

# Kırım Kongo Kanamalı Ateşi Tedavi



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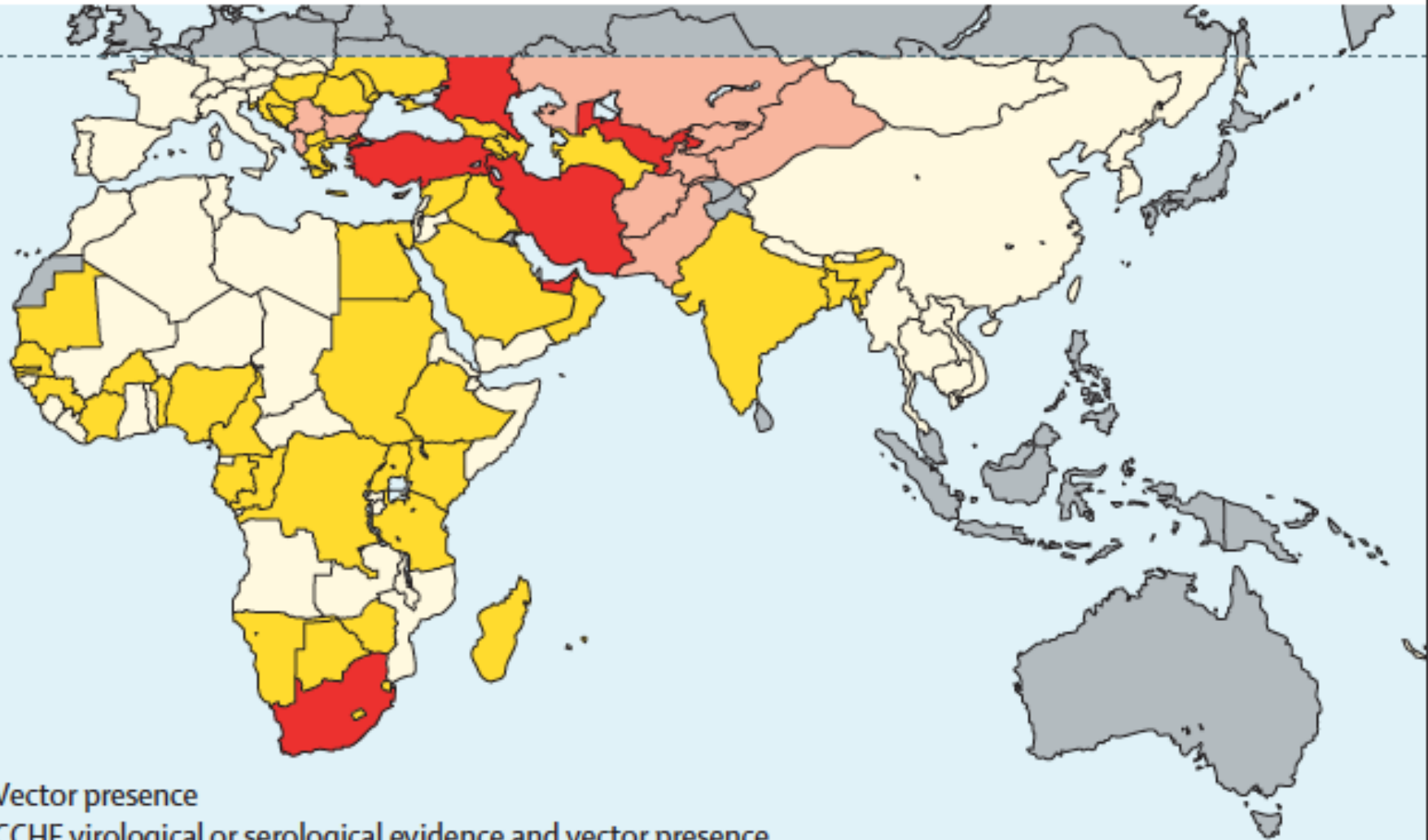
6 Ekim 2016, İstanbul

# Sunum İçeriği

- Epidemiyoloji güncelleme
- Patogenez
- Tedavi
- Korunma

# Kırım Kongo Kanamalı Ateşi Risk ve Olgu Haritası

50° north latitude: limit for geographical distribution of *Hyalomma* spp ticks



- Vector presence
- CCHF virological or serological evidence and vector presence
- 5-49 CCHF cases reported per year
- ≥50 CCHF cases reported per year

