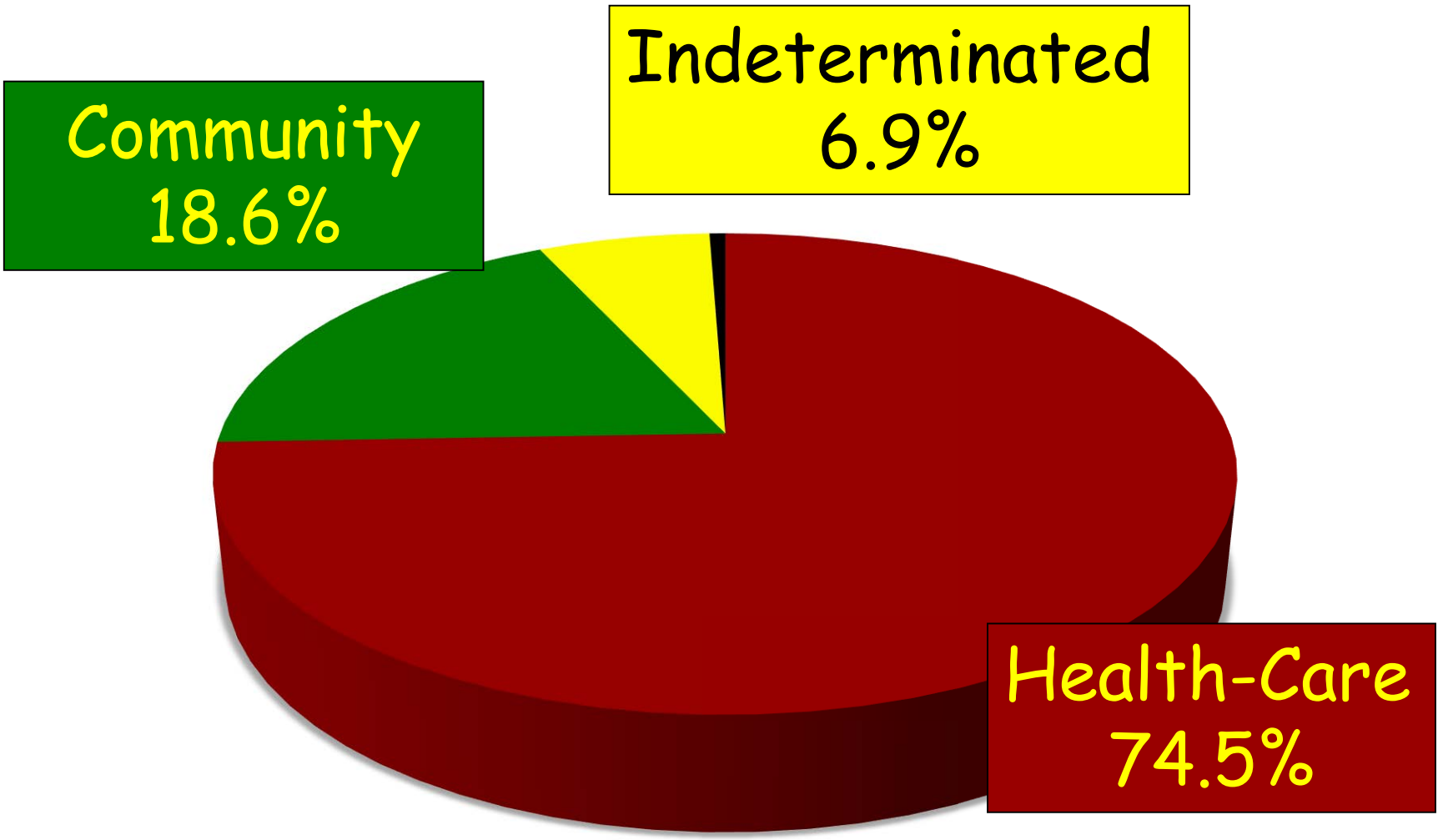
249 Pos >2 y

204 CDI

45 (18%) (No full clinical criteria, excluded)

Reigadas E, Bouza E. J.Infect. 2015; 70:264-272

CDI: Origin of the episodes. HGUGM



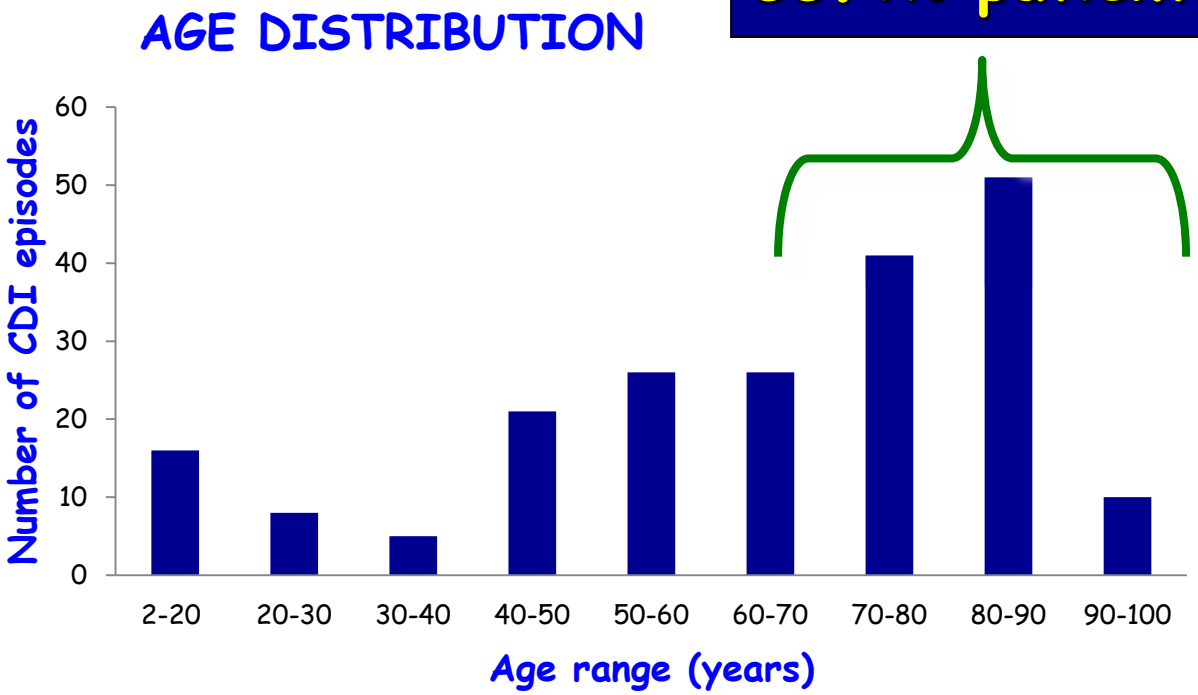
Reigadas E, Bouza E. J.Infect. 2015; 70:264-272

CDI: Gregorio Marañon Study: Results

Male 52.5%

Median age 69.6 y

55.4% patients >65 y



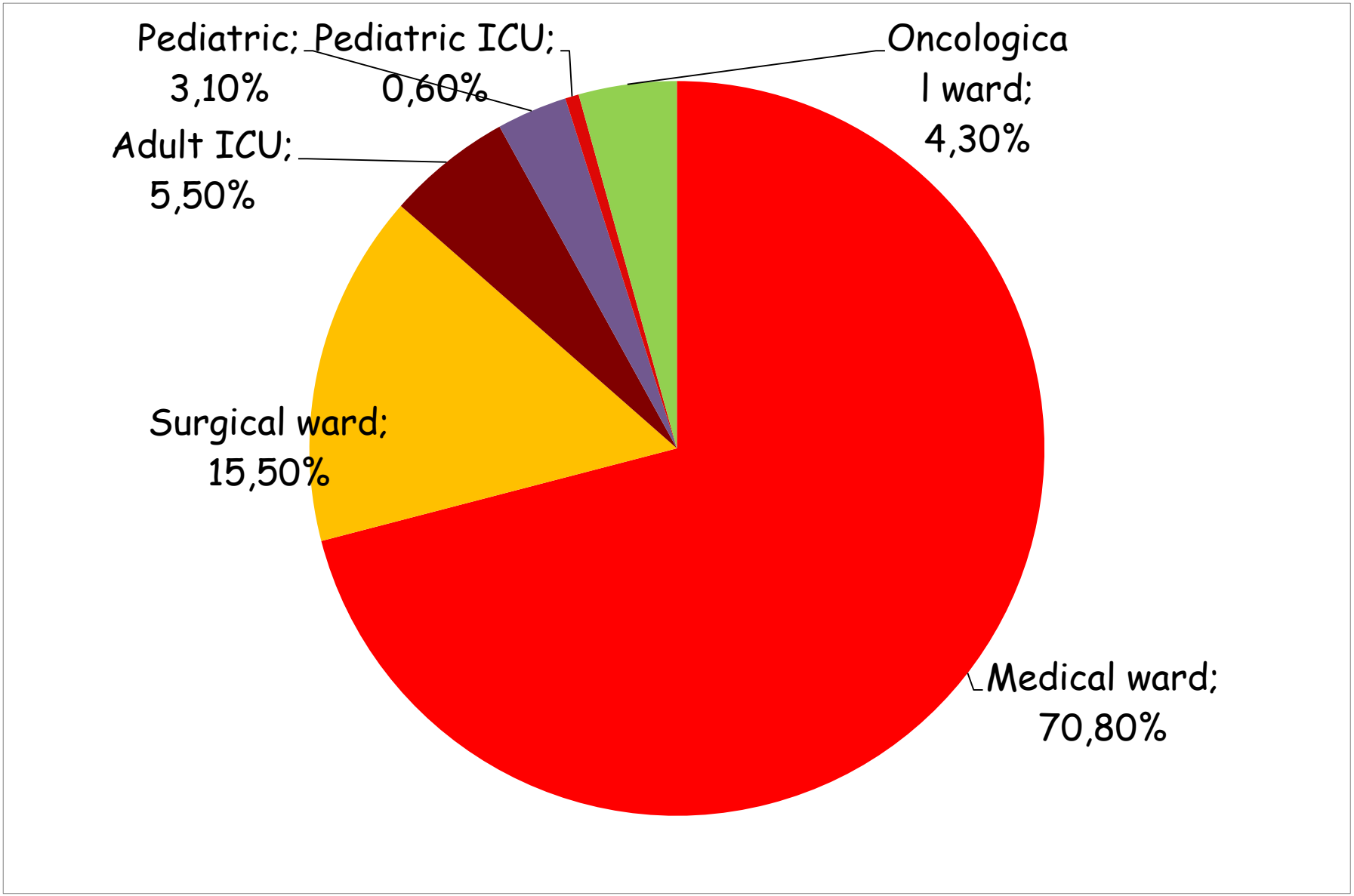
Reigadas E, Bouza E. J.Infect. 2015; 70:264-272

