

Clinical-epidemiological characterization of *Clostridium difficile* - ribotype 053 : A new hypervirulent strain with high transmissibility

M. Hell, D. Schmid, F. Berr, R. Greil, S. Huhulescu, A. Indra, M. Maaß, F. Allerberger

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Markus Hell, MD

Head of Department of Hospital Epidemiology
and Infection Control,
University Hospital Salzburg, Austria





Overview

- Background
- Aims - Methods
- Results
- Conclusion

CLOSTRIDIUM DIFFICILE





Background

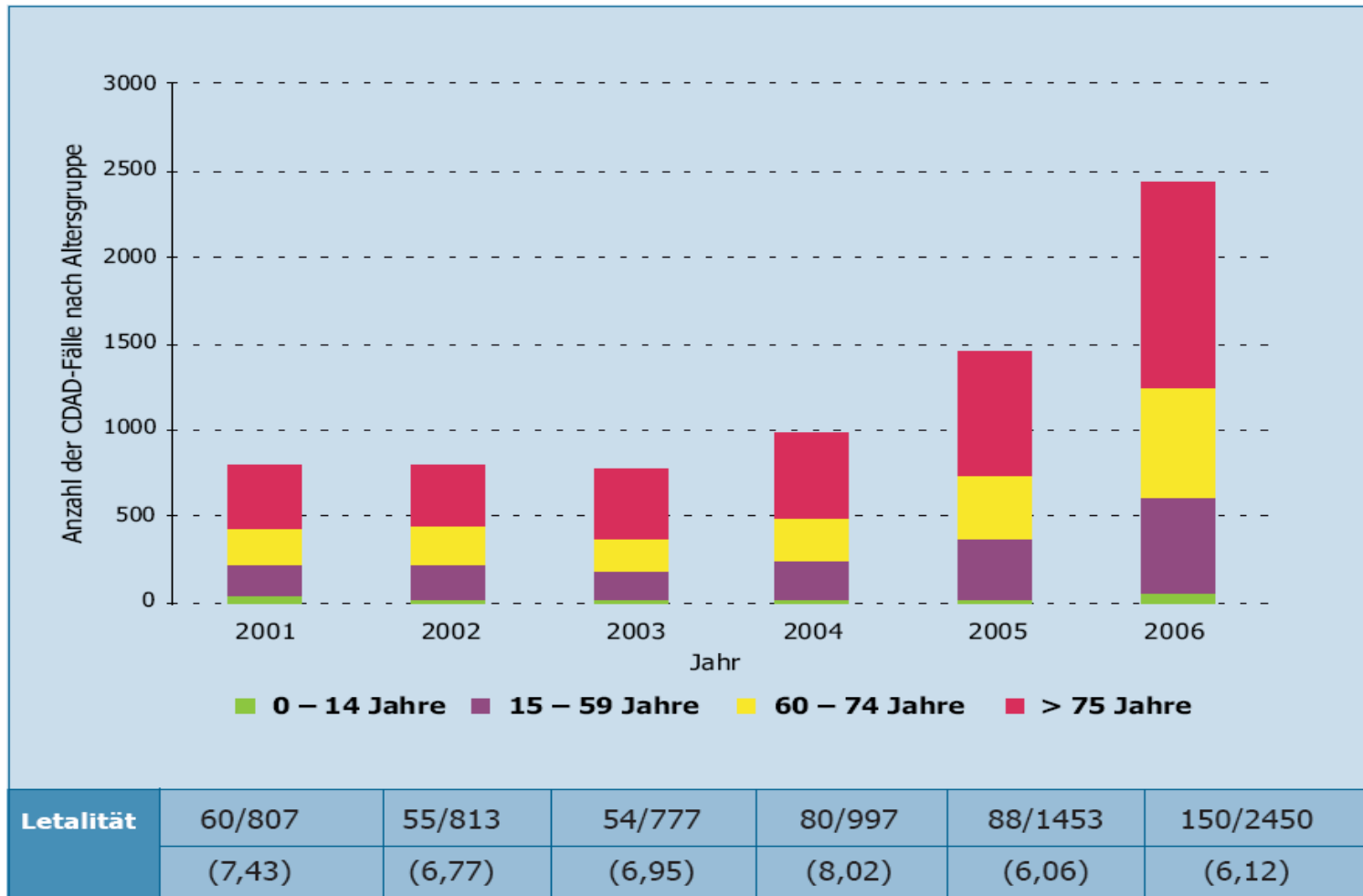
- "Changes in epidemiology of CDAD"
- CDAD also in the community
- Hypervirulent strains causing hospital outbreaks in Europe and North America
- O27-strain or other hypervirulent strains in Austrian hospitals?
- Local cluster of severe CDAD cases at the 1200 bed University Hospital Salzburg in 2006
(68.000 admissions, 321.000 bed-days)