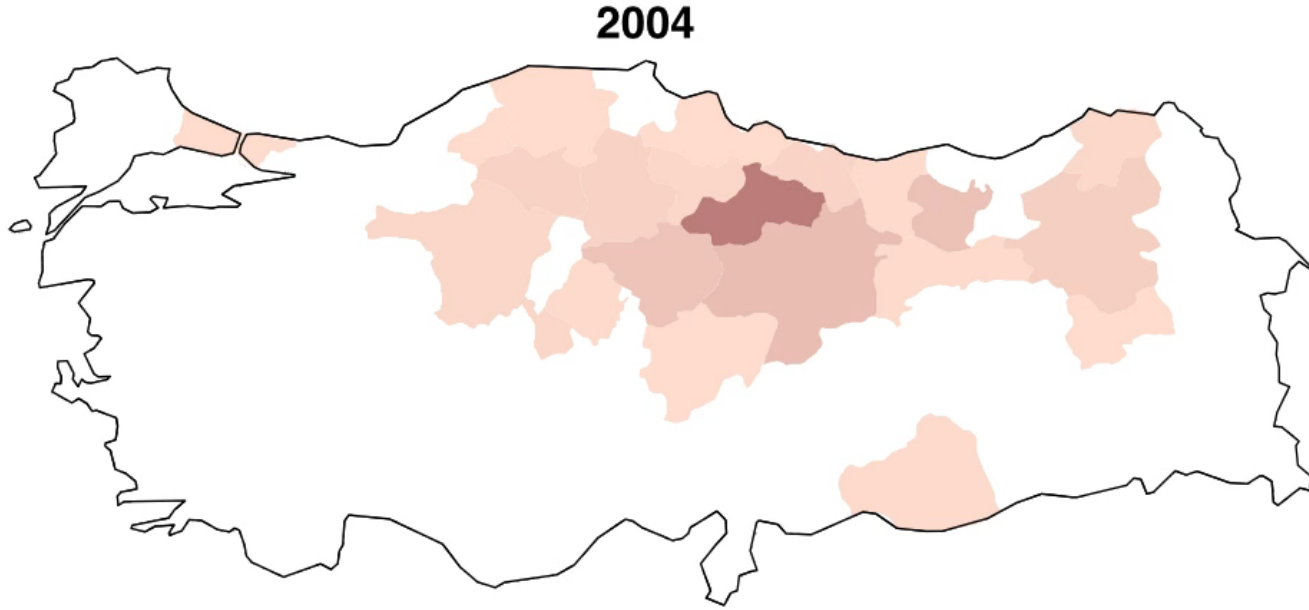


## Rapid RISK ASSESSMENT

# Crimean-Congo haemorrhagic fever in Spain

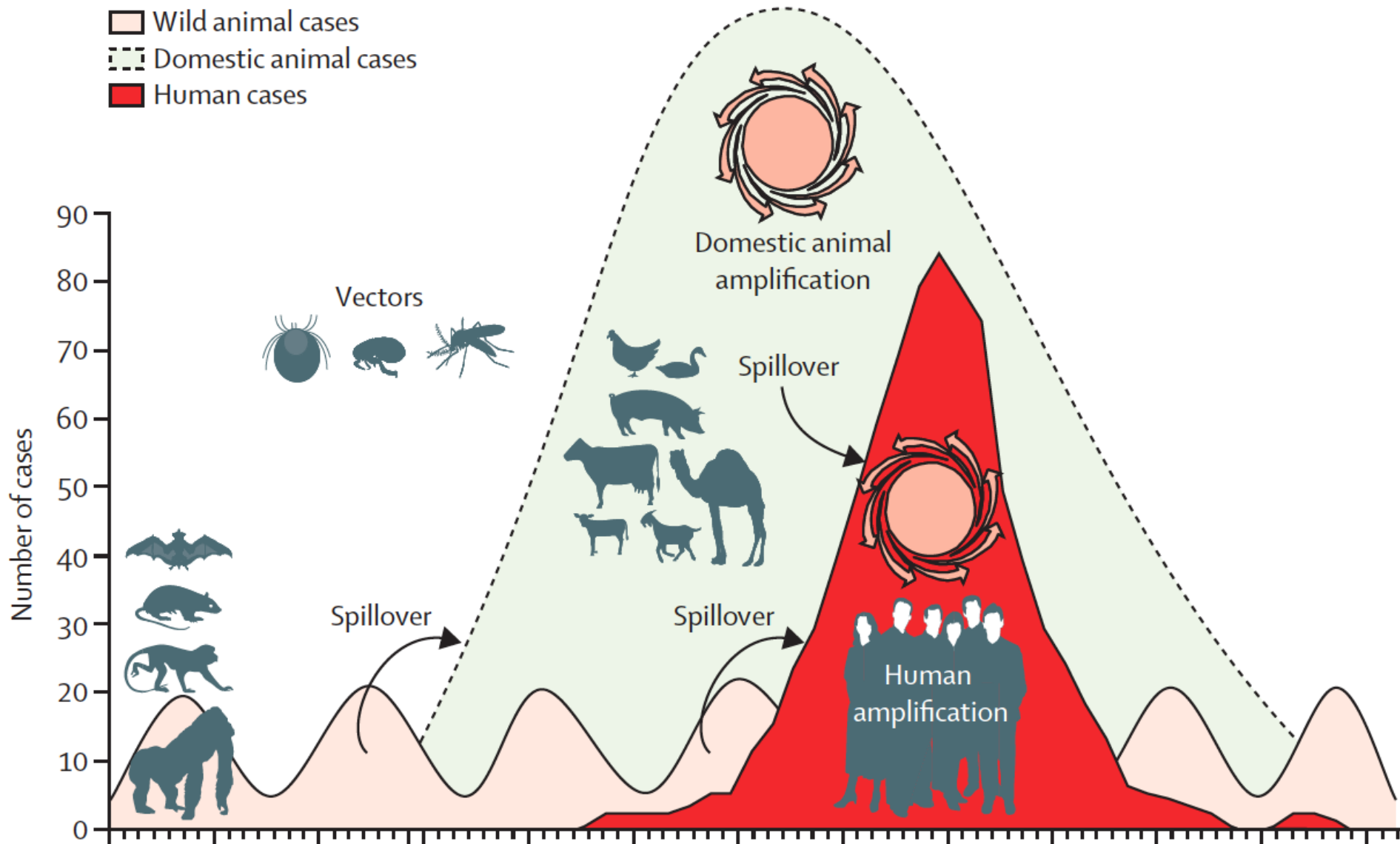
09 September 2016

# Türkiye’de Kırım Kongo Kanamalı Ateşi



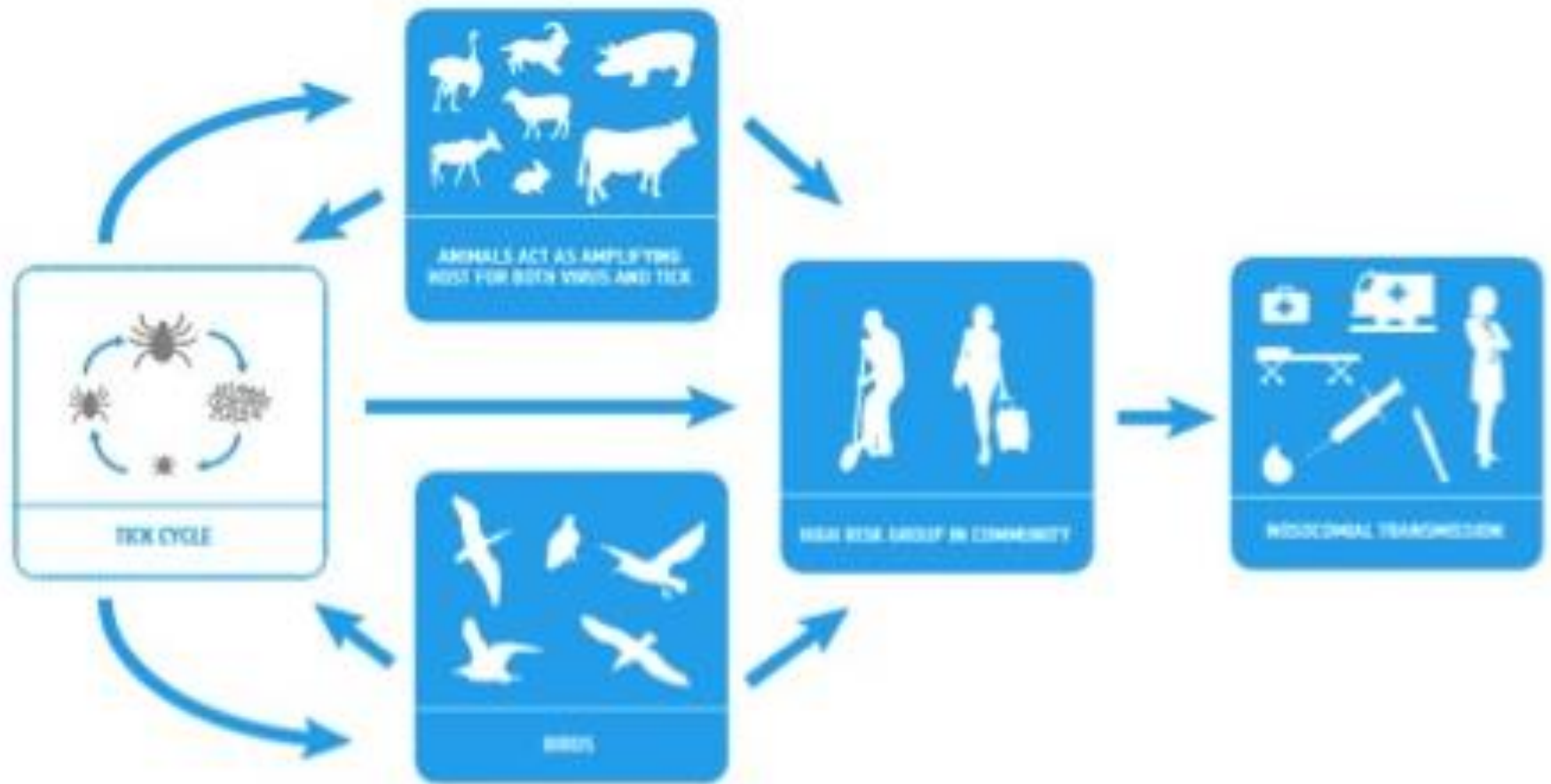
A

- Wild animal cases
- Domestic animal cases
- Human cases





# Crimean-Congo Hemorrhagic Fever



# Epidemiologic characteristics

Rural area: 70% of the cases

Male/female ratio: 1.13/1

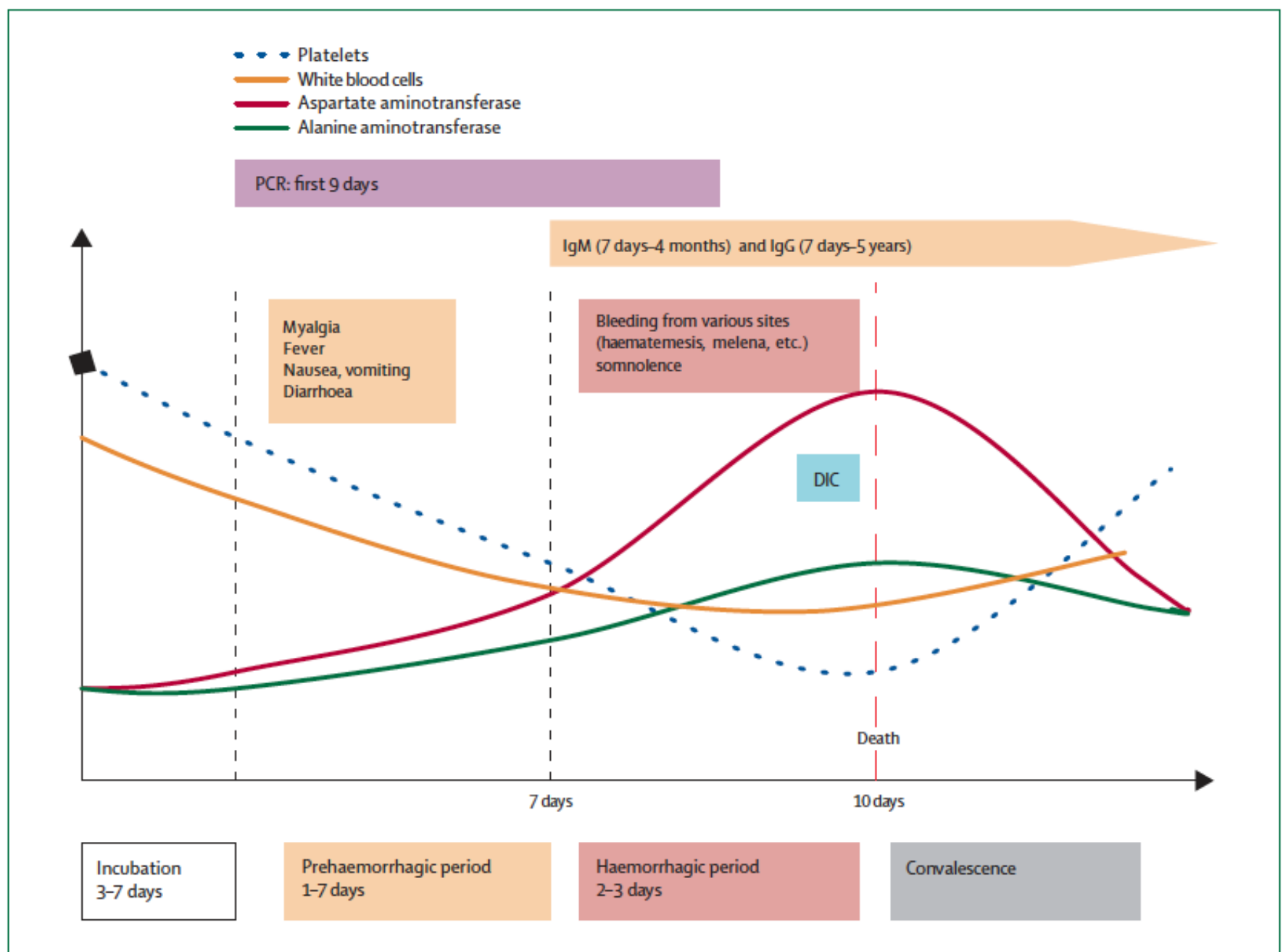
Tick bite history among patients: 69%

May, June, July: 84% of the cases



# Clinical Features





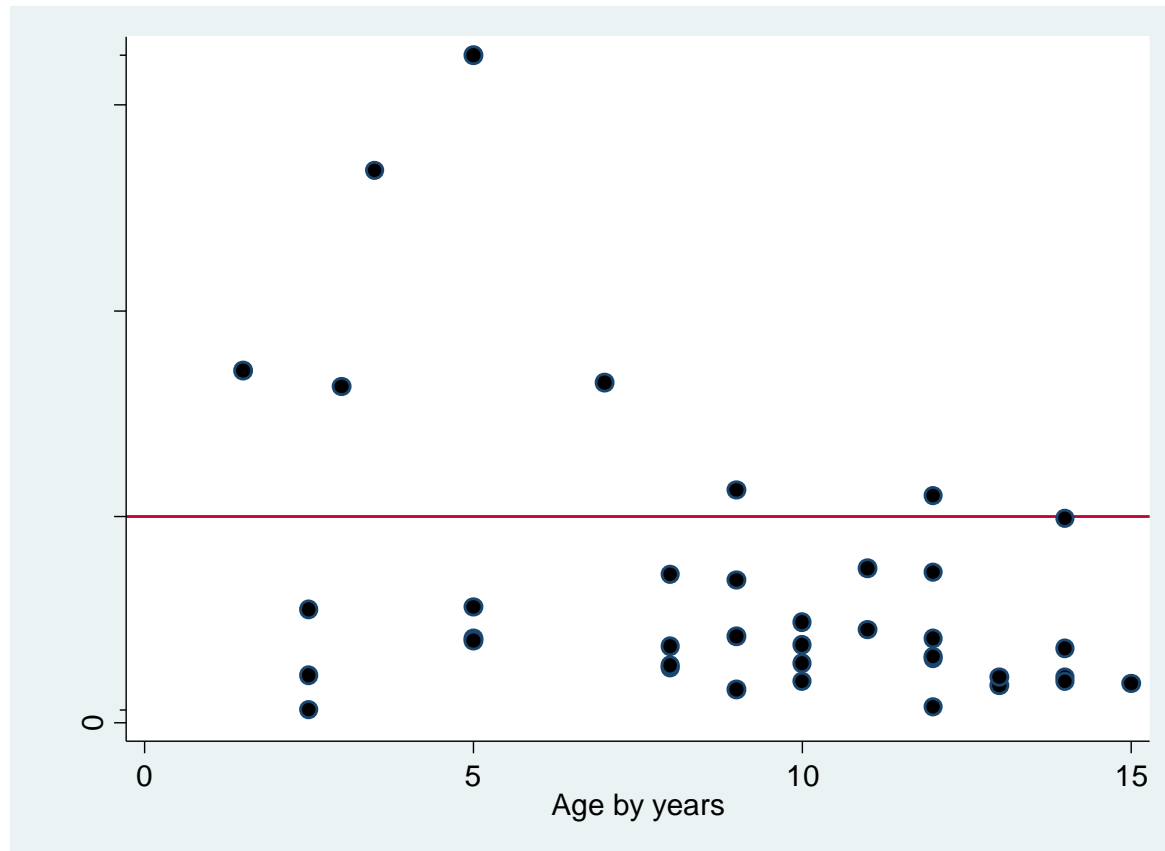
**Figure 3: Clinical and laboratory course of CCHF**  
 DIC=disseminated intravascular coagulation.