CDI: Gregorio Marañon Study: Results

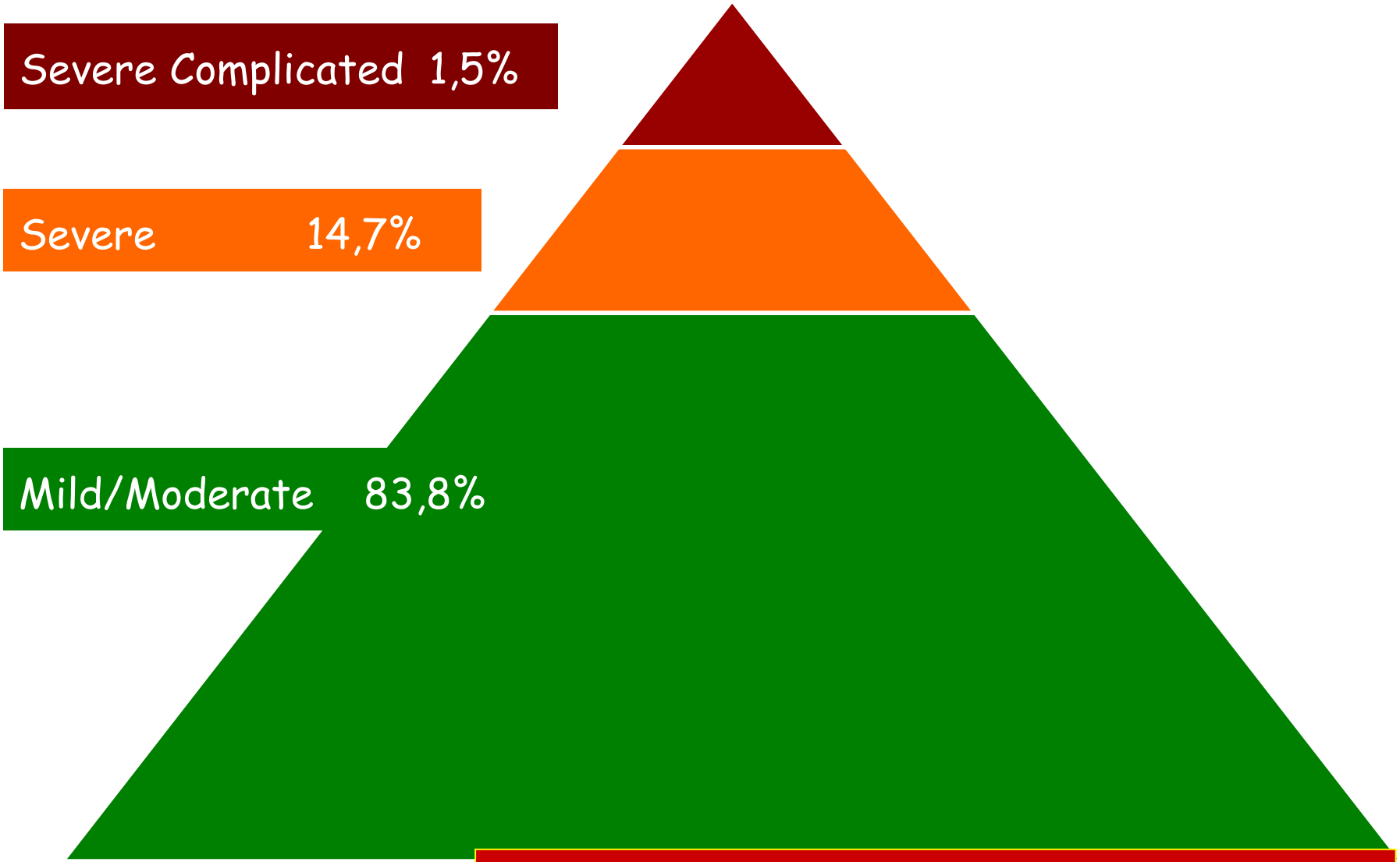
Main Underlying Diseases	
None	12 (5.9%)
Transplant recipient	14 (6.9%)
Cardiovascular	41 (20.1%)
Malignancy	46 (22.5%)
Neurologic	19 (9.3%)
Gastrointestinal	17 (8.3%)
Nephro-urologic	12 (5.9%)

Reigadas E, Bouza E. J.Infect. 2015; 70:264-272

Hospitalization Unit.

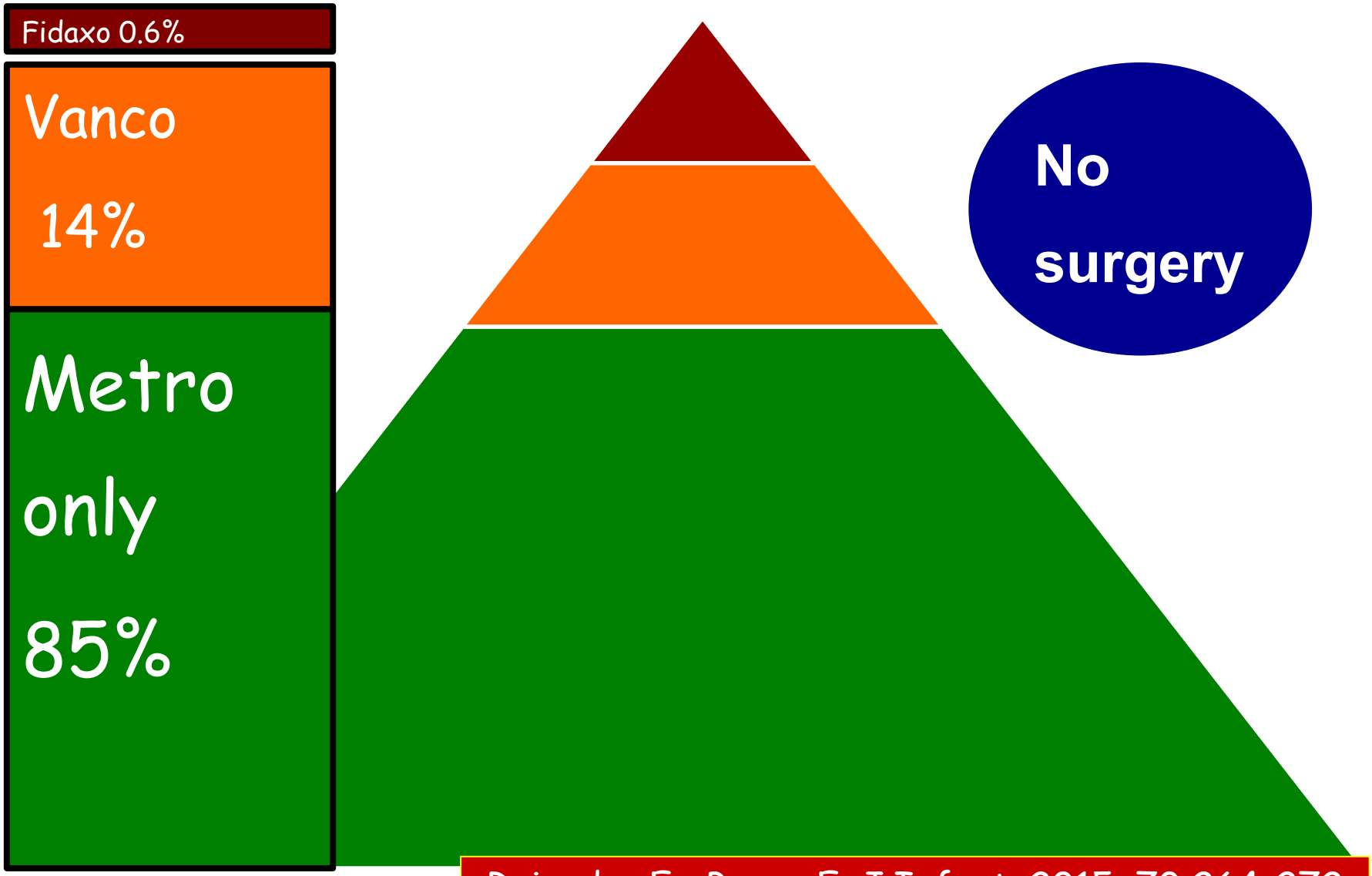


CDI: Severity Classification



Reigadas E, Bouza E. J.Infect. 2015; 70:264-272

CDI: Severity Classification



Reigadas E, Bouza E. J.Infect. 2015; 70:264-272

HGUGM Study: ICU admission

1.5% of patients were admitted to the ICU in relation to the CDI episode

Reigadas E, Bouza E. J.Infect. 2015; 70:264-272

HGUGM Study: Recurrence

204 episodes

33 1st Recurrence

16.2%

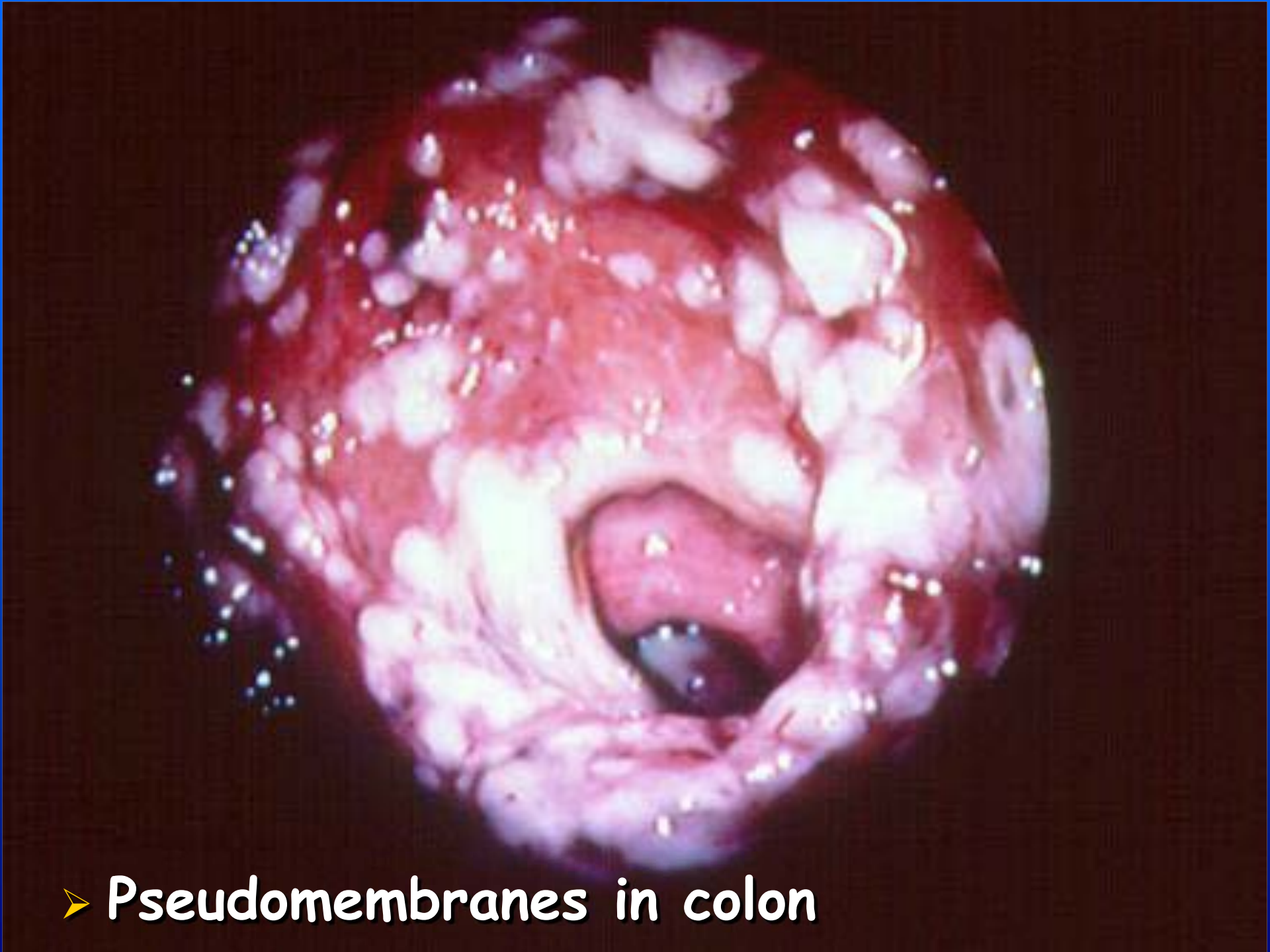
10 had ≥ 2 episodes

Median age 72.7 y

79% Health-Care Onset

Reigadas E, Bouza E. J.Infect. 2015; 70:264-272

Uncommon clinical manifestations



- Pseudomembranes in colon

Clinical manifestations: Leukocytosis

Conditions Associated with Leukocytosis in a Tertiary Care Hospital, with Particular Attention to the Role of Infection Caused by *Clostridium difficile*

Hospitalized patients

WBC 15.000 µL

Prospective study of 400 patients

Infectious disease in 207 cases (53%)

Wanahita A. C.I.D. 2002;34: 1585-1592.

Clinical manifestations: Leukocytosis

Type of infection	15,000 - 19,999	20,000 -29,999	≥ 30,000	Total
Lung	49%	40%	56%	47%
I.T.U.	29%	30%	25%	29%
Soft tissue	17%	20%	6%	16%
Abdominal	5%	12%	6%	8%
Vascular	1%	4%	16%	4%
Osteo-A	3%	5%	0	3%
C. diffic.	11%	15%	34%	16%
Other	6%	5%	13%	7%

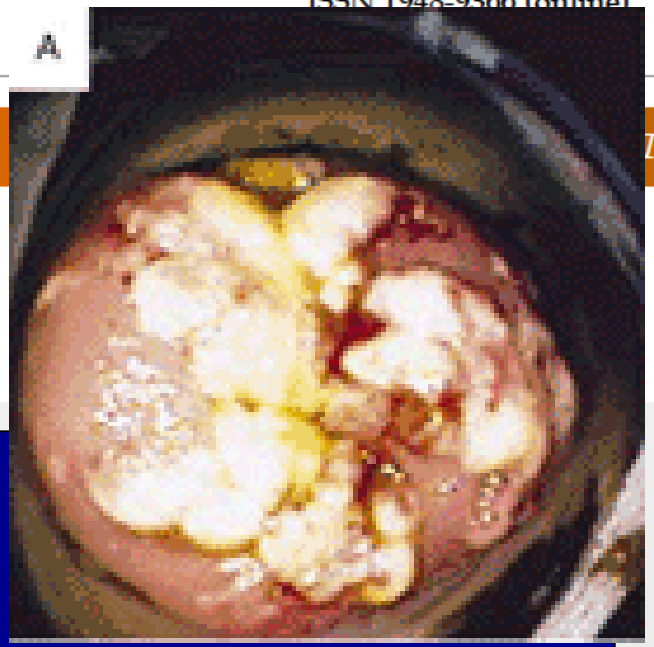
Wanahita A. C.I.D. 2002;34: 1585-1592.