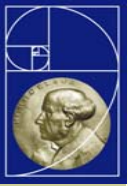




Discharge based CDAD incidence from Austrian hospitals 2001-2006

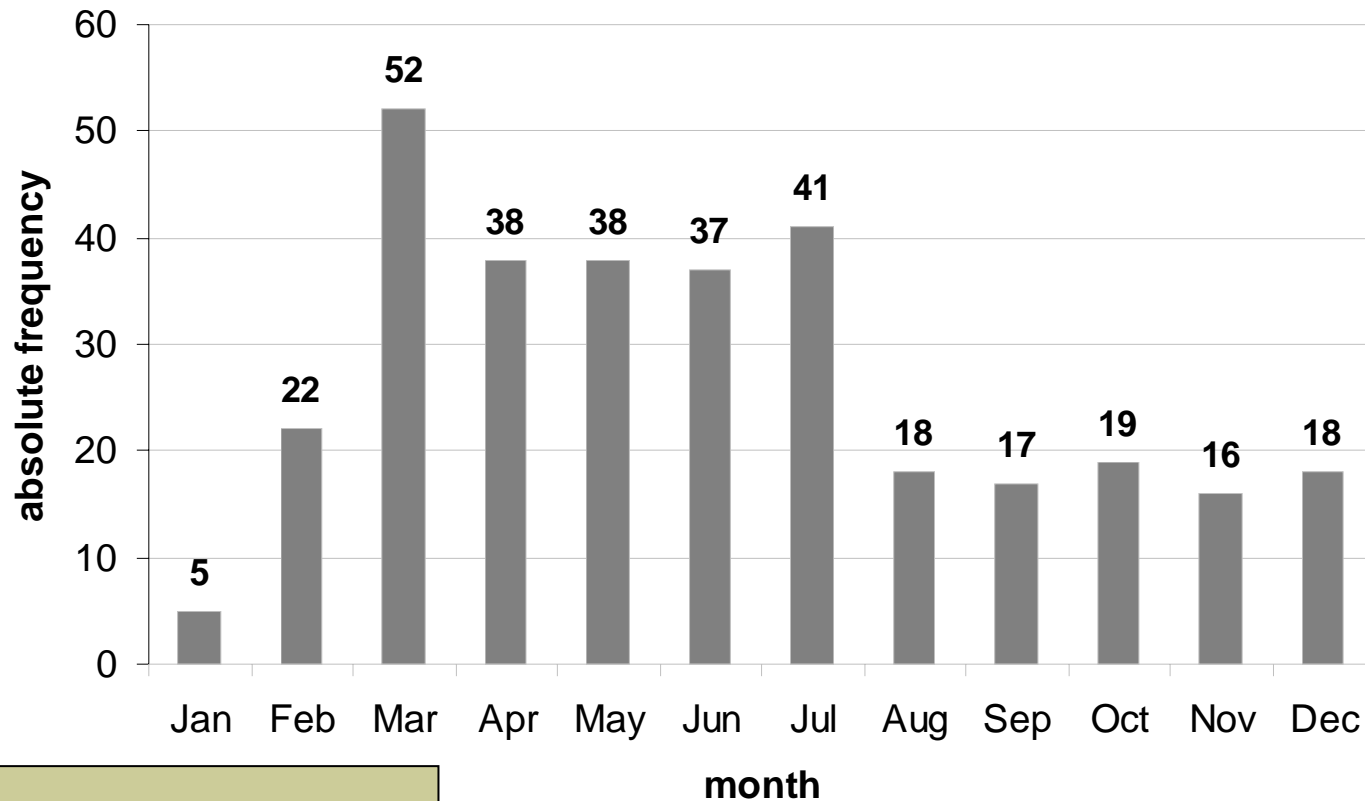
according to ICD-10 diagnosis





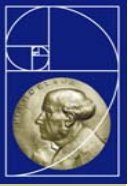
CDAD cases monthly in 2006

acc. to laboratory-based surveillance system



321 cases =
4-fold number of MRSA!

CDAD-incidence: 47/10.000 admissions



Aims

- Ongoing surveillance program to monitor incidence and death rate of CDAD in our hospital
- To characterize selected clinical cases by ribotyping and to assess the efficacy of infection control precautions





Methods

- Active surveillance-program:
Patients with diarrhea obligatory tested for *C. difficile*
- Laboratory-based reporting to hospital infection control team from February 2006 – October 2007

- Case definition according to *C. difficile* working group (ECDC advisory forum 2006)

- Selection criteria for typing:
 - Severe or recurrent cases
 - Cases epidemiologically related to these





CDAD– case definitions used

- **CDAD case**