# Fatality Among Hospitalized Children

33 children in Iran: 24% (Sharifi-Mood, et al. Ped Infect Dis J 2008)

31 children in Turkey: 0% (Tezer H, et al. J Clin Virol 2010)

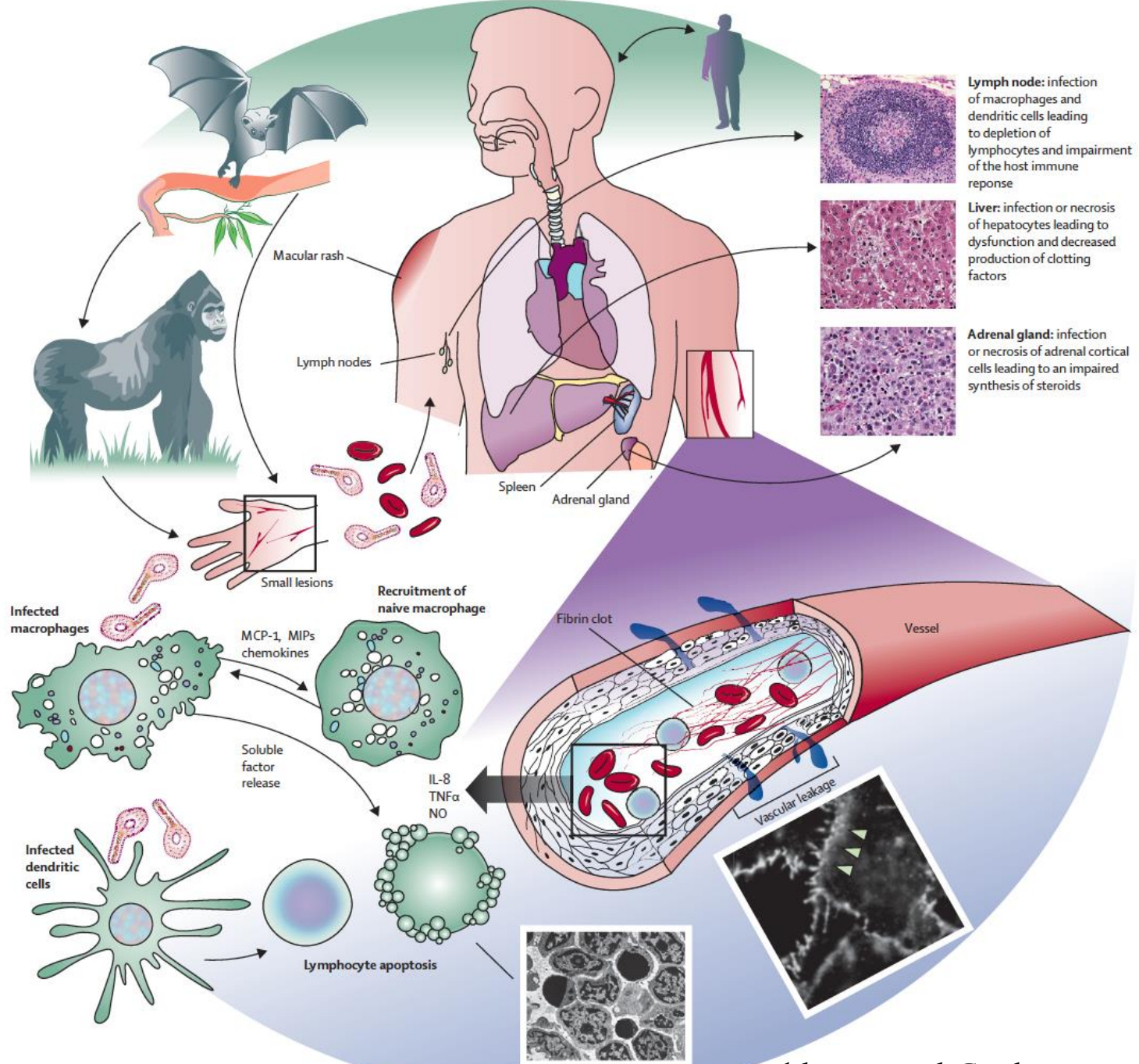
50 children in Turkey; 0% (Tuygun N, et al. Pediatr Int 2011)

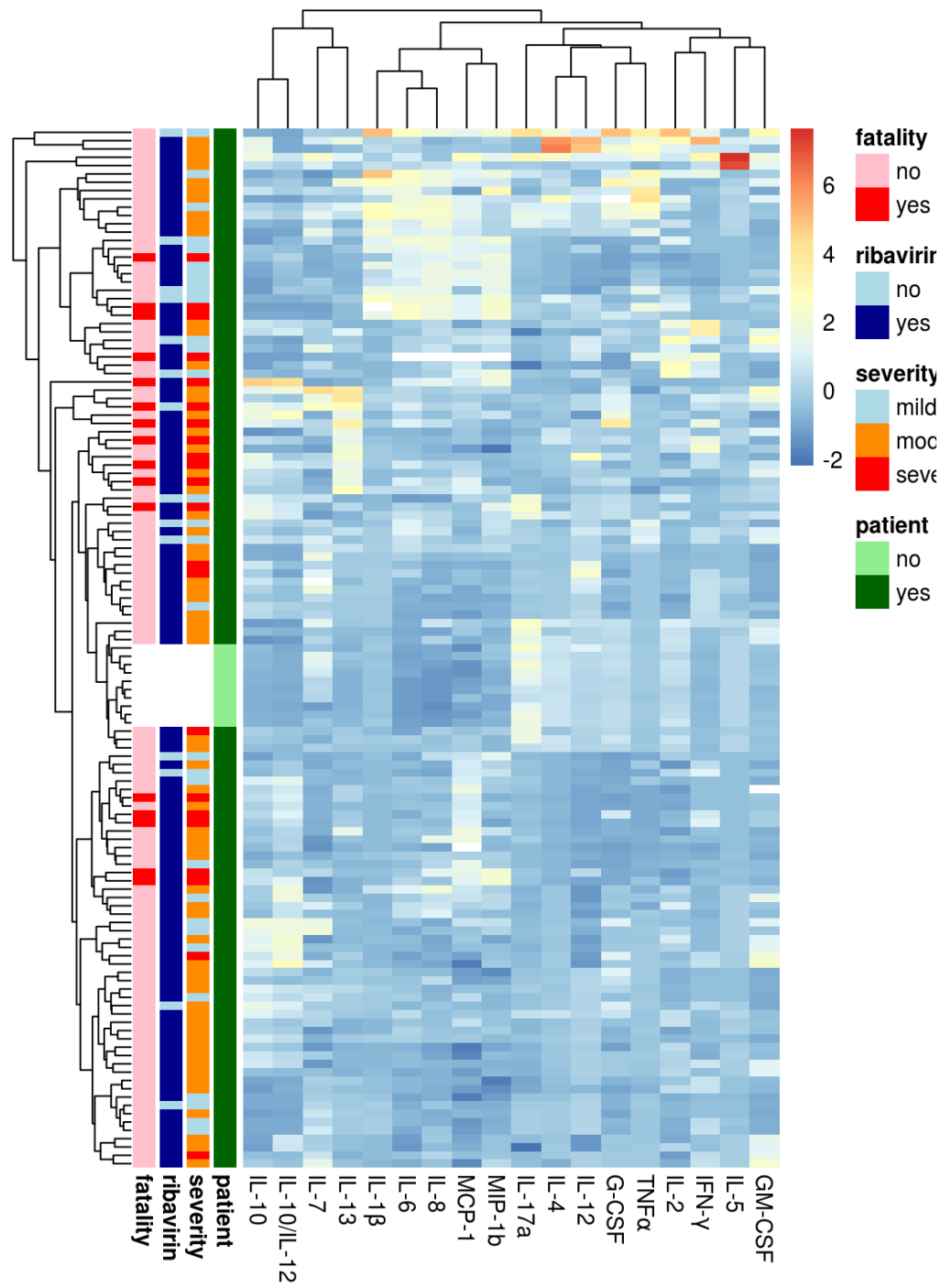


# Pregnancy and CCHF

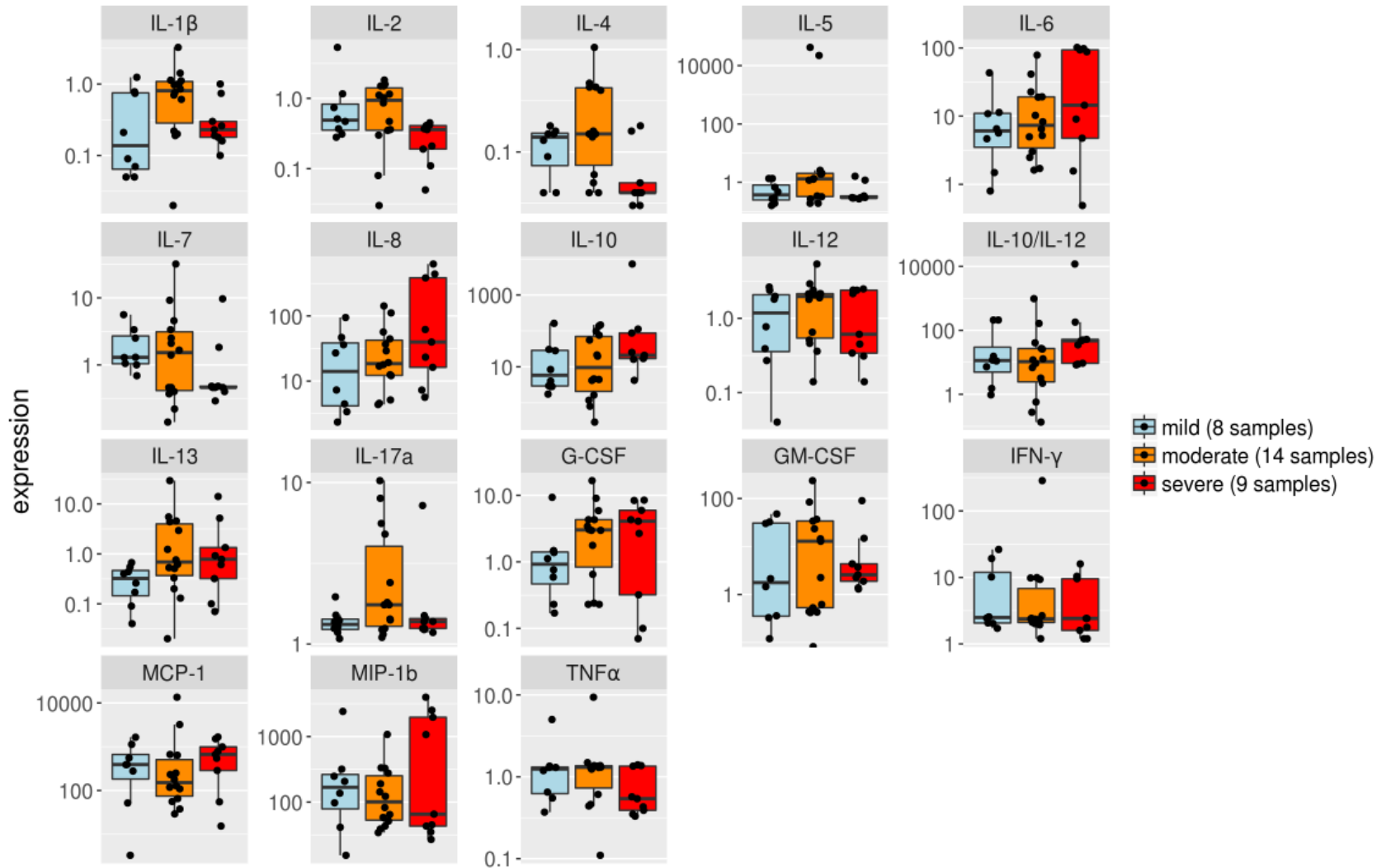
	Gestation (weeks)	Ig M	Ig G	PZR	Outcome
1. Mother	38	+	+	-	Survived
Baby	C/S		+	+	Fatal
2. Mother	19	+		+	Survived
Baby	vaginal(Term)	-		-	NEC Fatal
3. Mother	28	+		+	Fatal
Baby					Fatal