Clinical manifestations: Extra-colonic

World Journal of Gastrointestinal Surgery

Online Submissions: http://www.wjgnet.com/esps/
wjgs@wjgnet.com
doi:10.4240/wjgs.v5.i3.37

World J Gastrointest Surg 2013 March 27; 5(3): 37-42
ISSN 1948-9366 (online)



***Clostridium difficile* enteritis: A report systematic literature review**

83 cases collected overall

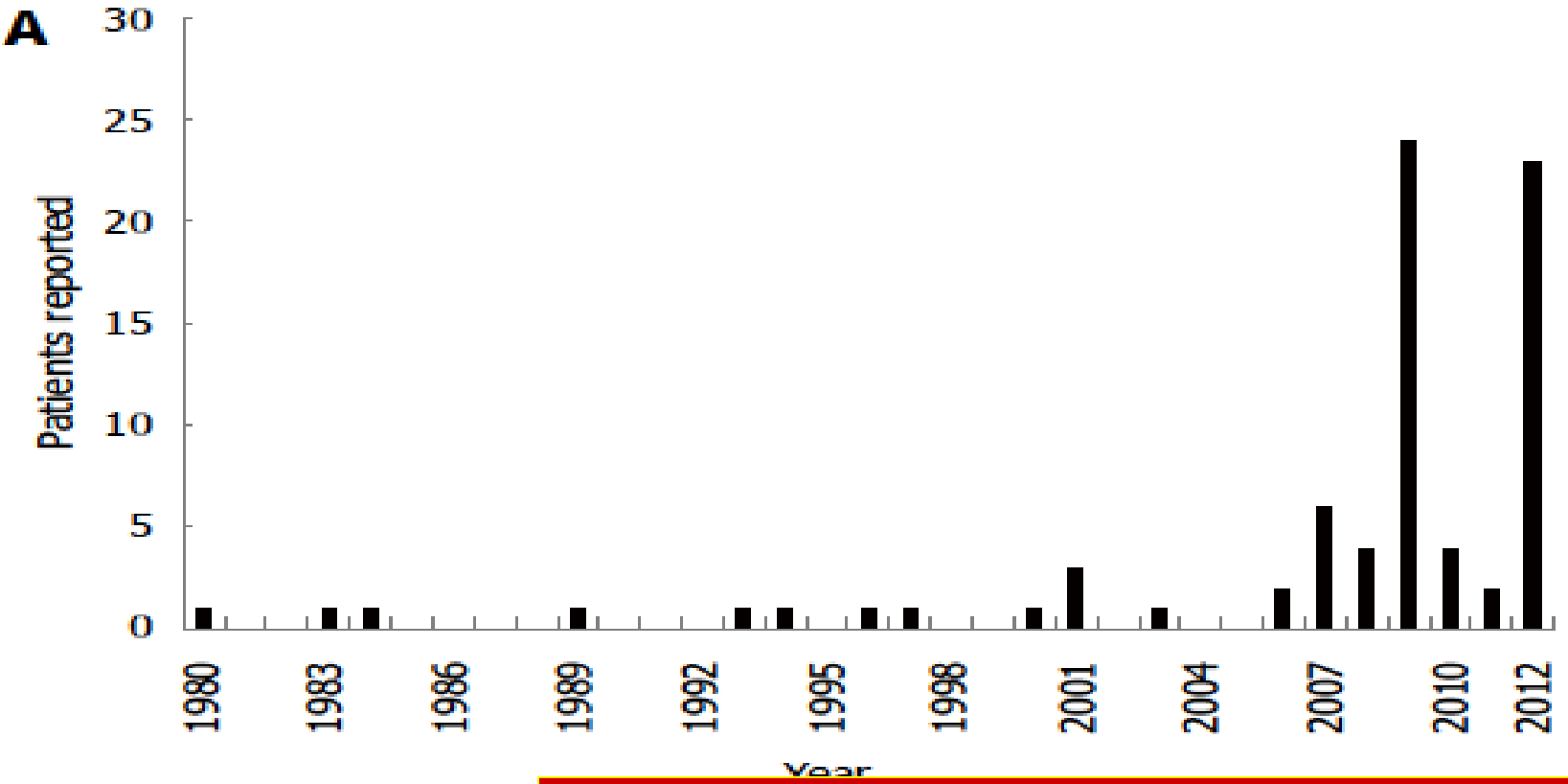
Overall mortality 23%

Dineen SP. World.J-Gastroint.Surg. 2013; 5: 37-42

Clinical manifestations: Extra-colonic

CASE REPORT

Clostridium difficile enteritis: A report of two cases and systematic literature review



Dineen SP. World.J-Gastroint.Surg. 2013; 5: 37-42

Extraintestinal CDI

Extraintestinal *Clostridium difficile* Infections

Eero Mattila,[1] Perttu Arkkila,[2] Petri S. Mattila,[3] Eveliina Tarkka,[4] Päivi Tissari,[4] and Veli-Jukka Anttila[1]

Departments of [1]Infectious Diseases, [2]Gastroenterology, and [3]Otorhinolaryngology, and [4]Division of Clinical Microbiology, Helsinki University Central Hospital Laboratory Diagnostics, Finland

Mattila E. C.I.D. 2013; 57: e148-e153

Extra-intestinal infections caused by *Clostridium difficile*

J. M. García-Lechuz, S. Hernangómez, R. San Juan, T. Peláez, L. Alcalá and E. Bouza

García Lechuz JM, Bouza E. C.M.I. 2001; 7: 453-457

Extraintestinal *Clostridium difficile* Infections

Byl B. C.I.D. 1996; 22: 712

The need for Surgery

Clinical manifestations: Surgery

ORIGINAL ARTICLE

Predictors of Mortality After Colectomy for Fulminant *Clostridium difficile* Colitis

John C. Byrn, MD; Dipen C. Maun, MD; Daniel S. Gingold, MD; Donald T. Baril, MD; Junko J. Ozao, MD; Celia M. Divino, MD

Retrospective study

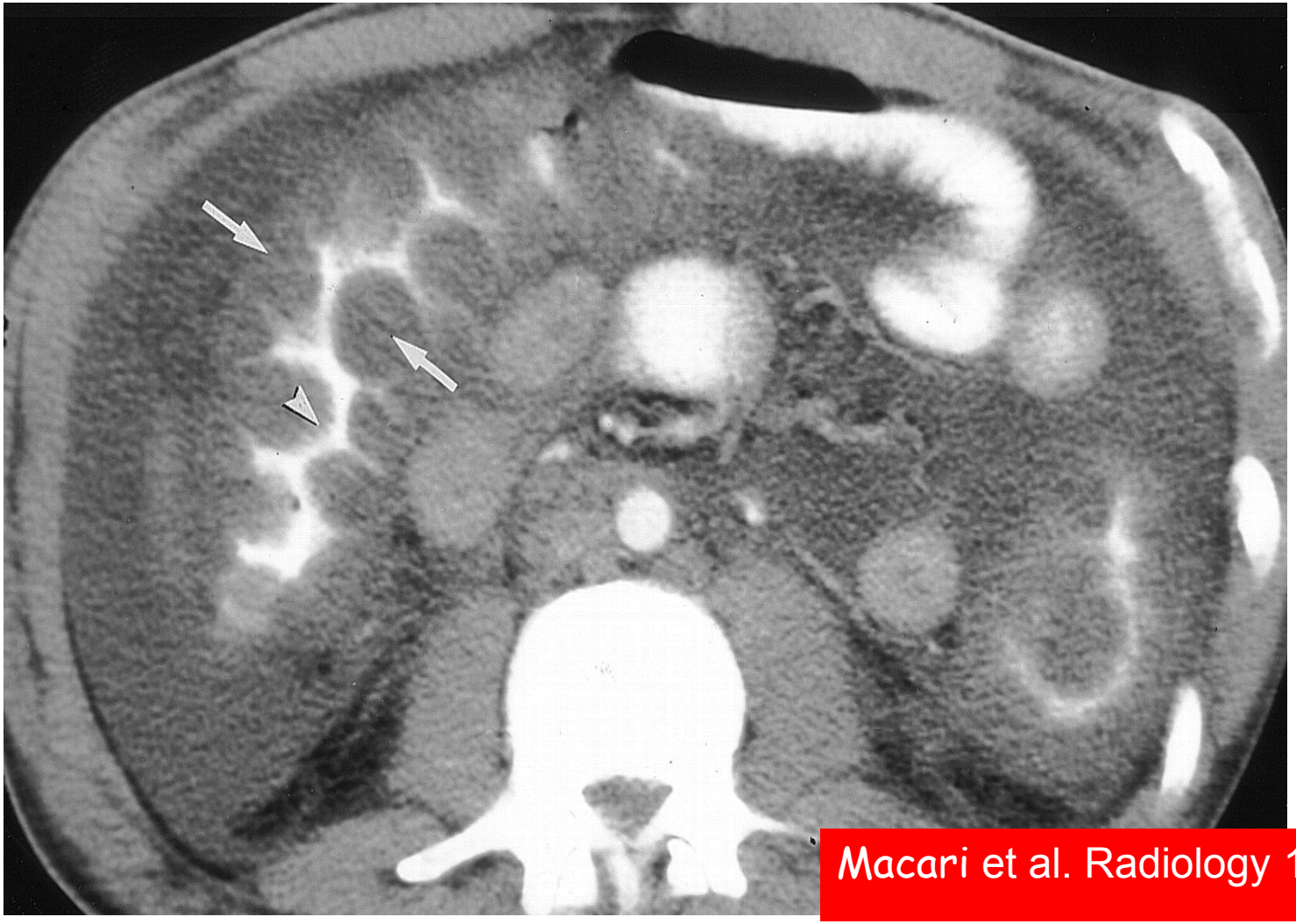
73 colectomies/5,718 CDI (1.3 %)

Mean age 68 y

In hospital mortality 34%

Byrn JC. Arch.Surg. 2008

The ‘accordion sign’ of CDI on CT scanning



Macari et al. Radiology 1999;211:743–6.

Clinical manifestations: Fulminant disease

Fulminant Clostridium difficile *Colitis: Comparing Computed Tomography with Histopathology: Are They Concordant?*

Colo-Rectum divided in 7 segments

20 patients with colectomy and CT

Only 50% concordance

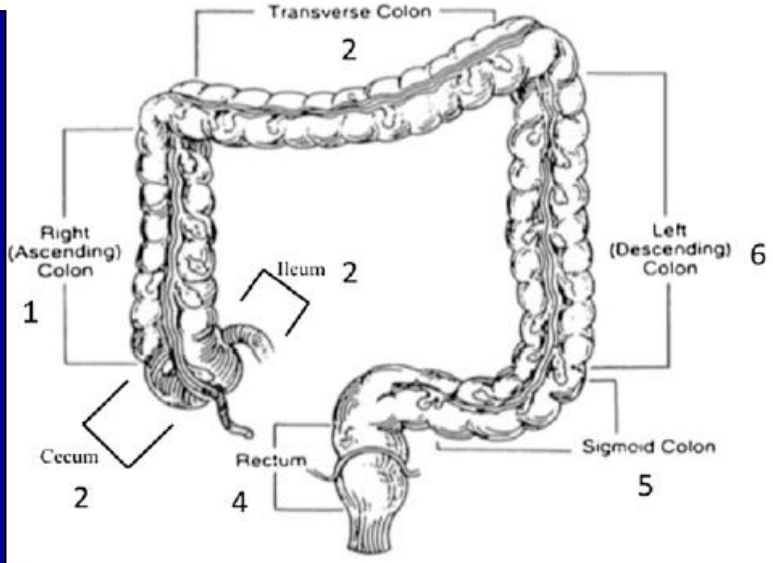


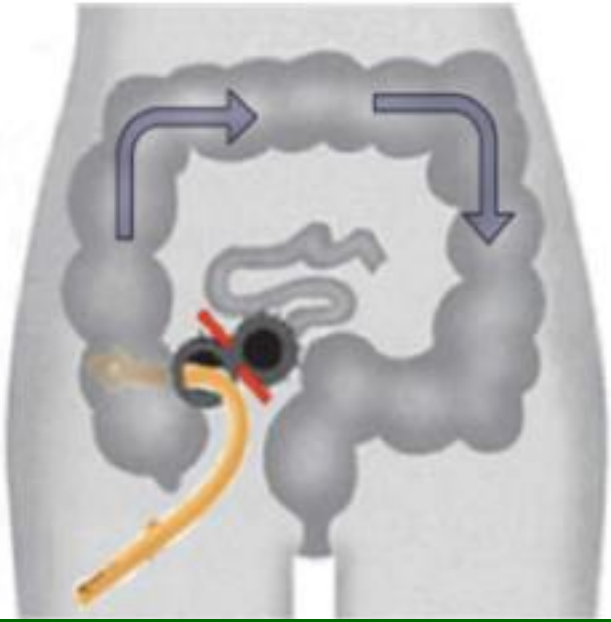
FIG. 1. Computed tomography-diagnosed *Clostridium difficile* olitis distribution. Pancolitis: 60 per cent, segmental colitis: 40 per ent, median number of segments involved: 3 (range, 2 to 5).