- **Severe CDAD case** (including death in 30 days)
- **Recurrent case** (= relapse / re-infection)

CA-CDAD:

patient with clinical onset in the community or ≤ 72 h after admission to HCF, provided that onset was later ≥ 12 w after last discharge from HCF.

Healthcare onset -HCFA:

patient with clinical onset ≥ 72 h after admission to an HCF

Community onset -HCFA:

patient with clinical onset in the community / ≤ 72 h after admission to HCF, provided that onset was less than 4w after last discharge from HCF.





RESULTS





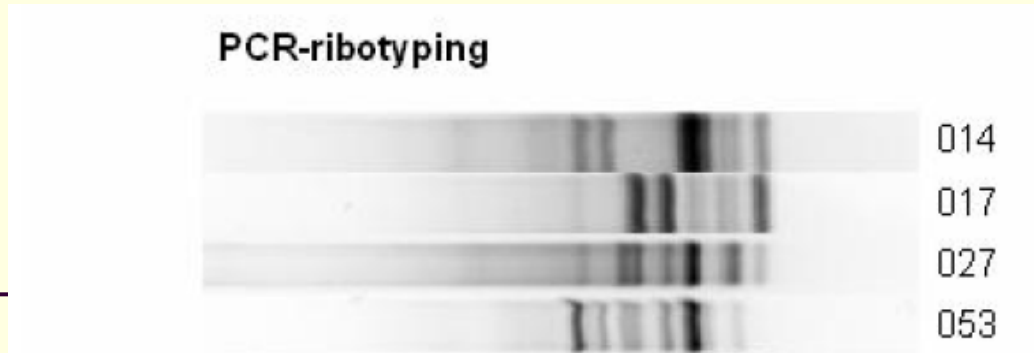
Results I

- 514 patients fulfilled the definition criteria of a case of CDAD in the period of 19 months
- Of these **514 cases, 97 (19%) cases** were **selected** for the study because of the severe course of their CDAD episode, relapse of CDAD cases and because of having been related in time and/or space with the severe or relapse cases
- All **97 cases** were retrospectively subjected to epidemiological and molecular biological investigation including **PCR-ribotyping**