# Cytokine Levels of Different Severity Groups for First Five Days





The goal of the therapy is  
the prevention of fatality

# Hematologic support

Fluid and electrolyte balance should be sustained

If necessary;

Blood,

Trombocyte suspension,

Fresh frozen plasma

# Supportive Therapy

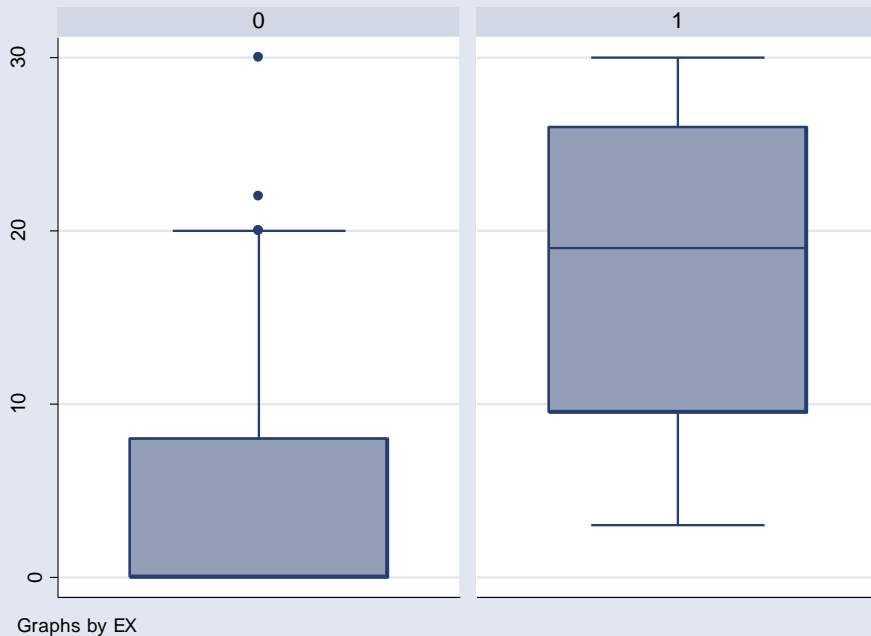
- What are the standards of supportive therapy?
- Preventive measures in patient care

# Confounding by indication

Fresh frozen plasma

Survived cases

fatal cases

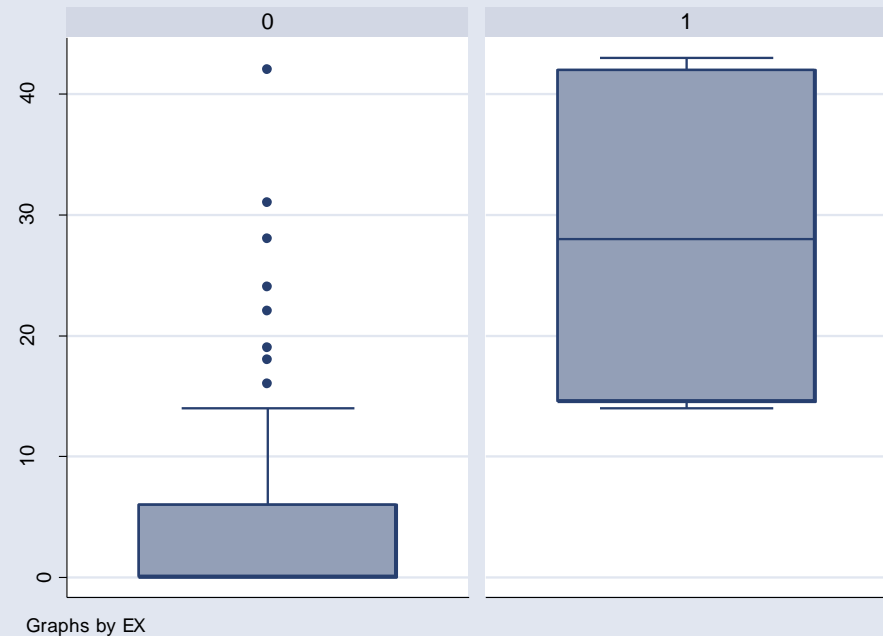


$p=0.002$

Thrombocyte suspension

Survived cases

fatal cases



$p=0.001$

Ergonul, et al. *CMI* 2006

# **Ribavirin: A Broad Spectrum Antiviral**

## **Only Drug for VHFs**

<b>Arenaviridae</b>
Lassa Fever
South America HF
<b>Bunyaviridae</b>
Hanta
Rift Valley
CCHF

# Inspirations from EBV and other HFs

favipiravir

brinsidofovir

ZMapp

TKM-Ebola

“antisense” oligonükleotidler (PMOs)

BCX4430

# Efficacy of T-705 (Favipiravir) in the Treatment of Infections with Lethal Severe Fever with Thrombocytopenia Syndrome Virus

Hideki Tani,<sup>a</sup> Aiko Fukuma,<sup>a</sup> Shuetsu Fukushima,<sup>a</sup> Satoshi Taniguchi,<sup>a</sup>  
Tomoki Yoshikawa,<sup>a</sup> Naoko Iwata-Yoshikawa,<sup>b</sup> Yuko Sato,<sup>b</sup> Tadaki Suzuki,<sup>b</sup>  
Noriyo Nagata,<sup>b</sup> Hideki Hasegawa,<sup>b</sup> Yasuhiro Kawai,<sup>c</sup> Akihiko Uda,<sup>d</sup>  
Shigeru Morikawa,<sup>d</sup> Masayuki Shimojima,<sup>a</sup> Haruo Watanabe,<sup>e</sup> Masayuki Saijo<sup>a</sup>

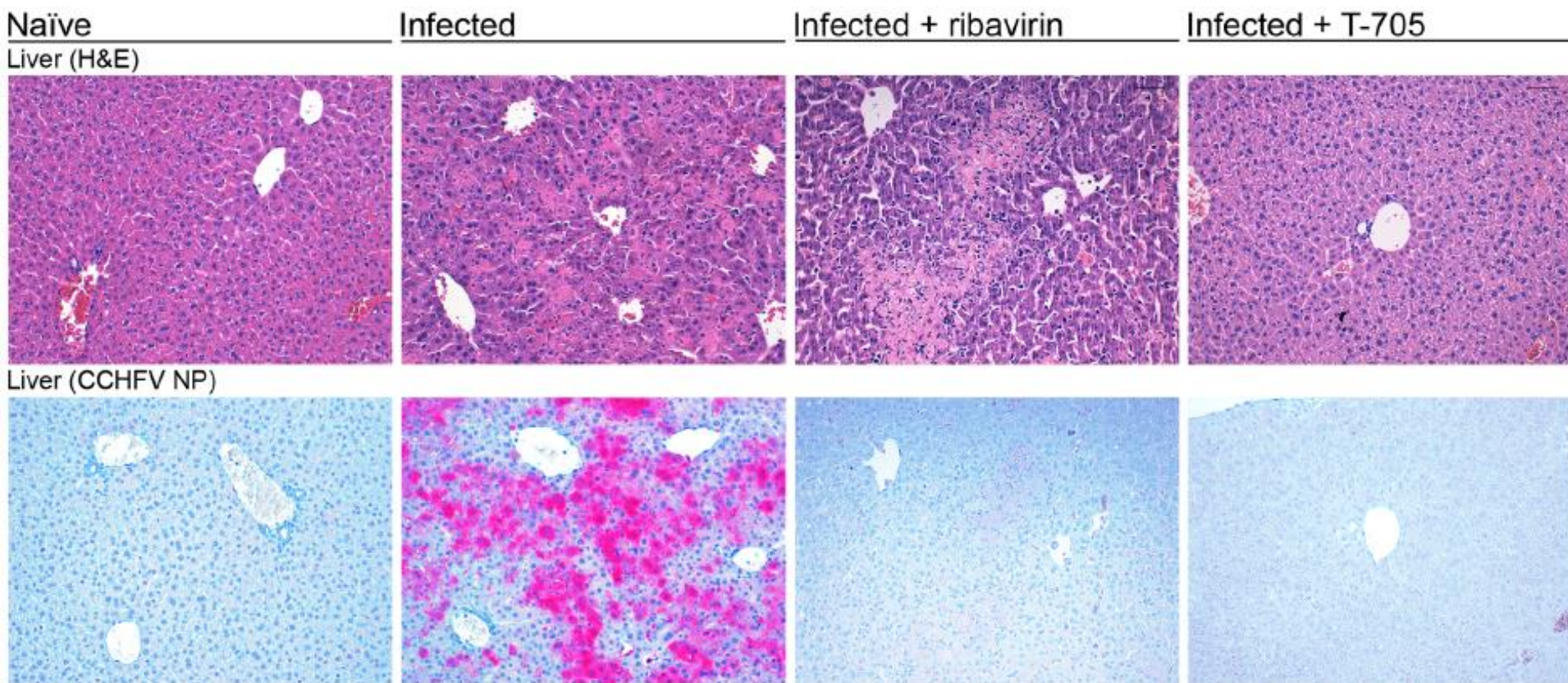
Department of Virology I,<sup>a</sup> Department of Pathology,<sup>b</sup> Division of Experimental Animal Research,<sup>c</sup> and  
Department of Veterinary Science,<sup>d</sup> National Institute of Infectious Diseases, Tokyo, Japan; National Institute of  
Infectious Diseases, Tokyo, Japan<sup>e</sup>