Felder SI. The Amer.Surg. 2014; 80: 1064-1068

Diverting loop ileostomy

Diverting Loop Ileostomy and Colonic Lavage

An Alternative to Total Abdominal Colectomy for the Treatment of Severe, Complicated Clostridium difficile *Associated Disease*



+ anterograde lavage with 8 l of warm polyethilenglicol
+ Vanco enemas

42 patients. 19% mortality (historic 50%)

Neal MD. Ann.Surg. 2011; 254: 423-427

Underdiagnoses and Overdiagnoses

CDI: The Nationwide studies I,II,III

ORIGINAL ARTICLE EPID GY

The undiagnosed cases of *Clostridium difficile* infection in a whole nation: where is the problem?

L. Alcalá[1,2,3], A. Martín[1], M. Marín[1,2,3], M. Sánchez-Somolinos[1], P. Catalán[1], T. Peláez[1,2,3,4] and E. Bouza[1,2,3,4] on behalf of the Spanish *Clostridium difficile* Study Group*

Alcalá, L, Bouza E. C.M.I. 2012.

Impact of clinical awareness and diagnostic tests on the underdiagnosis of *Clostridium difficile* infection

L. Alcalá[1,3,4] · E. Reigadas[1,2,3] · M. Marín[1,2,3,4] · A. Martín[1] · P. Catalán[1] · E. Bouza[1,2,3,4] · on behalf of the Spanish *Clostridium difficile* Study Group

Alcalá, L, Bouza E. Eur.JC.M.I.D. 2015; April Ahead of print

CDI: The Nationwide studies I,II,III

Study	Date	Number of Hospitals
I	June 2008	118
An opinion document with indications for clinicians and microbiologist was distributted Many industry sponsored talks Increase in scientific articles		
II	January 2013	111
III	July 2013	111

Alcalá, L, Bouza E. C.M.I. 2012.2015

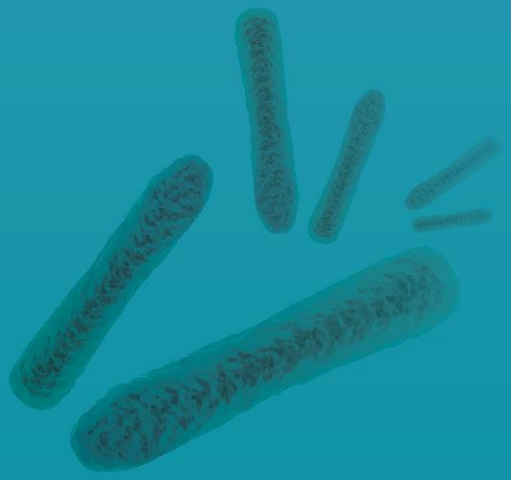
CDI: The Nationwide studies I,II,III

Underdiagnosis

	Study I 2008 June	Study II 2013 January	Study III 2013 July
Correct Suspicion and diagnosis	33%	48%	51%
Clinically Unsuspected	48%	36%	33%
Microbiological failure	19%	19%	13%

Alcalá, L, Bouza E. C.M.I. 2012.
+ Unpublished results

EUCLID



EUropean, multi-centre, prospective bi-annual point prevalence study of *CLostridium difficile* Infection in hospitalised patients with Diarrhoea study

Study initiated and sponsored by Astellas Pharma Europe Ltd

CDI: EUCLID Study I (Europe)

20 countries, 481 hospitals

CDI testing 65.8 tests/10.000 PBD

39.9% used optimised tehnology

Incidence 7 cases /10.000 PBD

23% were not diagnosed at PH

Davies K. Submitted to Lanced ID. 2015

The problem in pediatrics

CDI: Children

Lack of Evidence for an Unmet Need to Treat *Clostridium difficile* Infection in Infants Under 2 Years of Age: Expert Recommendations on How to Address This Issue

Saul N. Faust,[1] Mark H. Wilcox,[2] Aleksandra Banaszkiewicz,[3] Emilio Bouza,[4] Josette Raymond,[5] and Dale N. Gerding[6]

Controversy over the existance of CDI in neonates and infants

Faust S, Wilcox M, Banaszkiewicz A,Bouza E, Raymond J, Gerding DN. Clin.Infect.Dis. 2015; 60: 912-918

CDI: Children < 2 year old

Meaning of *C. difficile* isolated from children < 2 years, not well defined

?

Del Vechio M, Bouza E. Presented ICAAC 2014. Washington

CDI: Children < 2 year old

Prospective study

All diarrhoeic fecal samples from children < 2 y

Systematic search for *C. difficile*

Results reported to pediatricians

NO further intervention

Del Vechio M, Bouza E. Presented ICAAC 2014. Washington

CDI: Children < 2 year old

	C.diff Pos	C.diff. Neg	Significance p
Number of pts	100	100	
Infants	98	94	NS
Males	51	64	NS
Vesikari score	70%	65%	NS
Clinicians request	11%	7%	NS

Del Vechio M, Bouza E. Presented ICAAC 2014. Washington

CDI: Children < 2 year old

	C.diff Pos	C.diff. Neg	Significance p
Number of pts	100	100	
Other microorganism	25%	32%	NS
Prior Abx	18%	22%	NS
Use of Metronidazole	19%	0	
Surgery (30 d)	5%	10%	NS

Del Vechio M, Bouza E. Presented ICAAC 2014. Washington

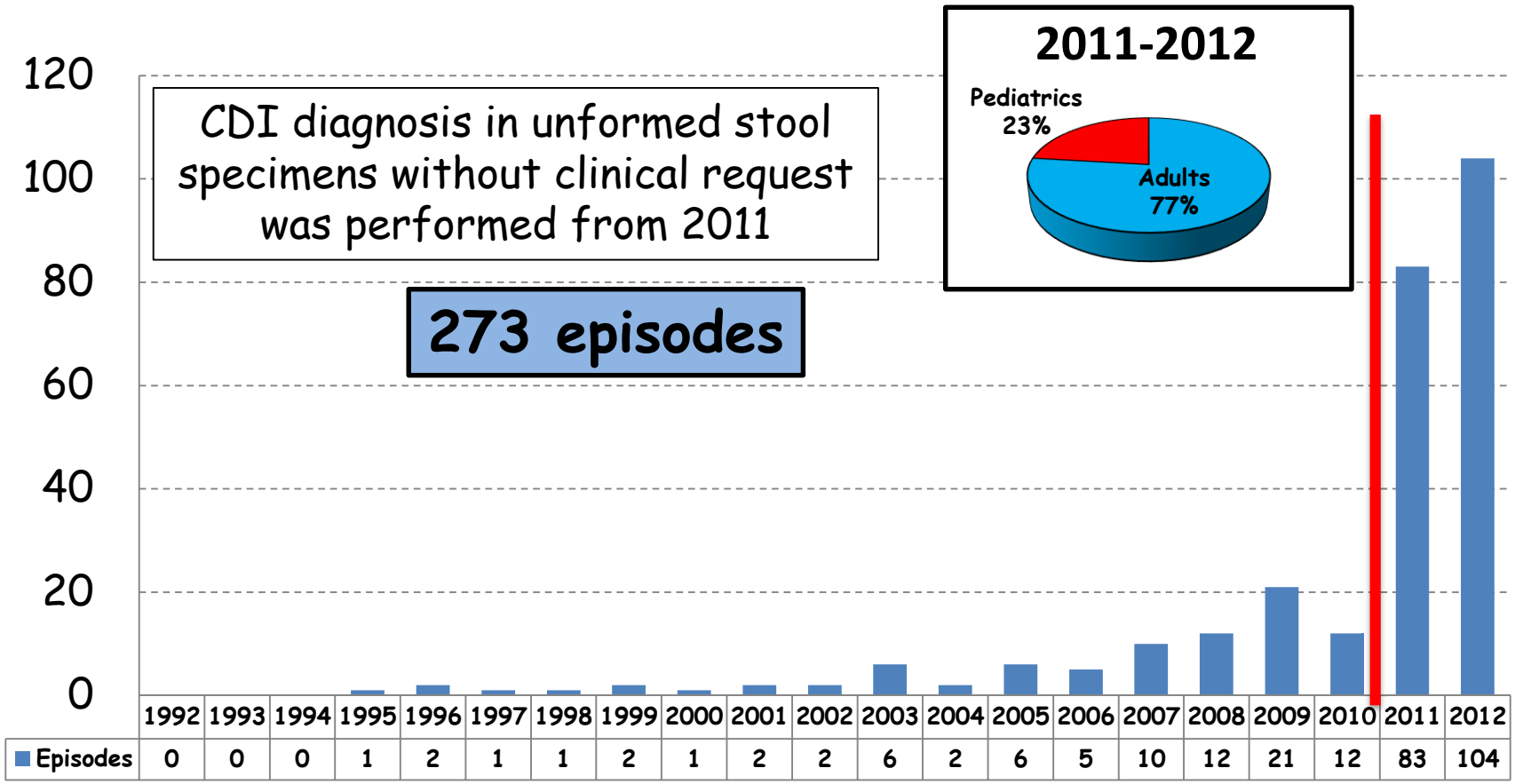
CDI: Incidence in Children > 2 year old

The Impact of a Change in the Diagnostic Approach Over the Incidence of *Clostridium difficile* Infection in Children

Meaning of *C. difficile* isolated from children > 2 years, not well defined

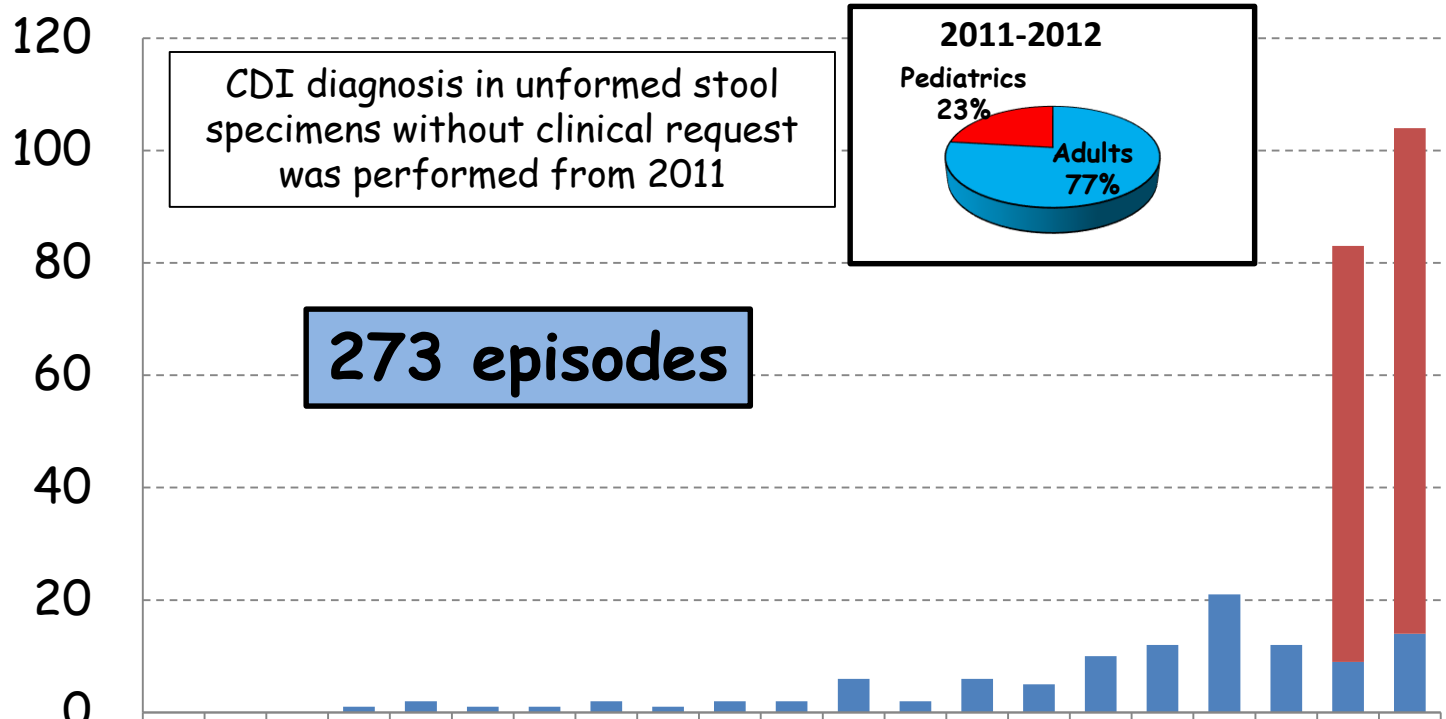
Del Vechio M, Bouza E. Presented ECCMID 2015. Copenhagen