Results II – PCR-Ribotypes

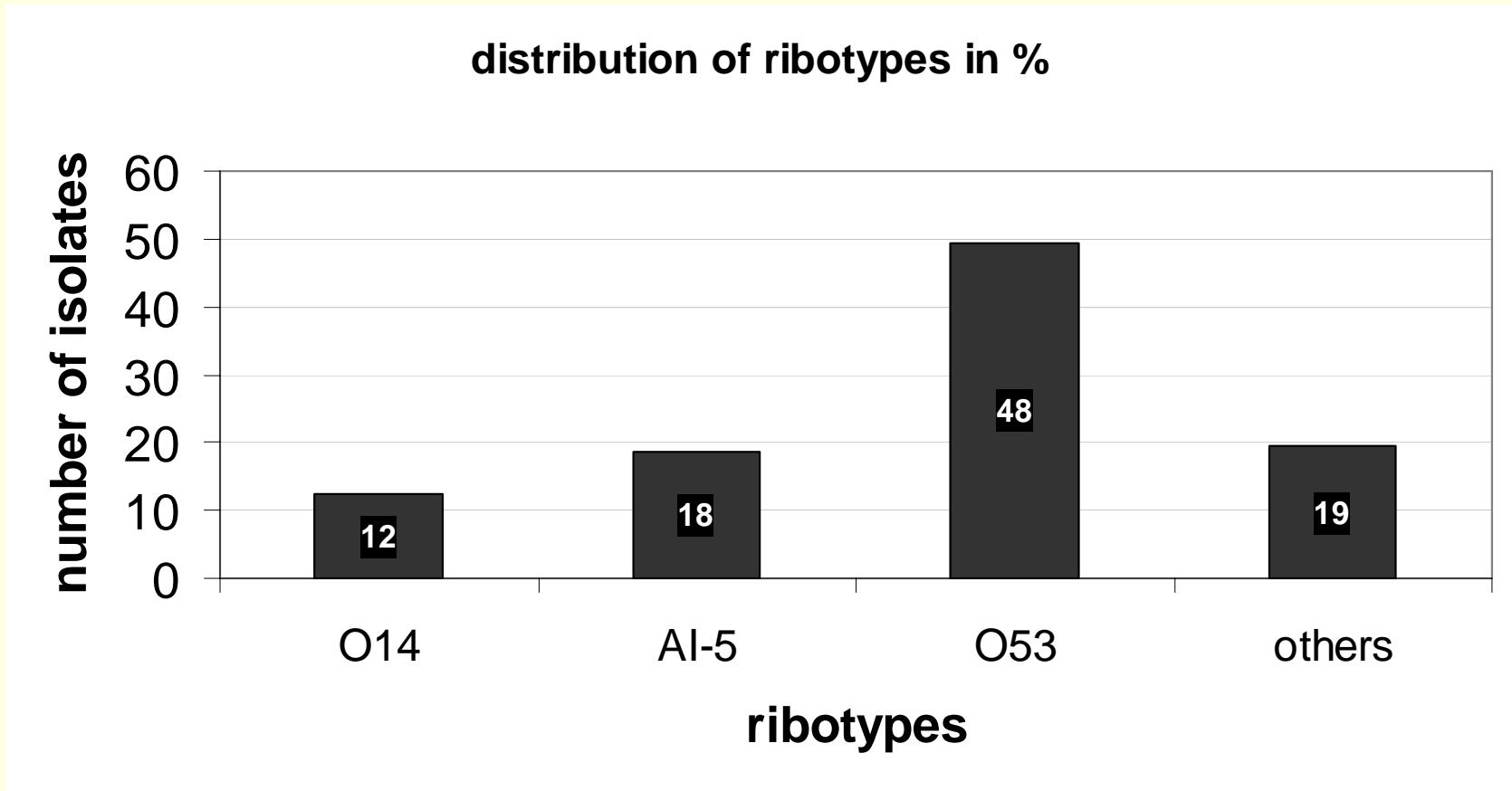


- **There was no ribotype 027 found among the isolates from the 97 cases**
- **The most prevalent ribotype found was ribotype 053 (49; 48%)**
- **053 = resistant to Clindamycin and Moxifloaxcin**