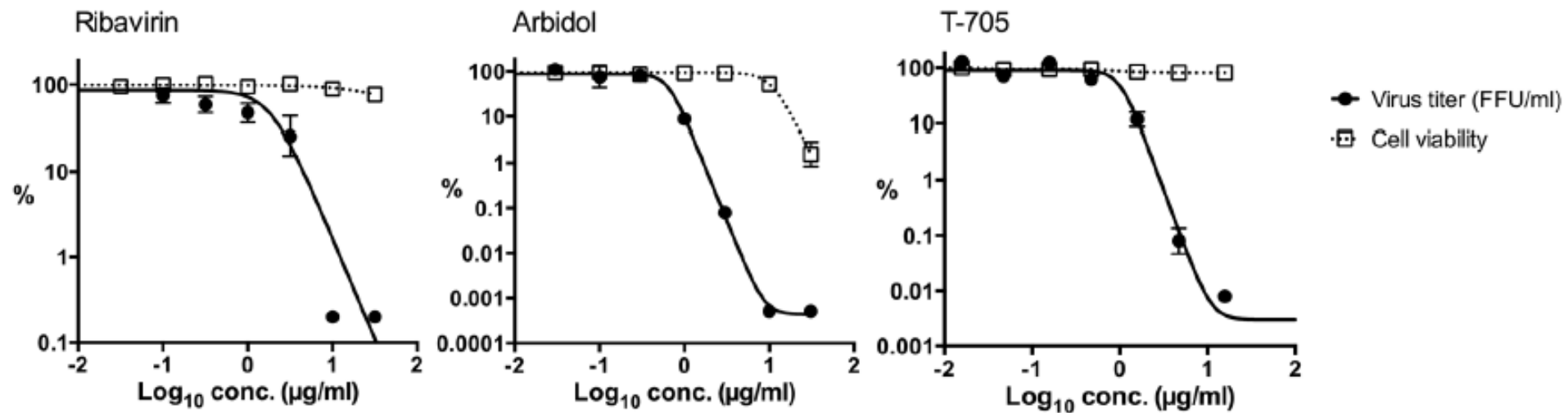
*vitro* and *in vivo*. A time-of-drug-addition study revealed that therapeutic T-705 treatment of SFTSV infection in IFNAR<sup>-/-</sup> mice was effective. These results suggest that T-705 is a promising candidate for the treatment of SFTS.



# Evaluation of Antiviral Efficacy of Ribavirin, Arbidol, and T-705 (Favipiravir) in a Mouse Model for Crimean-Congo Hemorrhagic Fever

Lisa Oestereich<sup>1,2</sup>, Toni Rieger<sup>1,2</sup>, Melanie Neumann<sup>3</sup>, Christian Bernreuther<sup>4</sup>, Maria Lehmann<sup>1,2</sup>, Susanne Krasemann<sup>3</sup>, Stephanie Wurr<sup>1,2</sup>, Petra Emmerich<sup>1,2</sup>, Xavier de Lamballerie<sup>5</sup>, Stephan Ölschläger<sup>1†</sup>, Stephan Günther<sup>1,2†\*</sup>





	Ribavirin (n=2)	Arbidol (n=3)	T-705 (n=2)
IC <sub>50</sub>	2.8 μg/ml (1.9–3.7)	0.6 μg/ml (0.08–1.2)	1.1 μg/ml (1.0–1.1)
IC <sub>90</sub>	4.7 μg/ml (4.6–4.8)	1.2 μg/ml (0.2–2.4)	1.6 μg/ml (1.5–1.7)
IC <sub>99</sub>	9.5 μg/ml (5.8–13.2)	2.0 μg/ml (0.5–3.8)	2.5 μg/ml (2.0–2.9)

# **Ribavirin is effective in vitro**

## **Effective in vitro**

Watts DM, et al. Am J Trop Med Hyg 1989

## **Inhibits viremia among rats**

Tignor GH, et al. Antiviral Res 1993

## **The most effective among the alternatives**

Paragas J, et al. Antiviral Res 2004

# Clinical Observations: Case series, historical control

Author, year	Cases	Fatality in ribavirin group	Fatality in no ribavirin group
Fisher-Hoch 1995	3 SÇ	0/3 (0%)	-
Mardani 2003	69	42/139 (30%)	22/48 (46%)
Ergonul 2006	45	0/22 (0)	1/23 (4.3%)
Ozkurt 2006	26	2/22 (9%)	4/38 (10.5%)
Elaldı, 2009	218	126 (7.1%)	92 (11.9%)

# The Role of Observational Studies

Goldberger believed that an infectious disease was unlikely to distinguish between inmates and employees or so systematically between rich and poor, and he favoured the hypothesis that a superior diet protected people from pellagra. He had also in mind the case of beriberi, a disease which had recently been shown to be responsive to dietary interventions. (Vandenbroucke 2003).

# Problems in Study Design: What We Learned?

## A. Study Design

### 1. Inclusion criteria

1. Severity
2. Confounding by indication

### 2. Number of days from onset of symptoms

1. Prehemorrhagic
2. Hemorrhagic

1. Ineffective application:

GIS symptoms in oral use (hematemesis)

### 3. Duration of treatment

## B. Statistical Analysis

1. P value is not everything; sample size is important

2. Meta-analysis: oranges & apples; early vs late



# Characteristics of Patients with Crimean-Congo Hemorrhagic Fever in a Recent Outbreak in Turkey and Impact of Oral Ribavirin Therapy

Önder Ergönül, Aysel Çelikbaş, Başak Dokuzoğuz, Şebnem Eren, Nurcan Baykam, and Harika Esener

Infectious Diseases and Clinical Microbiology Department, Ankara Numune Education and Research Hospital, Ankara, Turkey

patients infected with CCHF virus is suggested, which will be helpful for future outbreaks.

**Patients and methods.** Ankara Numune Education and Research Hospital (Ankara, Turkey) is one of the largest referral-based tertiary care community hospitals in Turkey. Patients with acute febrile syndrome characterized by malaise, bleeding, leukopenia, and thrombocytopenia were admitted to our clinic during the spring and summer of 2002 and 2003. Patients who had IgM antibodies or PCR results positive for CCHF virus in blood or tissue specimens were included to the study. Written informed consent was obtained from patients

Clin Infect Dis 2004

**Table 3. Univariate and Adjusted Analysis for Prediction of Death**

Factor	Univariate Analysis		Adjusted Analysis	
	OR (95% CI)	P Value	OR (95% CI)	P Value
SSI	2.49 (1.82–3.41)	<.001	3.27 (2.09–5.13)	<.001
Ribavirin use	0.68 (.23–1.93)	.470	0.04 (.004–.48)	.01
Corticosteroid use	5.65 (2.31–13.77)	<.001	0.22 (.039–1.27)	.092

Abbreviations: CI, confidence interval; OR, odds ratio; SSI, severity scoring index.

Clin Infect Dis 2013



# Severity Scoring Index for Crimean-Congo Hemorrhagic Fever and the Impact of Ribavirin and Corticosteroids on Fatality

Başak Dokuzoguz,<sup>1</sup> Aysel Kocagül Celikbas,<sup>1</sup> Şebnem Eren Gök,<sup>1</sup> Nurcan Baykam,<sup>1</sup> Mustafa Necati Eroglu,<sup>1</sup> and Önder Ergönül<sup>2</sup>

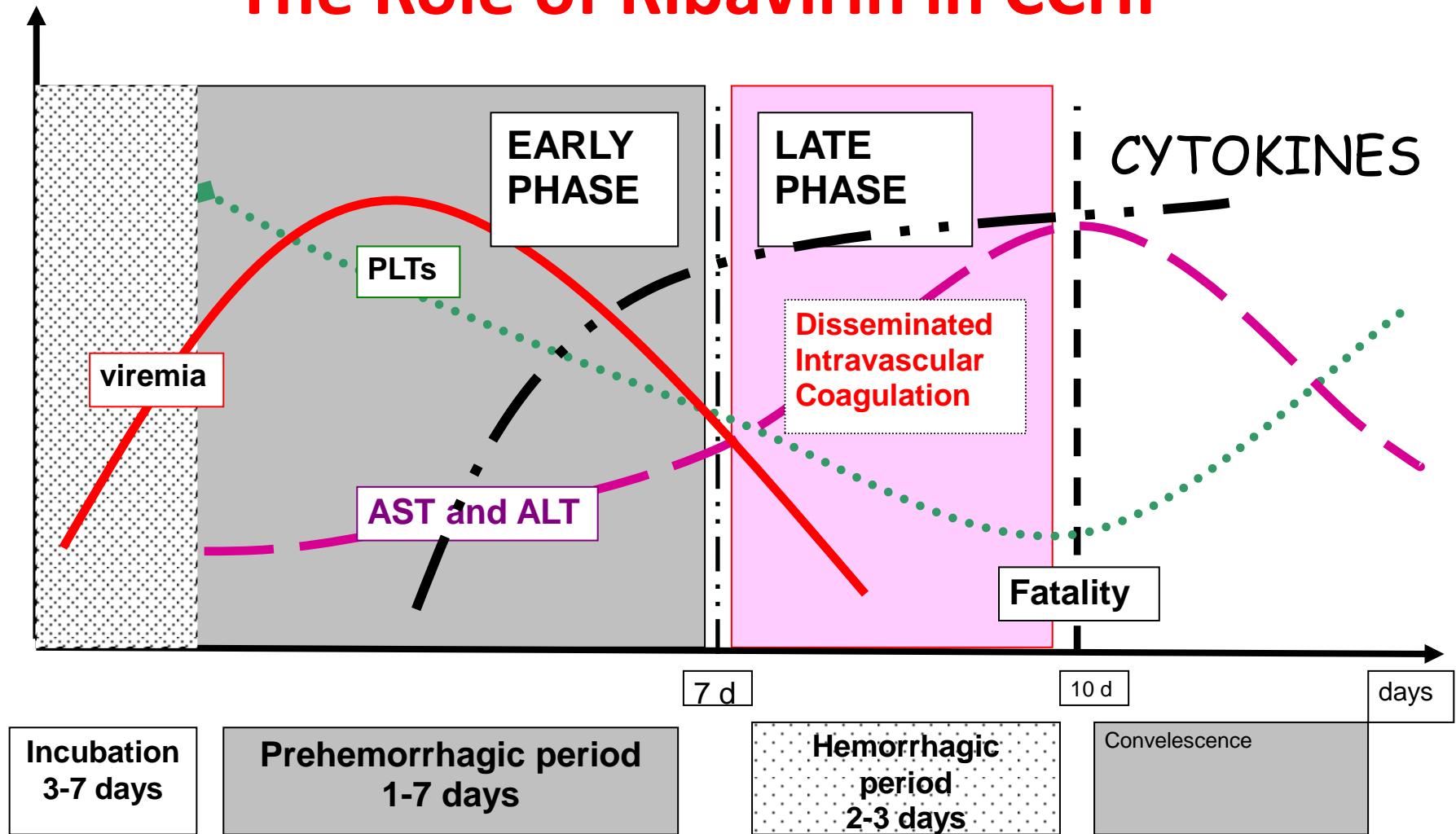
<sup>1</sup>Clinical Microbiology and Infectious Diseases Clinic, Ankara Numune Education and Research Hospital, Ankara, and <sup>2</sup>Infectious Diseases and Clinical Microbiology, Koç University, School of Medicine, Istanbul, Turkey