Evolution of episodes of pediatric CDI in the HGUGM (1992-2012)



	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Episodes	0	0	0	1	2	1	1	2	1	2	2	6	2	6	5	10	12	21	12	83	104

Evolution of episodes of pediatric CDI in the HGUGM (1992-2012)



	1992	1993	1994	1995	1996	1997	1997	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
No clinical request of CD diagnosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74	90
Clinical request of CD diagnosis	0	0	0	1	2	1	1	2	1	2	2	6	2	6	5	10	12	21	12	9	14

CDI: Pediatrics

Infección por *Clostridium difficile* en la Población Pediátrica: En la Nueva Era del *Clostridium difficile*

Prospective study in children > years

One year study (2013-2014)

Very young	2-6 years
Regular	7-12
Adolescents	13-17

González del Vecchio M. Congreso SEIMC 2015. Sevilla. Spain

CDI: Pediatrics

Overall episodes	40
Helath-Care Associated	20 (50%)
Clinically suspected	14 (35%).
Co-pathogens:	2 (5%) Salmonella spp*
No underlying diseases :	19 (47,5%)
Neoplasia	6 (15%)
IBD	6 (15%)
Abx month before	25 (62,5%)

González del Vecchio M. Congreso SEIMC 2015. Sevilla. Spain

CDI: Pediatrics

	2-6 y	7-12 y	13-17 y	p
Number of pts	22	10	8	
Mean Days diarrh.	3,94	27,99	14,10)	
Abdominal pain	4 (18)	5 (50)	8 (100)	<0,01
WBC>15,000	1 (5)	1 (10)	7 (88)	0,01
Severe	1 (5)	1 (10)	7 (88)	0,01
Medical Tx	9 (41)	5 (50)	8 (100)	0,01
ICU and/or Surgery	0	0	0	NS
Recurrence	0	0	1	NS

González del Vecchio M. Congreso SEIMC 2015. Sevilla. Spain

CDI: Children > 2 year old

Five Years Experience of *Clostridium difficile* Infection in Children at a UK Tertiary Hospital: Proposed Criteria for Diagnosis and Management

75 children. Mean age 2.97

49 Hospital onset. 22 Community

73% Abx in the prior month

12% Co-infection

2 required Intensive Care. 1 colectomy

73% Adult criteria for severity

Pai S. PLoSOne. 2012; 7: e51728

CDI: Children > 2 year old

Proposed revised criteria for severity	Points
Diarrhoea > 5 times	1
Abdominal pain and discomfort	1
Rising white cell count	1
Raised C-reactive protein	1
Fever > 38°C	1
Evidence of pseudomembranous colitis	2
ICU requirement	3

≥ 5
Severe

Pai S. PLoSOne. 2012; 7: e51728

Are ICU's areas of high risk for CDI

CDI in Adult ICU's

Reference	Country	ICU	Incidence
Dodek PM. J.Crit.Care. 2013	Canada	6 Mixed	15/ 1000 pts
Balassiano IT. Diag.Micr.Infect.Dis. 2010	Brazil	1 Mixed	1.8/10.000 d
Musa S. Journal of Cardiothoracic and Vascular Anesthesia. 2011	U.K	1 CardioThoracic	0.5/1000 pts/day
Bustinza A. I.C.H.E. 2009	Spain	1 Peds	3 cases outbreak
Beaulieu M. I.C.H.E. 2007	Canada	1 Medical	8.4 1000 pts/day
Marra AR. BMC Infect.Dis 2007	Canada	9 Mixed	??
Bouza E. Abstract ECCMID 2013	Spain	4 Mixed	13 /10.000 d

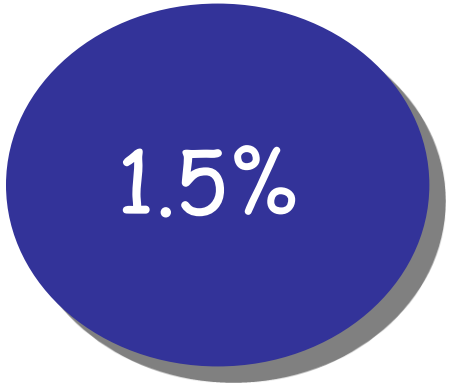
CDI in Adult ICU's

Length of stay and mortality due to *Clostridium difficile* infection acquired in the intensive care unit☆,☆☆

Peter M. Dodek MD, MHSc[a,b,c,*], Monica Norena MSc[a,c], Najib T. Ayas MD, MPH[a,b,c,d], Marc Romney MD[c,e], Hubert Wong PhD[a,c,f]

15,314 patients admitted to the ICUs

236 developed CDI



Dodek PM. J.Crit.Care. 2013

CDI in Adult ICU's

Length of stay and mortality due to *Clostridium difficile* infection acquired in the intensive care unit☆,☆☆

Peter M. Dodek MD, MHSc[a,b,c,*], Monica Norena MSc[a,c], Najib T. Ayas MD, MPH[a,b,c,d], Marc Romney MD[c,e], Hubert Wong PhD[a,c,f]

> Length of stay in ICU

> Length of Stay in hospital

Similar mortality in ICU and in Hospital

Dodek PM. J.Crit.Care. 2013

10 years of CDI in Adult ICU's

Journal of Critical Care 30 (2015) 543–549

Contents lists available at ScienceDirect

Journal of Critical Care

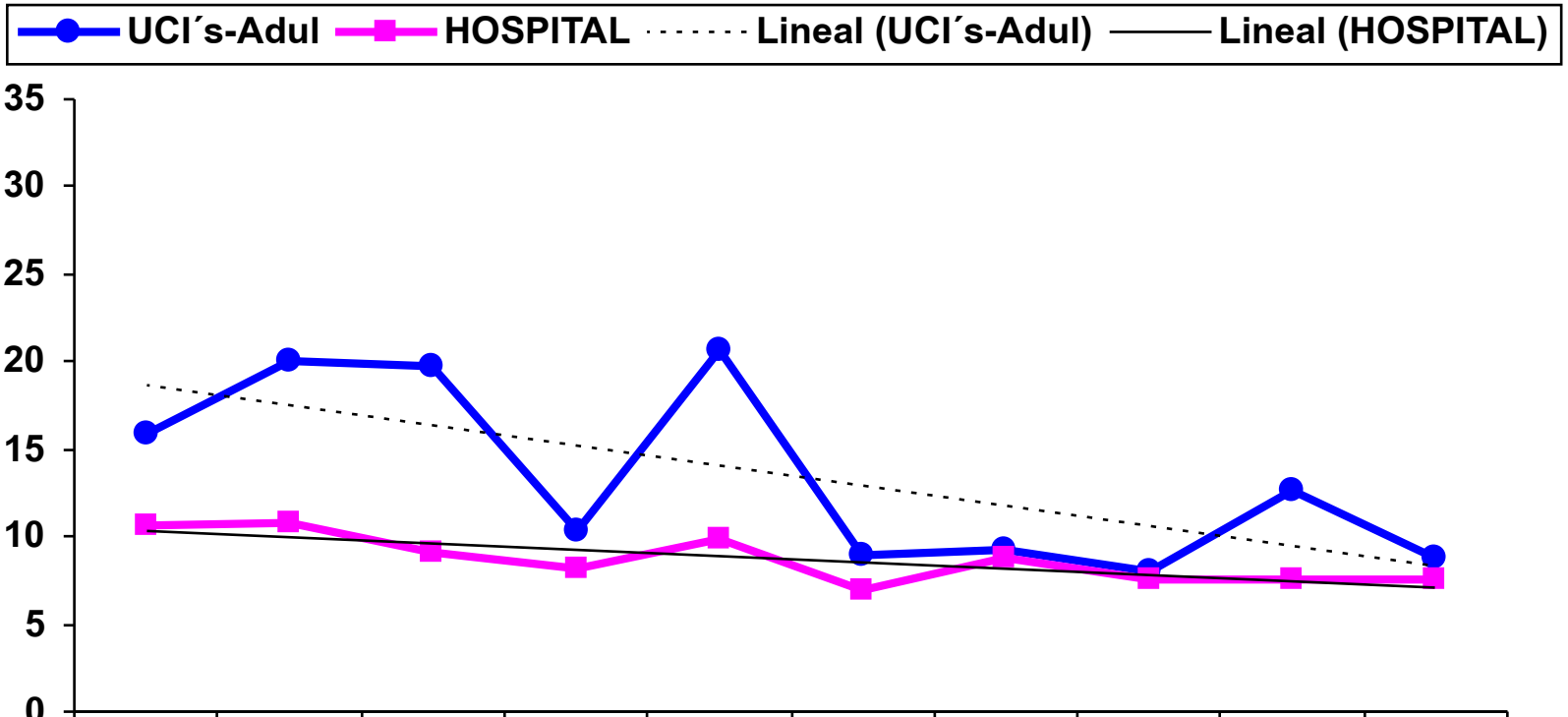
journal homepage: www.jccjournal.org

Is *Clostridium difficile* infection an increasingly common severe disease in adult intensive care units? A 10-year experience

10 year period
37,409 admissions to ICU. 194,667 days
4,095 episodes of CDI /328 in ICU (8%)

Bouza E. J.Crit.Care. 2015; 30: 543-549

Trends of CDI incidence/10,000 days in and out adult ICUs



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
UCI´s-Adul	15,9	20,1	19,7	10,3	20,6	8,9	9,2	8	12,7	8,8
HOSPITAL	10,7	10,8	9,1	8,1	9,9	7	8,8	7,5	7,5	7,6

Bouza E. J.Crit.Care. 2015; 30: 543-549

Trends of CDI recurence: in and out ICU's

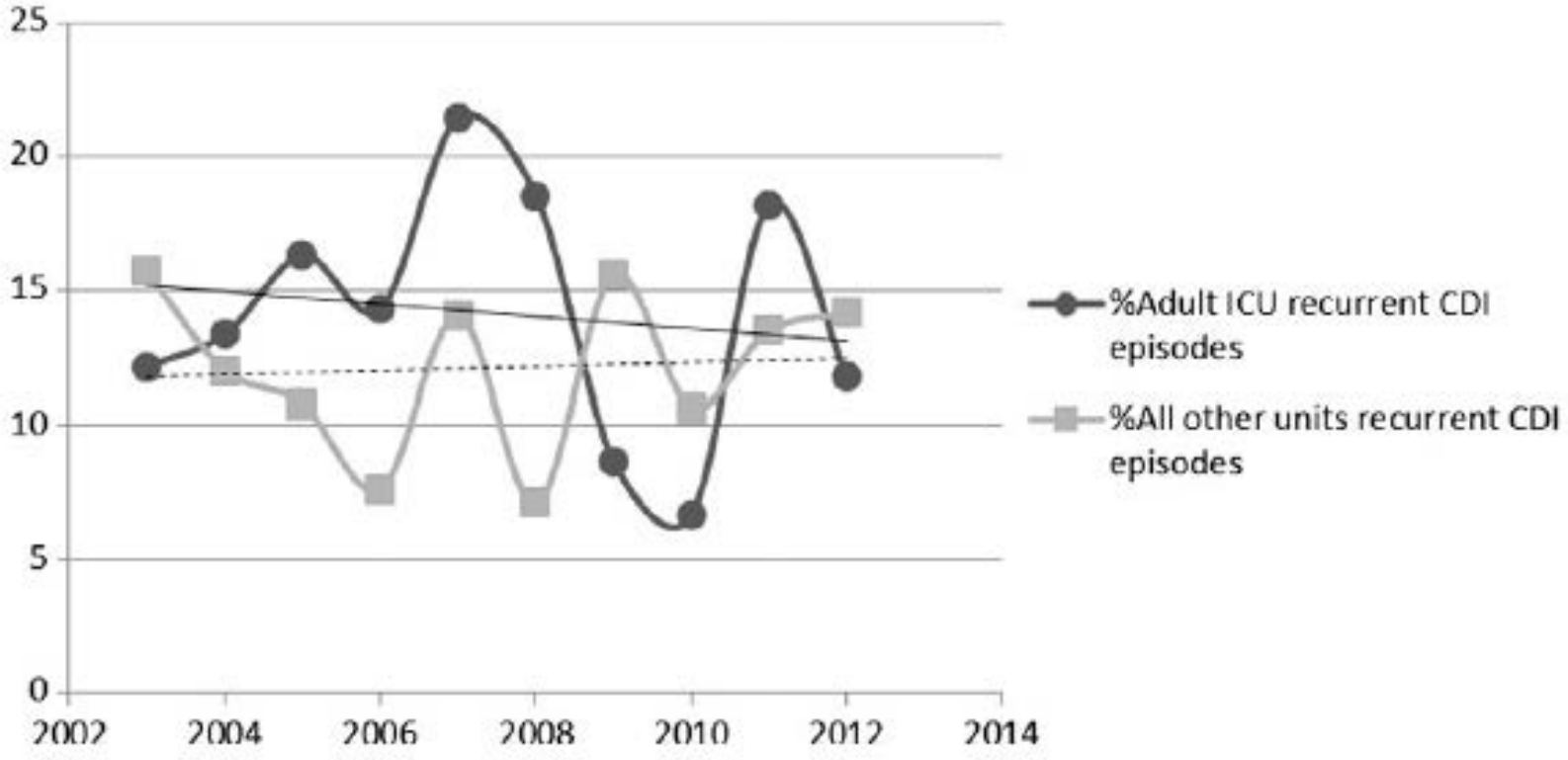


Fig. 3. Evolution of annual percentage of overall recurrent episodes of CDI and recurrent CDI episodes in A-ICUs.