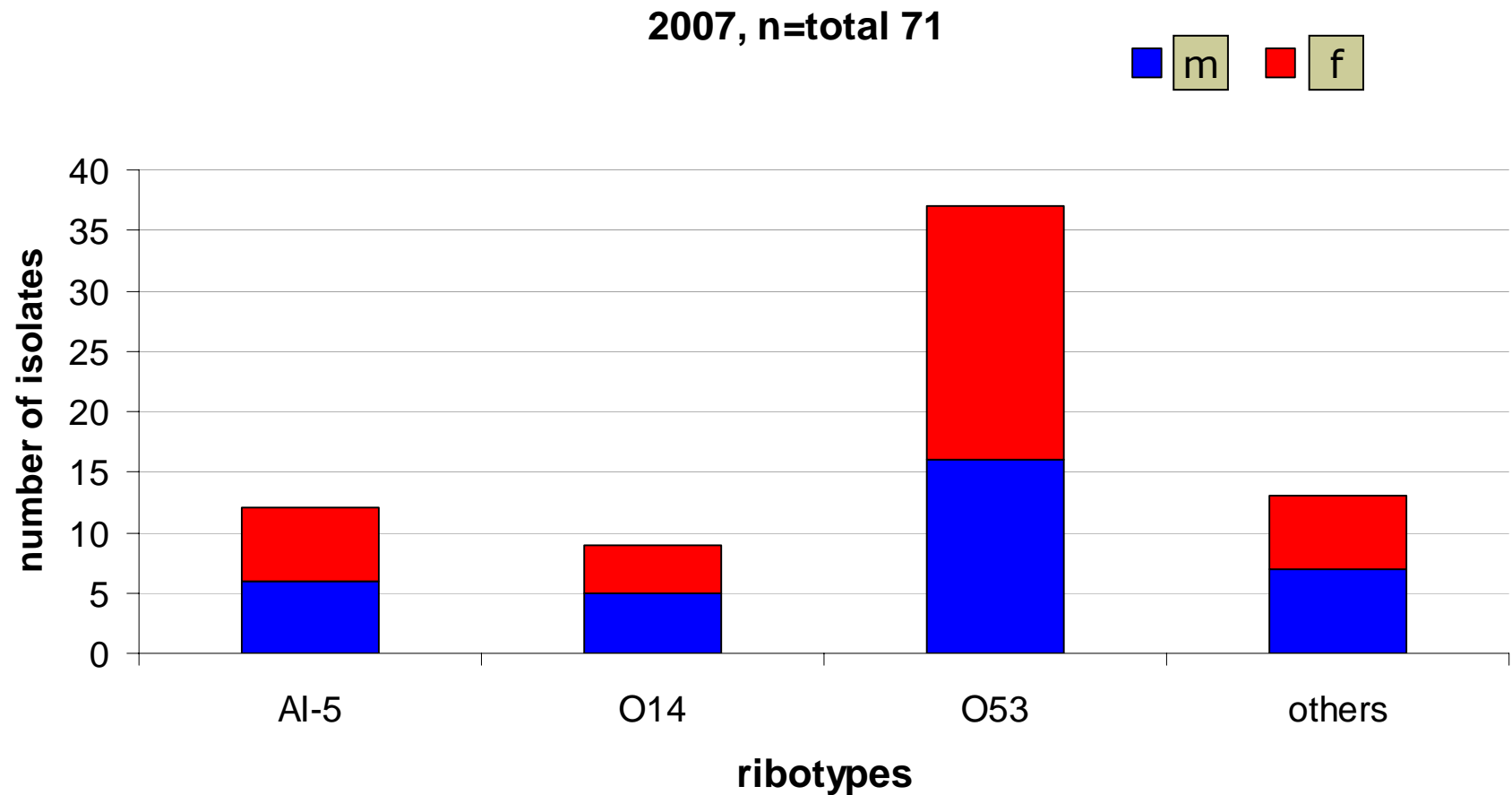


Distribution of PCR-ribotypes of 97 *C. difficile* isolates in %, University Hospital Salzburg 2006–2007