**Table 2. Effects of RBV and Additional Therapy on CFRs Among Patients With Crimean-Congo Hemorrhagic Fever, Stratified by SSI**

SSI, Disease Severity	CFR, % (Proportion of Patients), by RBV Status			CFR, % (Proportion of Patients), by CS Status		
	RBV	No RBV	<i>P</i> Value	CS	No CS	<i>P</i> Value
0–2, mild	0 (0/77)	0 (0/26)		0	0 (0/103)	
3–9, moderate	1.49 (2/134)	17 (3/18)	.001	4 (1/28)	1 (1/106)	.308
10–13, severe	67 (16/24)	100 (2/2)	.326	50 (8/16)	100 (8/8)	.014

Abbreviations: CFR, case-fatality rate; CS, corticosteroid; RBV, Ribavirin; SSI, severity scoring index.

# The Role of Ribavirin in CCHF



**Ribavirin could be more effective in early phase**

# A randomised controlled trial of ribavirin in Crimean Congo haemorrhagic fever: ethical considerations

B Arda,<sup>1</sup> A Aciduman,<sup>1</sup> J C Johnston<sup>2,3</sup>

## CONCLUSION

There is universal agreement that placebo-controlled trials should be prohibited in life-threatening conditions if an existing treatment is effective at prolonging or preserving life. The available literature provides convincing evidence that CCHF may be effectively treated with prompt administration of ribavirin. It is the standard of care in several nations, and ratified by the Centers for Disease Control and WHO. Therefore, it would be decidedly unethical to conduct an RCT of ribavirin in patients harbouring this life-threatening disease.



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## Letter to the Editor

### **Evidence supports ribavirin use in Crimean-Congo hemorrhagic fever**



The Perspective “Ribavirin is not effective against Crimean-

the use of ribavirin were to be infected with the CCHF virus (which I sincerely hope never occurs), would they reject ribavirin treatment? Then, remember the Hippocratic Oath: *primum non nocere*. So, why not give this treatment to the patients?

*Conflict of interest:* No conflict of interest to declare.

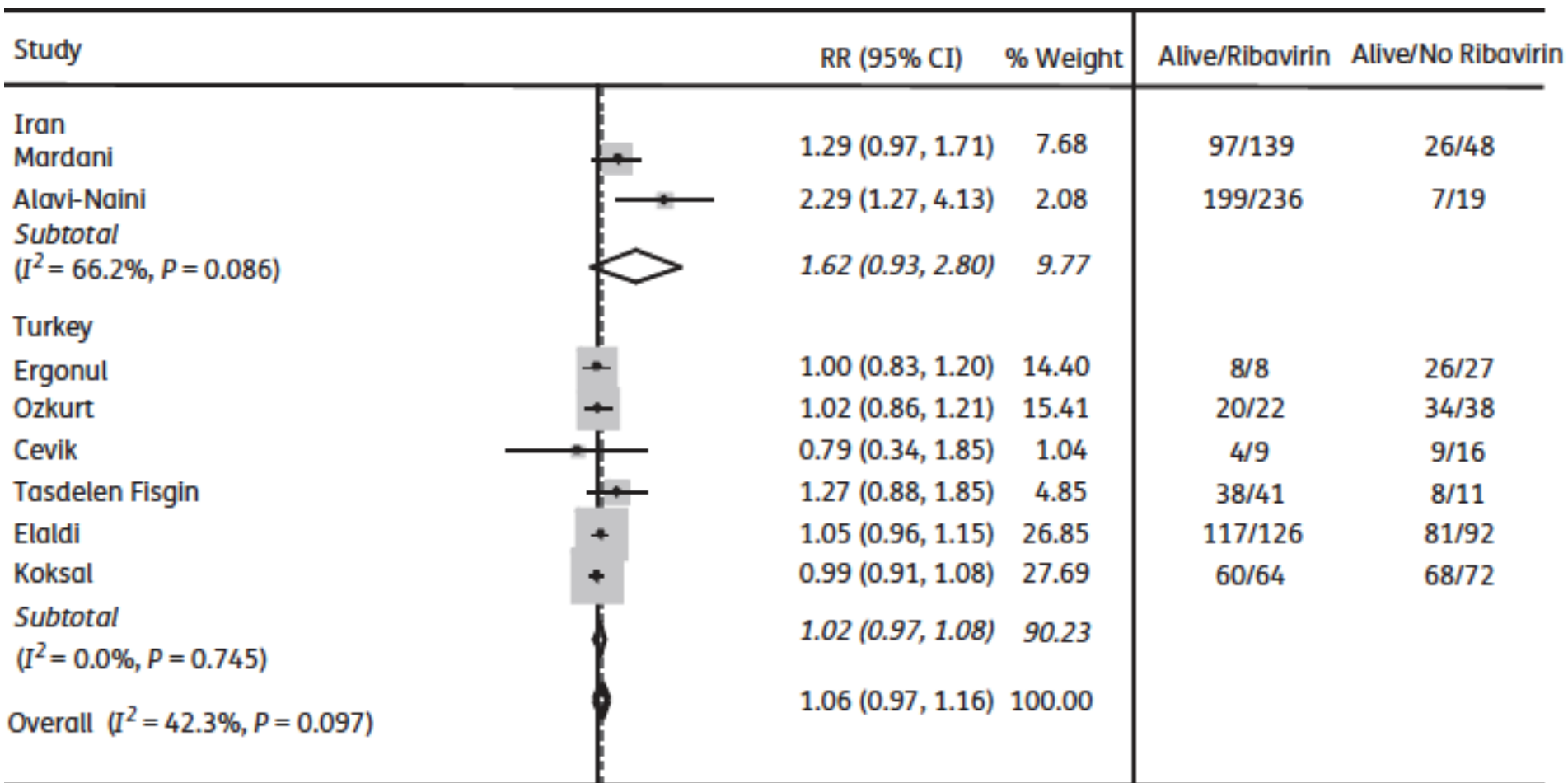
If the physicians who are against the use of ribavirin were to be infected with the CCHF virus (which I sincerely hope never occurs), would they reject ribavirin treatment?

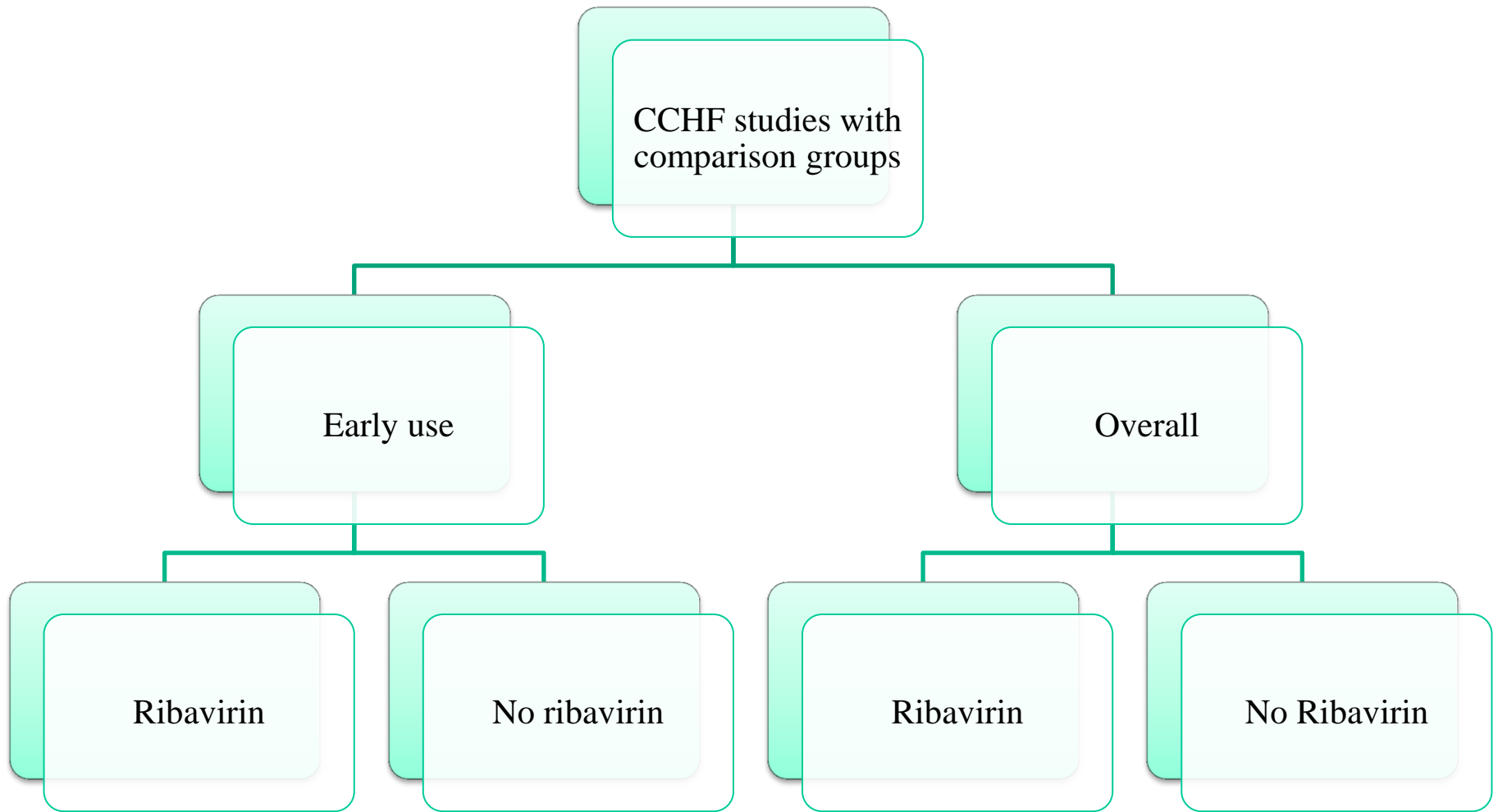
Galen: *primum non nocere*.