Bouza E. J.Crit.Care. 2015; 30: 543-549

Special populations: SOT,Hematology

HIV, IBD,

CDI: Solid Organ transplant

ORIGINAL ARTICLE

Outcome of *Clostridium difficile*-associated disease in solid organ transplant recipients: a prospective and multicentre cohort study

4472 SOT: 36 cases (0.94%)

Type of transplant	Total number of transplants	Total CDAD cases	Incidence (%)	Incidence density rate*
Liver	1570 (35)	10 (23.7)	0.63	0.16
Kidney	2057 (46)	16 (38)	0.77	0.2
Heart	406 (9)	5 (12)	1.23	0.33
Lung	310 (7)	6 (14.3)	1.93	0.71
Pancreas	128 (3)	5 (12)	3.9	1.62
Global	4472 (100)	42	0.94	0.86

Len O. Transplant International 2012; 25: 1275-1281

CDI: Solid Organ transplant

ORIGINAL ARTICLE

Outcome of *Clostridium difficile*-associated disease in solid organ transplant recipients: a prospective and multicentre cohort study

Only 2 cases documented after the 1st year after SOT

Only one episode required colectomy

No attributable deaths

Recurences 16.7%

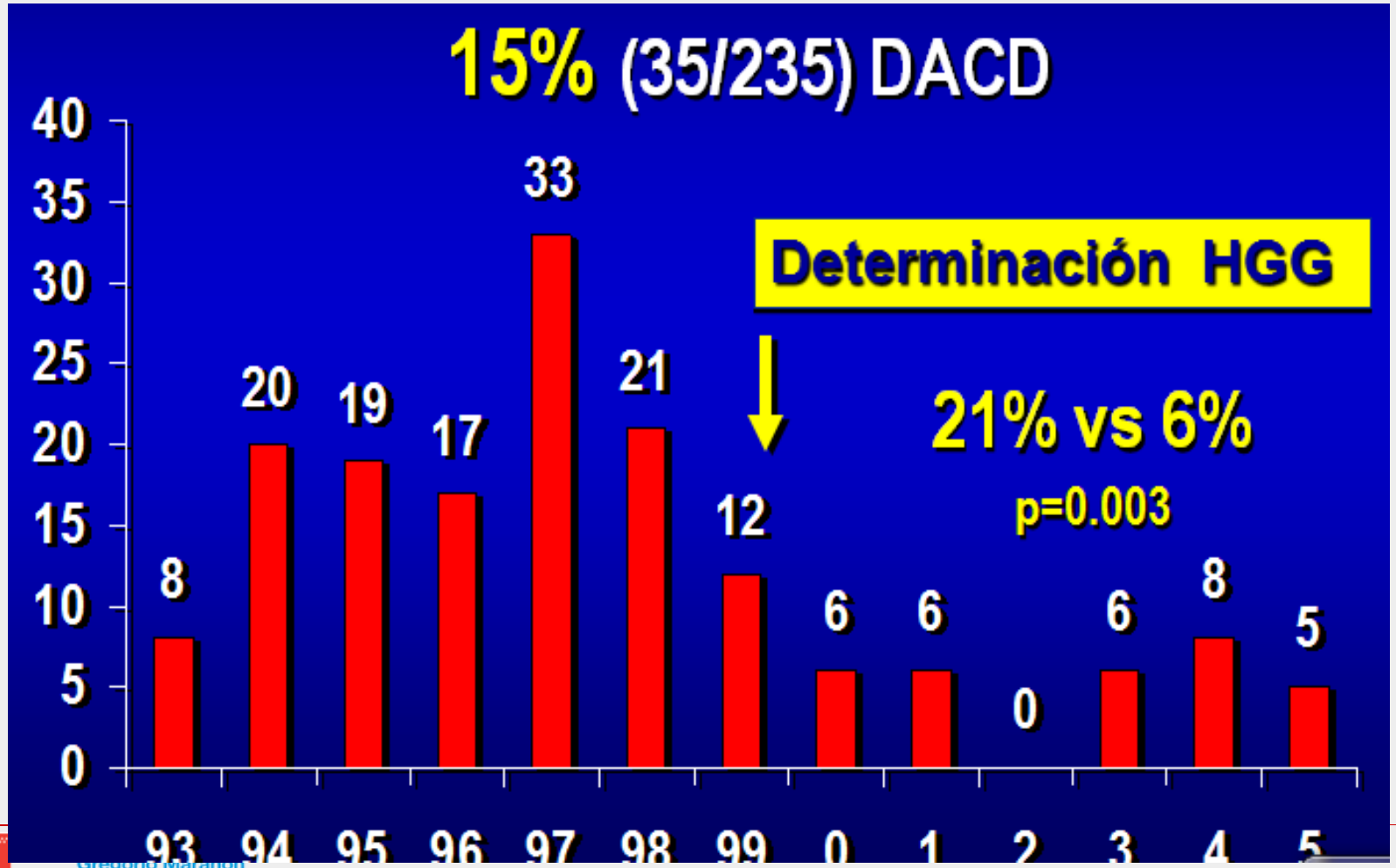
No influence in survival. "A Benign Entity"

Len O. Transplant International 2012; 25: 1275-1281

Clostridium difficile–associated Diarrhea in Heart Transplant Recipients: Is Hypogammaglobulinemia the Answer?

Patricia Muñoz, MD, PhD, Maddalena Giannella, MD, Luís Alcalá, PharmD, Elisabeth Sarmiento, MD, Juan Fernandez Yañez, MD, Jesus Palomo, MD, Pilar Catalán, PharmD, Javier Carbone, MD, and Emilio Bouza, MD, PhD

J Heart Lung Transplant 2007;26:907-14.



CDI: Incidence in HSCT patients

Author	Transplant type	N	Episodes of diarrhoea[a]	CDI / episode of diarrhoea
Mossad 1996	Auto-HSCT	219	76 (34.7%)[b]	1 (1.3%)
Yuen 1998	NS	120	141[c]	15 (10.6%)
Avery 2000	Auto-HSCT	80	61 (76.3%)	3 (4.9%)
Bilgrami 1999	Auto-HSCT	200	NS	15 (7.5%)
Barton 2001	Auto-HSCT	127	NS	14 (11.0%)
Gorschluter 2001	NS	371	NS	61 (6.9%)
Tomblyn 2002	Both	119	109 (91%)	7 (6.4%)
Jillella 2003	Auto-HSCT	54	15 (27.8%)[c]	1 (6.7%)
Arango 2006	Auto-HSCT	242	157 (64.8%)	21 (15.5%)
Cox 1994	Both	296	150 (50.7%)	6 (4.0%)
van Kraaj 2000	Both	60	**48 (80%)**	2 (4.2%)
Chakrabarti 2000	Allo-HSCT	75	49 (65.3%)	**10 (20.4%)**

[a]Episodes of diarrhoea per number of patients in the study population; [b] Total number of infectious complications; [c]Every patient had at least one episode of diarrhoea; HSCT, haematopoietic stem cell transplantation; NS, not specified

Bobak et al. Bone Marrow Transplant 2008; 42, 705–713.

CDI: Epidemiology and outcome in HSCT

MAJOR ARTICLE

Epidemiology and Outcomes of *Clostridium difficile* Infections in Hematopoietic Stem Cell Transplant Recipients

Carolyn D. Alonso,[1,2] Suzanne B. Treadway,[1] David B. Hanna,[3] Carol Ann Huff,[4] Dionissios Neofytos,[1] Karen C. Carroll,[5] and Kieren A. Marr[1,4]

No classic markers of severity

Recurrence rates 21.7%

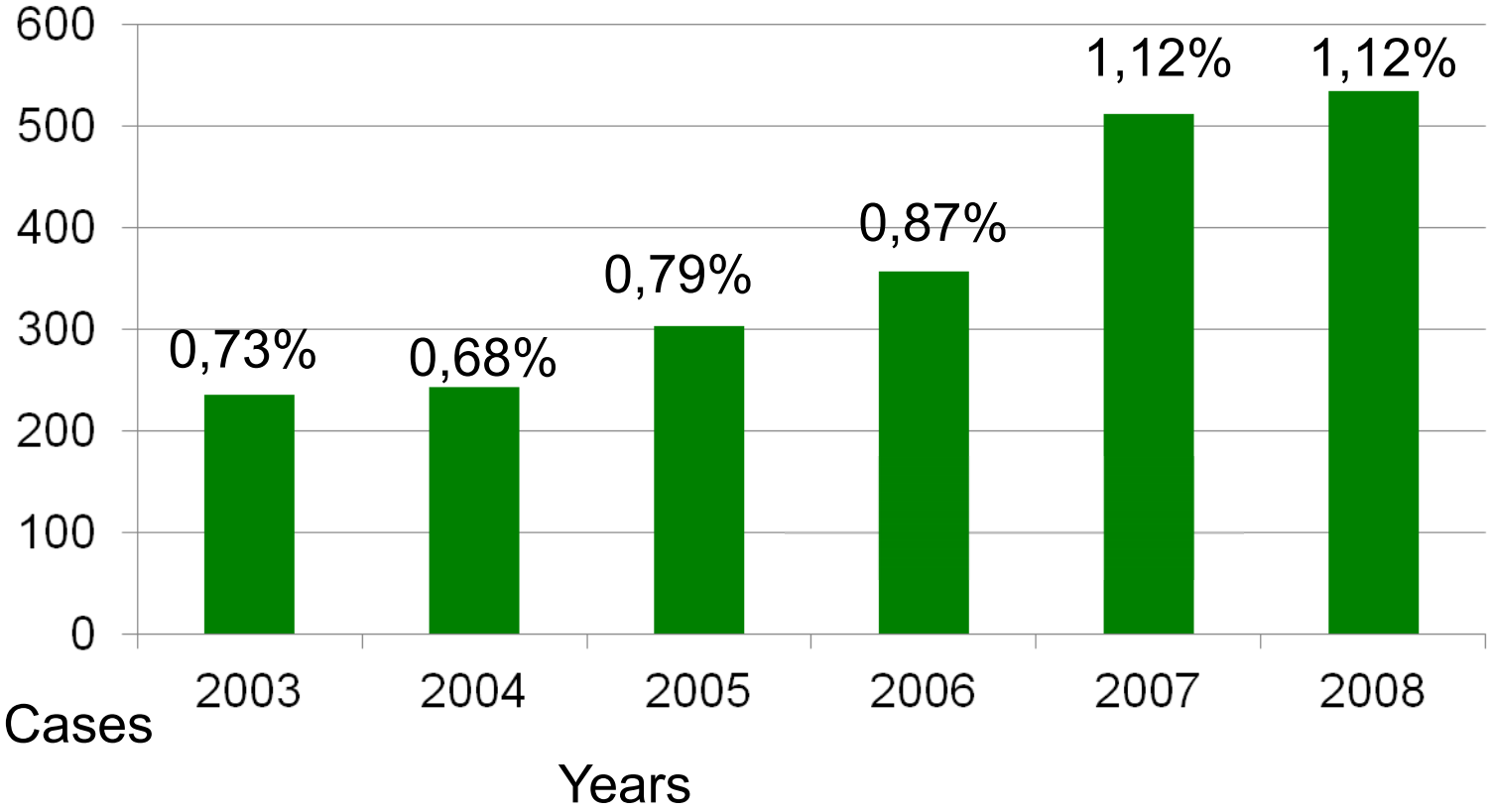
No increase mortality after 1 year (Alo HSCT) (30.4%)

Good response to metronidazole

Alonso et al. Clin Infect Dis 2012;54:1053-63

CDI: Inflammatory Bowel Disease

Increased health burden associated with *Clostridium difficile* diarrhoea in patients with inflammatory bowel disease



Jen MH. Alimen. Pharmacol. Ther. 2011

CDI: Inflammatory Bowel Disease

US 10-year study of >350,000 patients with inflammatory bowel disease (IBD)

CDI occurred in 3.7% in Ulcerative colitis

1% in Crohn's disease

CDT recurrence in IBD patients ~5.5–59%

Weber et al. J Clin Gastroenterol 1992;14:302–8;

Mylonaki et al. Eur J Gastroenterol Hepatol 2004;16:775–8;

Meyer et al. J Clin Gastroenterol 2004;38:772–5;

Issa et al. Inflamm Bowel Dis 2008;14:1432–42;

UK IBD Audit Steering Group. February 2012;

Vonberg et al. Clin Microbiol Infect 2008;14(Suppl 5):2–20;

Strange et al. J Crohns Colitis 2008;2:1–23.