Distribution of PCR-Ribotypes in *C. Difficile* Isolates by sex, Hospital Salzburg 2007



* Other = AI-1, AI-14, AI-16, AI-18, AI-49



Demographics of the 39 CDAD-cases due to *C. difficile* O53

Characteristics	N _{total} = 39 (%)
Age (median, range)	76 (70-86)
Sex m (%)	21 (53.)
Reason for admission	
Diarrhea	10 (27.5)
cardio vascular disorder (CVD)	8 (20)
Other disorders	8 (20)
peripheral arterial circulatory disorders	7 (17.5)
renal failure	3 (7.59)
neoplasia	2 (5)
pneumonia	1 (2.5)



Comorbidities of the 39 CDAD-cases due to *C. difficile* O53

Comorbidities n (%)	38 (97.4)
CVD (cardiovascular disease)	32
Renal failure	18
Lung disease	13
Hepatic disease	3
Gastrointestinal surgery in the past year	8
Invasive devices during current hosp. stay	6
Neoplasia	7
Diabetes mellitus	6





Clinical-epidemiological characteristics of the CDAD episode under study - 1

characteristics	N_{total} = 39 (%)
Case classification	
Probable new infection	28 (71.8)
Recurrence by means of relapse	11 (28,2)
Clinical criteria	
Diarrhoe	37 (94.9)
Bloody diarrhoe	2 (5,1)
Toxic megacolon	0
CDAD treatment received	36 (92.3)
vancomycin	5
metronidacol	29
metronidacol / vancomycin	2



Clinical-epidemiological characteristics of the CDAD episode under study - 2

CDAD complication	4
Refractory colitis	2
Blood stream infection/SIRS	2
Perforation of colon	0
Severe CDAD	15 (38.5)
Outcome _ death	13 (33.4)



Medications of the 39 CDAD-cases due to *C. difficile* O53

Medication rcv'd in 12 w prior to onset n (%)	20 (51.3)
PPI	16 (77%)
H2-receptor antagonist	2
Cytostatics	2
Analgetics	8
Antibiotic(s) received in 12 w prior to onset	36 (92.3)
Number of Antibiotic regimes	90
1	7
2	12
3	11
4	5
5	1



Antibiotic exposure in these 39 053- CDAD cases

Antibiotics used : 90 regimens	
Moxifloxacin	2
Ciprofloxacin	23
<u>2. Clindamycin</u>	22
<u>3. Amoxicillin/Clavulanic acid</u>	15
Cephalosporine I	2
Cephalosporine II	3
Cephalosporine III	1
Imipenem/Cilastatin	2
Fucidic acid	1
<u>4. Piperacillin/Tacobactam</u>	9
Tigecycline	1
Clarithromycin	5
Vancomycin	2
Metronidazol	2



PCR-ribotype 053-Transmissibility

- 2 clusters at the gastroenterology-department
Jan- Oct, 2007
- Twice **survival of Ribotype- 053 - spores**
in the patients environment despite
efficacious routine disinfections measures.
(2 positive swabs out of 15 ,13 %) in a
non-outbreak situation
- 053-Transmission to a health-care-worker
who had nursing-contact to CDAD patients
with several ribotypes at the oncology
department in 02/07 developing CDAD