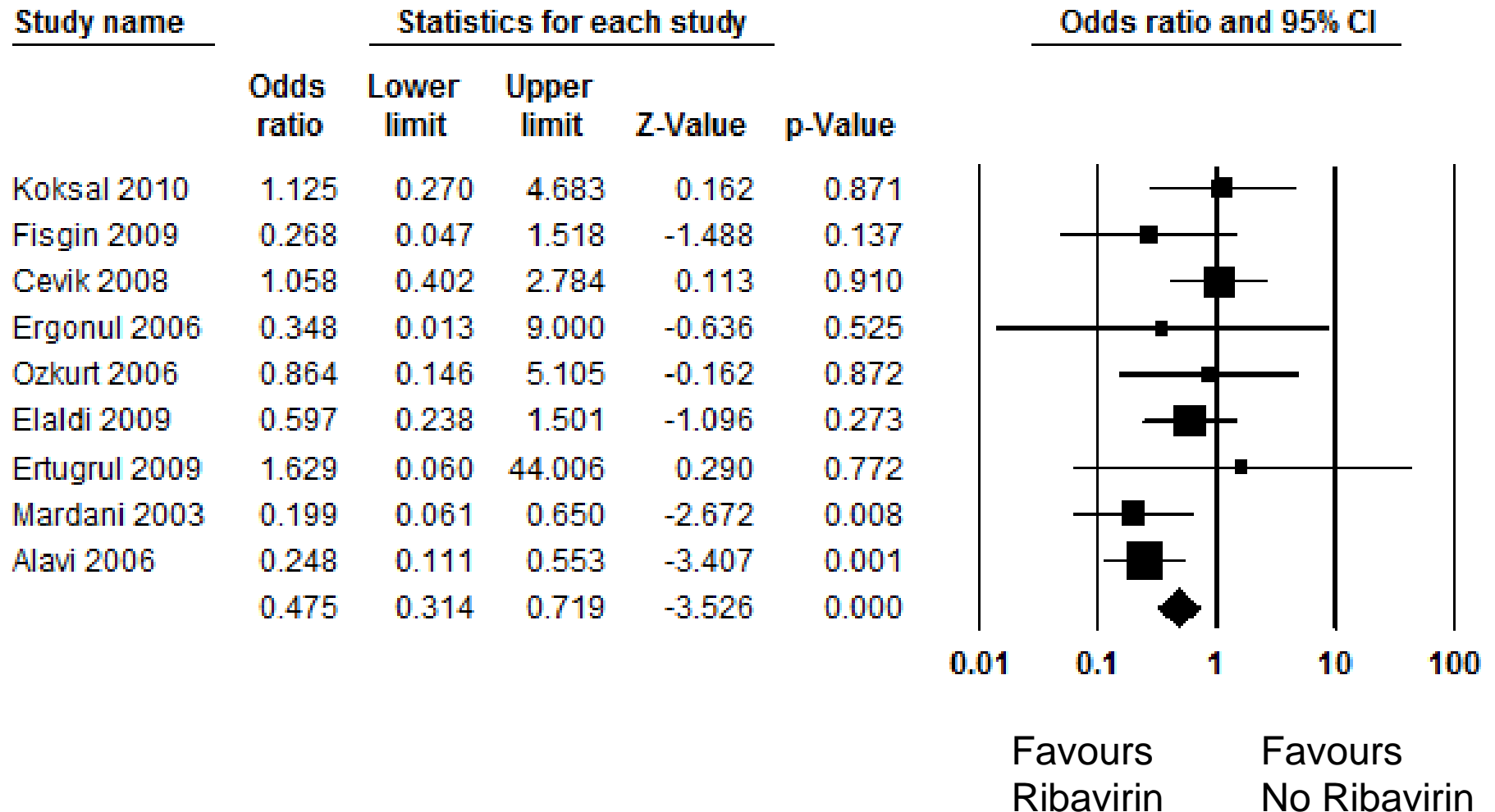
So, why not give this treatment to the patients?

# Ribavirin for patients with Crimean–Congo haemorrhagic fever: a systematic review and meta-analysis

Sibel Ascioğlu<sup>1,2\*</sup>, Hakan Leblebicioğlu<sup>3</sup>, Haluk Vahaboglu<sup>4</sup> and K. Arnold Chan<sup>2</sup>

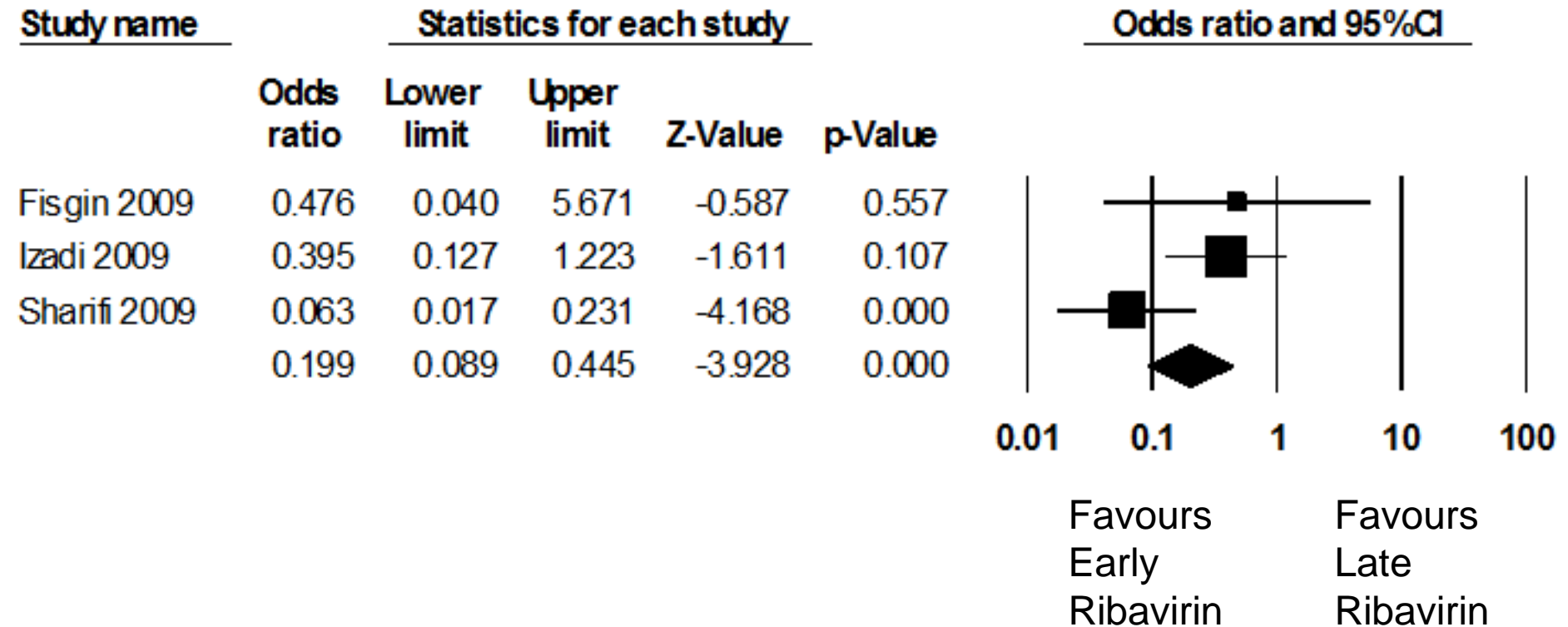








# Early Use is More Effective



## Short Communication

# Prompt Administration of Crimean-Congo Hemorrhagic Fever (CCHF) Virus Hyperimmunoglobulin in Patients Diagnosed with CCHF and Viral Load Monitorization by Reverse Transcriptase-PCR

Ayhan Kubar\*, Mustafa Hacıomeroglu<sup>1</sup>, Aykut Ozkul<sup>2</sup>, Umit Bagriacik<sup>3</sup>,  
Esragul Akinci<sup>4</sup>, Kenan Sener, and Hurrem Bodur<sup>4</sup>

*Gulhane Military School of Medicine, Ankara; <sup>1</sup>Refik Saydam Hygiene Center, Ankara;  
<sup>2</sup>Ankara University, Ankara; <sup>3</sup>Gazi University, Ankara; and  
<sup>4</sup>Ankara Numune Training and Research Hospital, Ankara, Turkey*

No difference in fatality

<b>VHF</b>	<b>Human to human transmission</b>
Ebola	High
Marburg	High
Lassa	Moderate
S.America	Low
Hantaan	No
RV	No
CCCF	High
Yellow fever	No
Dengue	No
Omsk	Not reported
Kyasanur	Not reported
Alkhumra	Not reported

## Laboratory and Epidemiology Communications

# Potential Sexual Transmission of Crimean-Congo Hemorrhagic Fever Infection

Onder Ergonul<sup>1\*</sup> and Ismet Battal<sup>2</sup>

<sup>1</sup>*Infectious Diseases Department, School of Medicine, Koc University, Istanbul; and*

<sup>2</sup>*Viral Hemorrhagic Fever Unit, Zoonotic Diseases Department, Public Health Institute, Ankara, Turkey*

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## Case Report

# Possible sexual transmission of Crimean-Congo hemorrhagic fever

Natalia Yurievna Pshenichnaya<sup>a,\*</sup>, Irina Stanislavovna Sydenko<sup>b</sup>,  
Elena Pavlovna Klinovaya<sup>b</sup>, Elena Borisovna Romanova<sup>a</sup>, Alexey Sergeevich Zhuravlev<sup>c</sup>

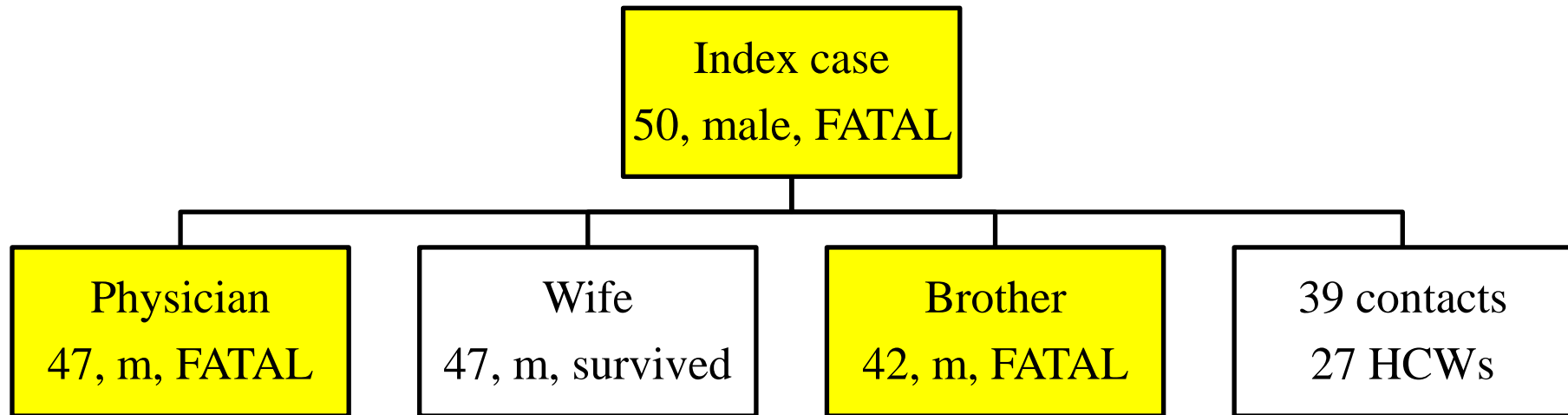
<sup>a</sup> Rostov State Medical University, Rostov-on-Don, Russia