C. difficile: HIV

Authors (year)	Clin	Treat	Relap	Mortal
Bartlett (92). C.I.D.	Simil	Worse	NR	Worse
Cozart (93). JCG	Simil	Simil	NR	Simil
Hutin (93).AIDS	Simil	Worse	NR	NR
Lu (94). A.J.G.	Simil.	Simil	Simil	NR
McBride (94). AIDS	Simil.	Simil	NR	NR
Tumbarello(95). EJGH	Worse	Simil	More	Simil
Bouza (94,96).RCE	Simil	Simil	More	Simil

CDI: HIV infected patients

Clostridium difficile **infection in HIV-seropositive individuals and transplant recipients**

CDI caused 10-50% of diarrhea in hospitalized HIV patients.
6-34% colonized by *C. difficile*
Rates not clearly higher in the HAART era
Similar clinical presentation and recurrence

Collini PJ. J. Infect. 2011

Is poor evolution predictible?

CDI: Clinical Predictors Poor Outcome

Poor Outcome CDI= R-CDI, treatment failure, or progression to severe or severe complicated CDI.

204 CDI -> 45 (22.1%) PO-CDI

33 (16.2%) R-CDI

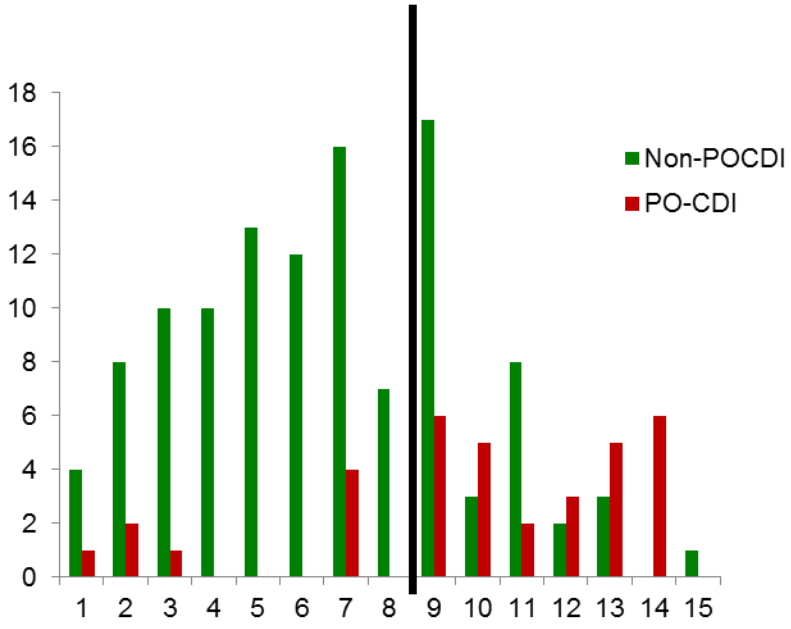
4 (2.0%) Treat. failures

8 (3.9%) Progression.

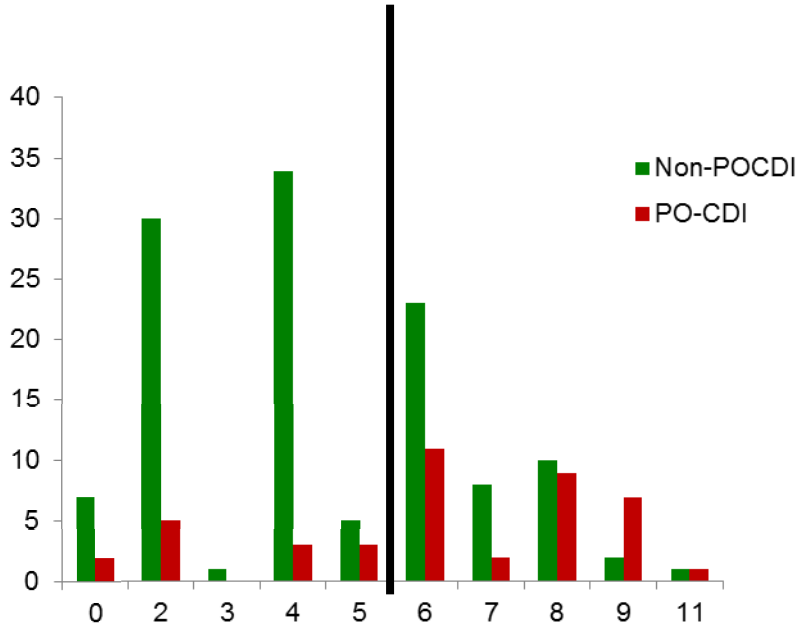
Reigadas E, Bouza E. J.Infect. 2015; 70:264-272

Combined vs Clinical Prediction Rule POCDI

COMBINED Score
Microbiological + Clinical



Clinical Score



CDI: Severity scores

OPEN ACCESS Freely available online

PLOS | ONE

Risk Factors for Recurrence, Complications and Mortality in *Clostridium difficile* Infection: A Systematic Review

68 studies
19 only recurrences
11 complications
2 therapeutic failures
23 only mortality
13 Multiple factors

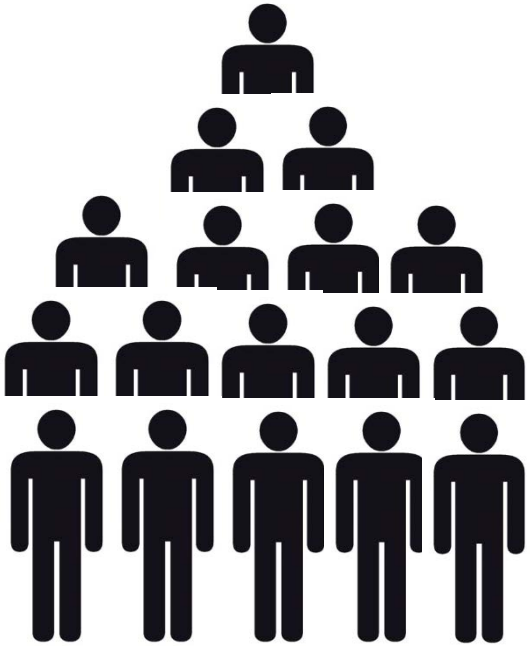
Advanced age
Continue with Abx
PPIs
Ribotypes
Leukocytosis
Renal Failure

Abou Chakra CN. PloSOne; 2014:9: e98400

The cost of CDI

HGUGM Study: Mortality

Overall mortality (17) 8.3%



CDI-related mortality (5) 2.5%

Reigadas E, Bouza E. J.Infect. 2015; 70:264-272

CDI: Cost

Reference	Country	Year	2008 $ US
Kofsky et al. Dis.Colon. Rect.	U.S.A.	1991	9,099
Wilcox et al. J.Hosp.Infect.	U.K.	1996	9,277
McFarland et al. I.C.H.E.	U.S.A	1999	2,626
Al-Eidan et al. J.Clin.Pharm.	Ireland	2000	6,890
Kyne et al. C.I.D.	U.S.A.	2002	3,669
Miller et al. I.C.H.E.	Canada	2002	12,099
O'Brian et al I.C.H.E.	U.S.A.	2007	13,675
Zerey et al. Surg.Infect.	U.S.A.	2007	77,483
Lawrence et al. I.C.H.E.	U.S.A.	2007	5,325-27,290
Dubberke et al. C.I.D.	U.S.A.	2008	2454 - 5042
Ananthakrishnan et al. Gut	U.S.A.	2008	11,000
McGlone et al. C.M.I.	U.S.A.	2011	9,179-11,456

Ghantoji SS. J.Hosp.Infect.2010

CDI: Cost in Spain

COSTE DE LA DIARREA ASOCIADA A *CLOSTRIDIUM DIFFICILE* EN ESPAÑA

Ángel Asensio (1), Emilio Bouza (2), Santiago Grau (3), Darío Rubio-Rodríguez (4), Carlos Rubio-Terrés (4).

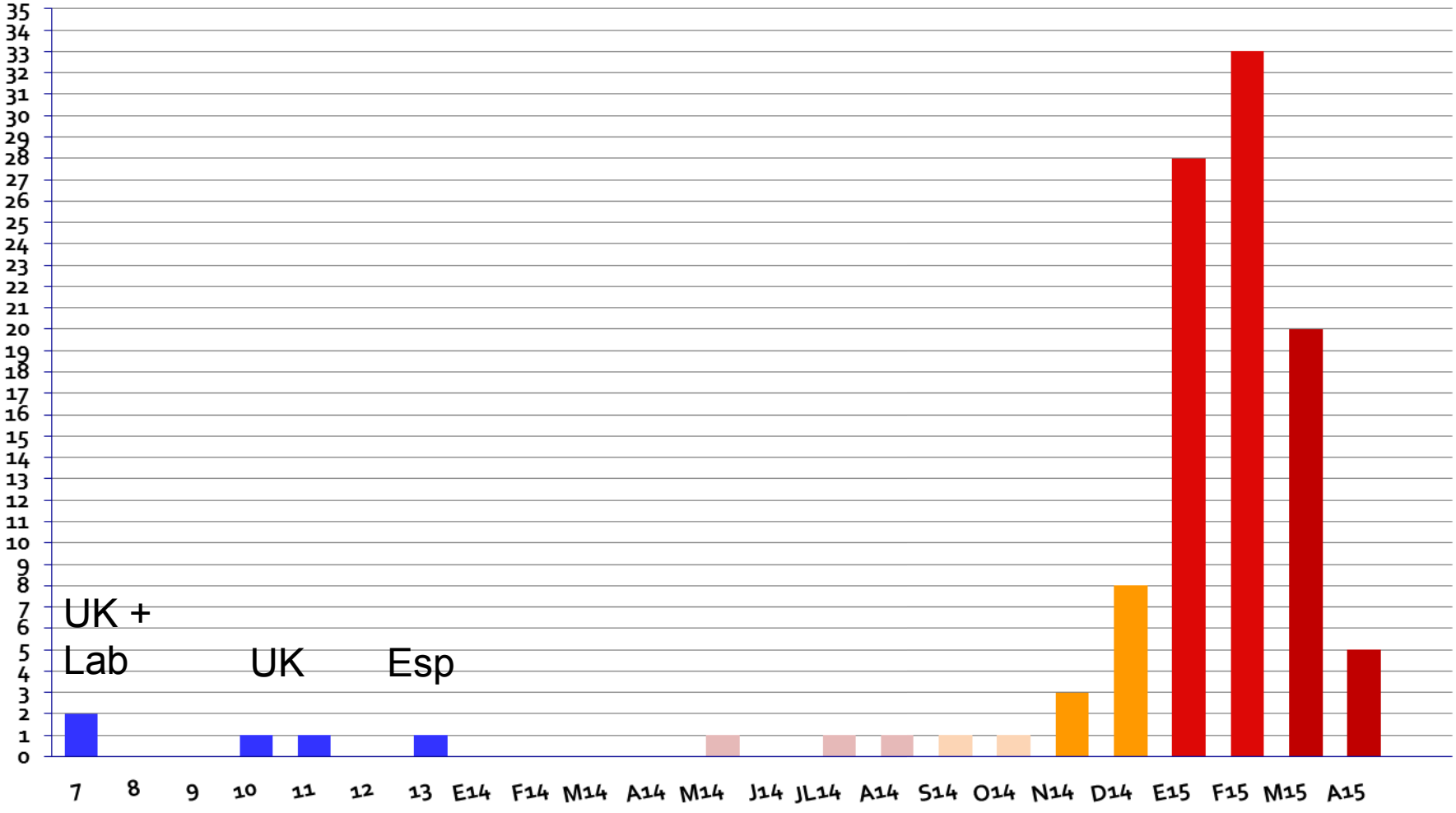
Estimated episodes/year	7,601
Cost per episode	
Initial	3,901 €
First Recurrence	4,875 €
Sec. Recurrence	5,916 €

Estimated annual cost for the Health Care System 32,000,000 €.