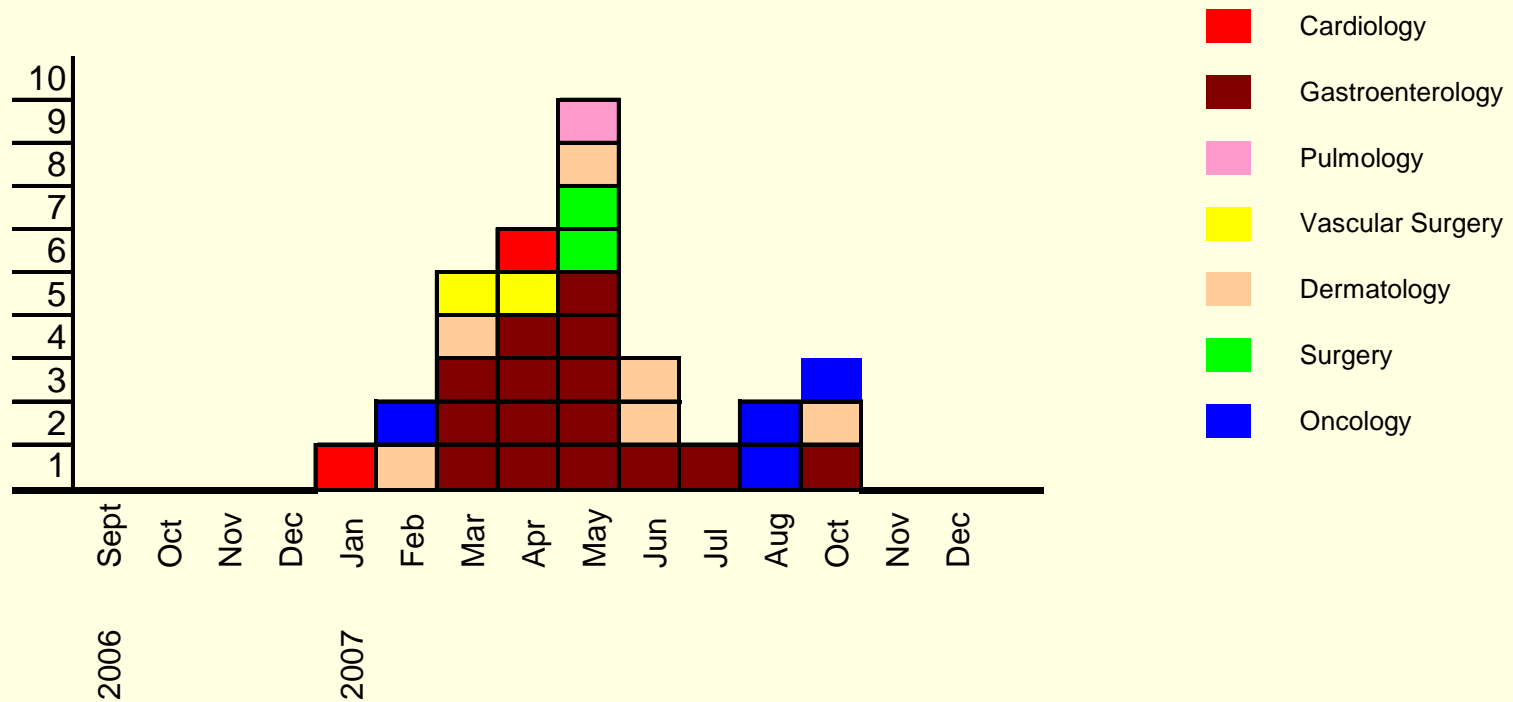


Ribotypes – department relation 2006

Ribotype	053	AI5	AI16	AI1	AI14	AI18	O14	total
Gastroenterology	053	AI5, AI5						3
Cardiology	053, 053					AI18		3
Oncology	053	AI5	AI16		AI14			4
Vascular Surgery	053, 053			AI1, AI1				4
Orthopaedics		AI5						1
Dermatology	053, 053, 053							3
Gynaecology							O14	1
Total	9	4	1	2	1	1	1	19



PCR-ribotype O53 – isolates by month and department of occurrence, Jan- Oct, 2007





Conclusions

- Based on PCR-ribotyping 053 was the predominating strain in selected CDAD patients identified in a 19-month-surveillance period in our hospital
- Our findings indicate a high transmissibility and hypervirulence of this strain.
- Further efforts should be put on the molecular-microbiological investigation of this strain detecting responsible virulence factors





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