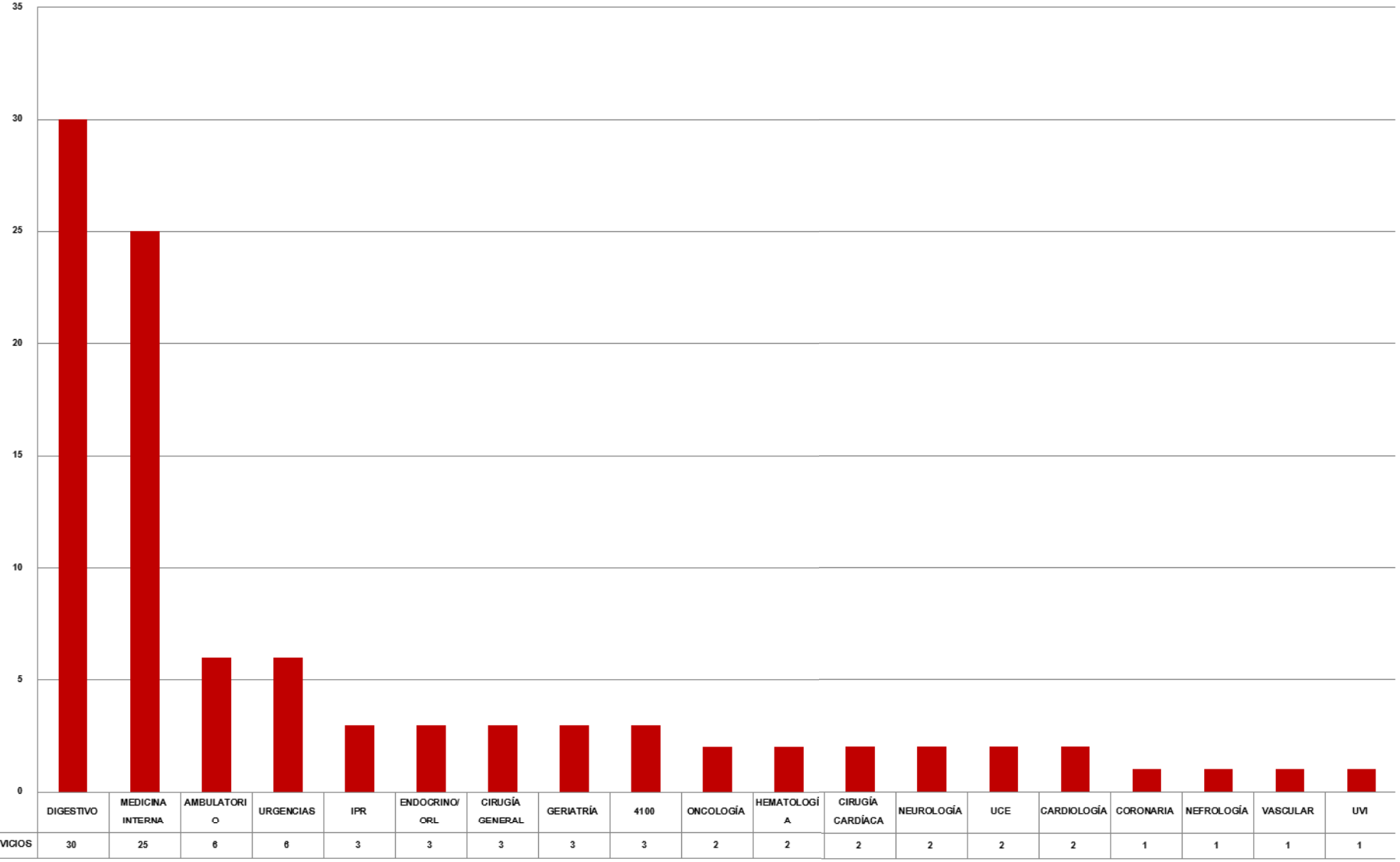
Asensio A, Bouza E. Rev.Esp.Salud.Pub. 2013; 87:25-33.

A Present day outbreak

C. difficile 027 in HGUGM (2002-2015)

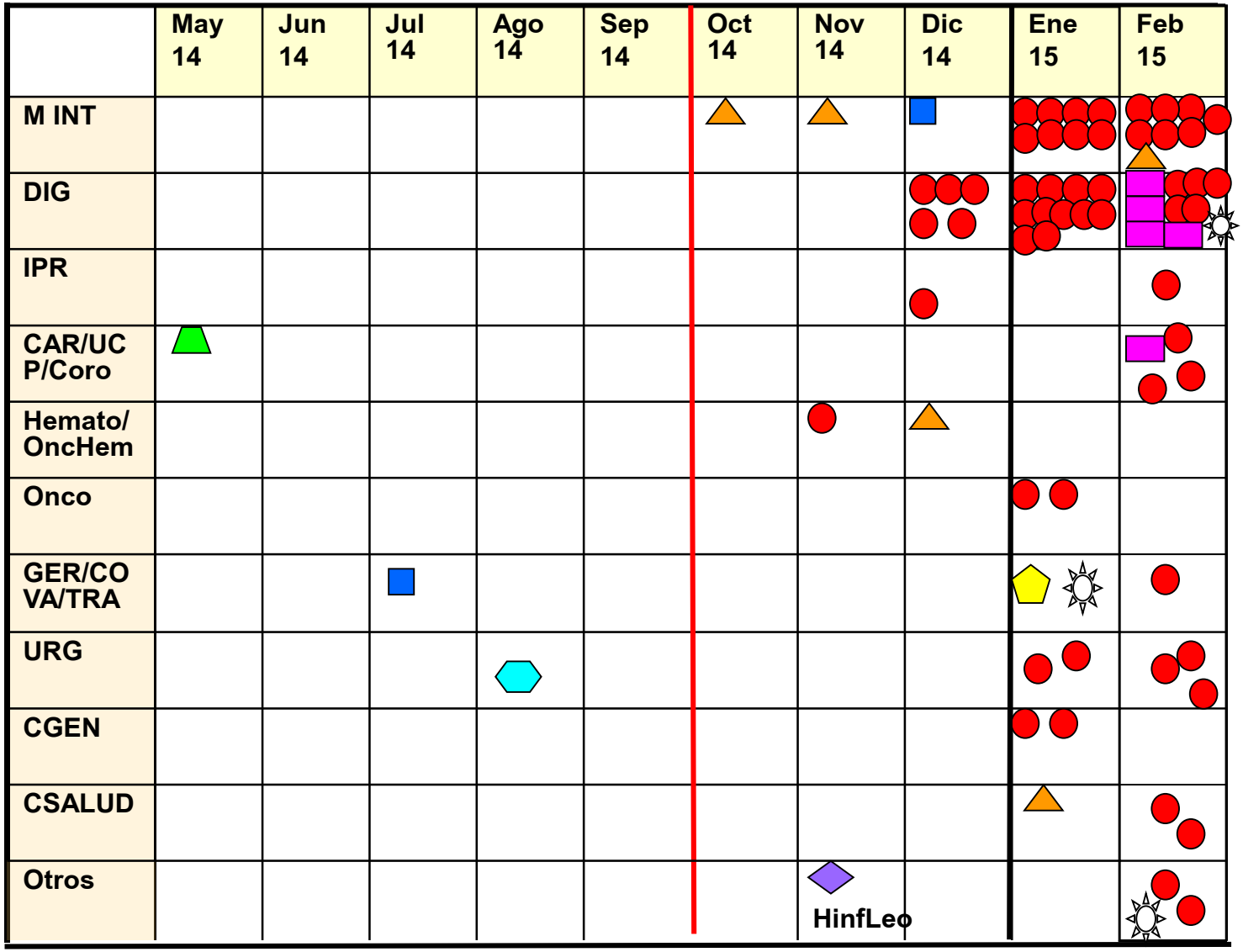


Distribution by hospital units (N=98)



Se detectan casos esporádicos hasta Nov 2014

Subtipado *C. difficile* Ribotipo 027 HGUGM (2014-2015): MLVA



MLVA 1

MLVA 2

MLVA 3

MLVA 4

MLVA 5

MLVA 6

MLVA 7

MLVA 8

Subtipo pendiente

1.- Incidence of CDI in Spain is in the european average

2.- Overall 85% of the episodes were health-care-related

3.- Figures of increasing incidence may represent more clinical awareness and better laboratory search.

4.- The large majority of the episodes are mild to moderate

5.- 20% of the episodes had poor evolution (meaning evolution to severity of recurrences)

6.- Prediction of patients with poor-outcome is clinically poor and can be improved with microbiological techniques

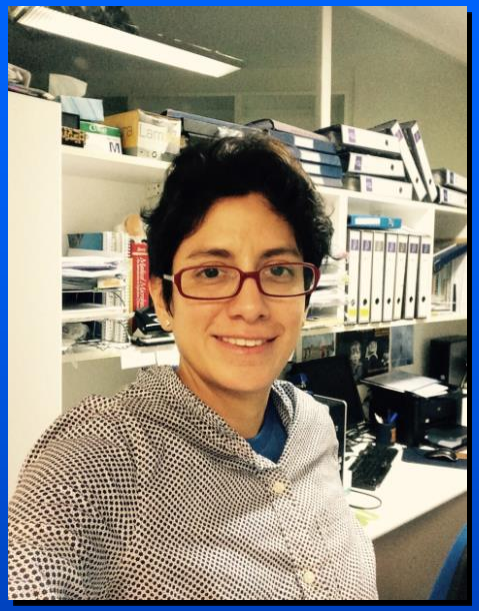
7.- The rate of underdiagnosis in Spain is improving but still very high

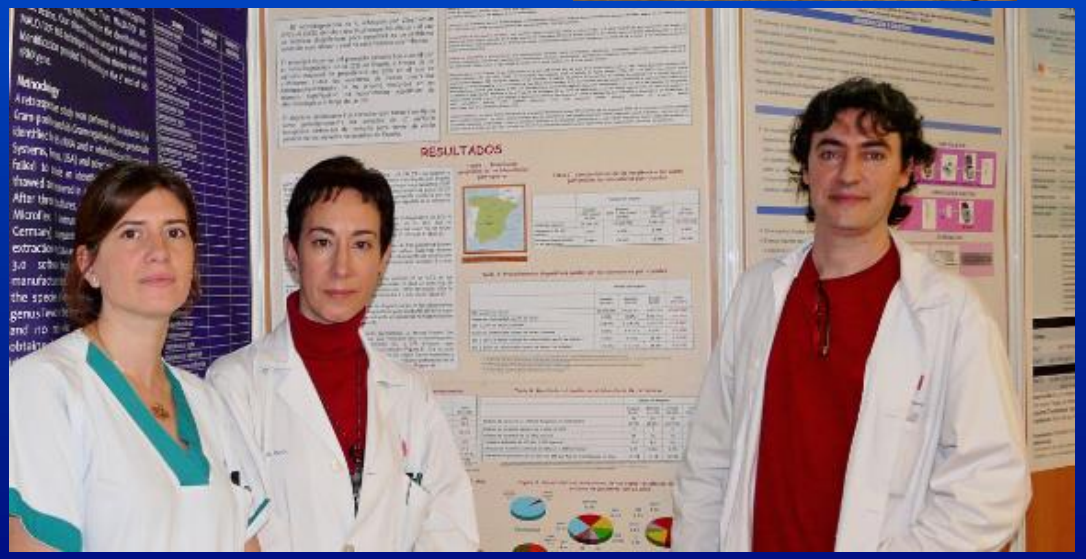
8.- Risk factors for missing a case include: young age, community onset, no antimicrobial agents, no underlying diseases

9.- The majority of cases are still treated with metronidazole and vancomycin and the use of Fidaxomicin is disproportionally low.

10.- Strains with binary toxin do not predict poor evolution nor poor outcome

CDI Team





The end