<sup>b</sup> Central District Hospital of Salsk District of the Rostov Region, Russia

<sup>c</sup> First Moscow Medical University "I.M. Sechenov", Moscow, Russia



# Nosocomial Infection in Tajikistan, 2009



# Transmission of CCHF to HCWs

Clinical manifestations, demographic variables, risk factors and outcome of nosocomial and index cases of Crimean-Congo hemorrhagic fever, Iran\*

Case	Age, years	Sex	Bleeding manifestations	Fever	Job	Contact type/details of exposure	Outcome	Incubation period, days†
Index 1	55	M	GI bleeding, epistaxis	Yes	Shepherd	Animal contact	Dead	NA
Secondary 1	32	M	Petechia	Yes	Physician	Physical contact without gloves, blood splashing into face, performing gastric lavage	Alive	14
Tertiary 1	26	F	Hematemesis, vaginal bleeding, epistaxis, hematuria	Yes	Physician	Physical contact without gloves, blood sampling, providing intravenous access, touching skin, contact with sweat and saliva, sexual contact	Dead	12
Index 2	65	M	GI and pulmonary hemorrhage	Yes	Farmer	Animal contact	Dead	NA
Secondary 2	32	M	Petechia, purpura	Yes	Physician	Physical contact without gloves, intubation, resuscitation, blood splashing into face	Alive	22

3 out of 5 (60%) died

No ribavirin use 10 years ago in Iran

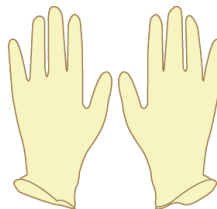
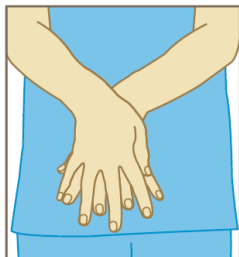
# What precautions should be used for HCW ?



<http://www.mkk.de/cms/media/bilder/presse/2002/50/Lassa.jpg>

# Hand hygiene and use of PPE based on risk assessment

- Always before and after patient contact, and after contact with contaminated environmental surfaces or equipment
- If direct contact with patient's blood and body fluids, secretions, excretions, mucous membranes or non-intact skin
- If there is a risk of spills onto the health-care worker's face





# Main conclusions and options for response

On 31 August 2016 the Autonomous Community of Madrid, Spain, reported two cases of infection with Crimean-Congo haemorrhagic fever (CCHF) virus. The primary case is a 62 year old man with a potential exposure to CCHF virus in the countryside of the province of Ávila (Spain). The secondary case is a 50-year-old healthcare worker who attended the primary case during the ICU admission. These are the first autochthonous clinical cases of CCHF in Spain and in South-Western Europe.

Recent detection of CCHF virus in ticks from the autonomous community of Extremadura, Western Spain, indicates the circulation of CCHF virus among wildlife. Therefore, the occurrence of CCHF virus infection is not an unexpected event in Spain. Nosocomial transmission of CCHF can occur even in a non-endemic region when appropriate infection prevention and control (IPC) measures have not been observed.

The probability of CCHF virus infection in Spain is low. However other sporadic cases are possible. The risk of further human-to-human transmission in hospital settings can be significantly reduced by applying timely appropriate IPC measures.

The options for risk reduction are suggested as follows:

- Enhance awareness of health care providers in areas with potential circulation of CCHF virus of early diagnosis and laboratory confirmation of CCHF. Timely and appropriate case management is pivotal to reduce case fatality.
- Standard precautions, preferably combined with contact and droplet precautionary measures, should be taken when caring for patients presenting with haemorrhagic fever syndrome, including suspicion of CCHF.
- Laboratory tests on patient samples present a high risk and should only be conducted under appropriate biological containment conditions.
- As a precautionary measure, risk groups should be informed about the mode of transmission and comply with advice on the prevention of tick bites. Risk groups in potentially affected areas are primarily:
  - persons working in close vicinity of animals, especially livestock (e.g. agricultural workers in animal husbandry or slaughterhouse workers, veterinarians);
  - persons exposed to tick-to-human transmission through their outdoor activities (e.g. hunters, forest workers, hikers); and
  - health care providers at risk of human-to-human transmission.
- In order to better target preventive measures and raise clinical awareness, areas with CCHF virus circulation and areas suitable for CCHF circulation in the Iberian Peninsula should be defined by

## Рекомендуемый порядок снятия СИЗ

Помните о тех участках, где возможно загрязнение СИЗ, и не допускайте самозаражения при их снятии!

*Пример: выделение патогена пальцами с титчакм гриппом*

Снимите перчатки вместе с халатом (если халат одноразовый), выбросьте их.

Обработайте руки спиртосодержащим препаратом или водой.

Снимите защитные очки. НЕ прикасайтесь к передней части.

Снимите респиратор. НЕ прикасайтесь к передней части.

Обработайте руки спиртосодержащим препаратом или водой.

### How to put on PPE (when all PPE items are needed)



#### Step 1

- Identify hazards & manage risk. Gather the necessary PPE.
- Plan where to put on & take off PPE.

Do you have a friend? Mirror?  
Do you know how you will deal with waste?



#### Step 2

- Put on a gown.



#### Step 3a

- Put on face shield.

OR

#### Step 3b

- Put on medical mask and eye protection (face visor/goggles).



**Note:** If performing an aerosol-generating procedure (e.g., aspiration of respiratory tract, intubation, resuscitation, bronchoscopy, autopsy), a particulate respirator (e.g., UL-100, NIOSH-certified N95, EU FFP2, or equivalent respirator) should be used in combination with a face shield or an eye protection. Do user seal check if using a particulate respirator.



#### Step 4

- Put on gloves (lower cuff).

### How to take off PPE



#### Step 1

- Avoid contamination of self, others & the environment.
- Remove the most heavily contaminated items first.

#### Remove gloves & gown

- Peel off gown & gloves and roll inside out.
- Dispose of gloves and gown safely.



#### Step 2

- Perform hand hygiene.



#### Step 3a

- If wearing face shield:
  - Remove face shield from behind.
  - Dispose of face shield safely.



#### Step 3b

- If wearing eye protection and mask:
  - Remove goggles from behind.
  - Put goggles in a separate container for reprocessing.
  - Remove mask from behind and dispose of safely.



#### Step 4

- Perform hand hygiene.



## Perspective

# Probable Crimean-Congo hemorrhagic fever virus transmission occurred after aerosol-generating medical procedures in Russia: nosocomial cluster



Natalia Yurievna Pshenichnaya\*, Svetlana Alexeevna Nenadskaya

*Rostov State Medical University, Rostov-on-Don, Russia*

This case of airborne transmission of CCHF demonstrates that during performance of any AGMPs for any CCHF patient, airborne precautions should always be added to standard precautions (particulate respirator protective to N95 or equivalent standard, eye protection, single airborne precaution room or well-ventilated setting, etc.) according to WHO guidelines<sup>16</sup> for all HCWs who are in a patient's room. Access to any room where the aerosol-generating procedures are performed should be extremely limited.

# Is Ribavirin Prophylaxis Effective for Nosocomial Transmission of Crimean-Congo Hemorrhagic Fever?

Rahmet Guner, Prof Dr,<sup>1</sup> Imran Hasanoglu,<sup>2</sup> Mehmet Akin Tasyaran,<sup>1</sup> Derya Yapar,<sup>3</sup>  
Siran Keske,<sup>4</sup> Tumer Guven,<sup>2</sup> and Gul Ruhsar Yilmaz

## Conclusions

In preventing the transmission of CCHF, it should always be kept in mind, especially in serious CCHF cases, that there can always be bleeding. Barrier precautions should never be neglected. Ribavirin is the drug of choice currently available and seems effective in cases of nosocomial transmission of CCHF.

# Crimean-Congo Hemorrhagic Fever among Health Care Workers, Turkey

Aysel Kocagul Celikbas, Başak Dokuzoğuz,  
Nurcam Baykam, Sebnem Eren Gok,  
Mustafa Necati Eroğlu, Kenan Midilli,  
Herve Zeller, and Onder Ergonul

Table 1. Clinical and laboratory findings of HCWs in whom Crimean-Congo hemorrhagic fever developed after occupational exposure, Turkey, 2004–2011\*†

HCW, outcome	Body temperature, °C	Bleeding	Leukocytes/mm <sup>3</sup>	Platelets/mm <sup>3</sup>	AST	ALT	APTT	Fibrinogen	SSI
1, survived	38.5	No	800	42,000	425	346	44	225	Moderate
2, survived	37.2	No	1100	53,000	145	81	43	270	Mild
3, died	40.5	Ecchymosis, hematemesis, melena, hematuria	11,100	40,000	251	277	90	171	Severe
4, survived	40.5	No	2,900	78,000	150	110	37.4	250	Mild
5, survived	39	Epistaxis	1,800	58,000	167	129	64	218	Moderate
6, survived	40.5	No	1,800	44,000	123	216	40.5	165	Moderate
7, survived	39.1	No	3,100	13,000	418	132	40.9	170	Moderate

\*HCW, health care worker; AST, aspartate aminotransferase; ALT, alanine aminotransferase; APTT, activated partial thromboplastin time; SSI, severity score index.

†Reference values: leukocytes, 4,000–11,000/mm<sup>3</sup>; platelets, 150,000–450,000/mm<sup>3</sup>; AST, <50 IU/L; ALT, <50 IU/L; APTT, 24–36 sec; fibrinogen, 200–400 mg/dL.

Table 2. Demographic features of HCWs with occupational exposure to Crimean-Congo hemorrhagic fever virus, Turkey, 2004–2011\*

Episode, outcome†	HCW age, y/sex/profession	Procedure	Transmission route	Ribavirin for postexposure prophylaxis	Ribavirin for therapy (no. d after symptom onset)	Fatal
Episode 1; survived, her baby died	36/M/nurse	Wound care	Contact with surgical wound without protective equipment	No	Yes (0)	No
	31/F/nurse	Intubation, aspiration	Aerosol and droplet and contact without protective equipment	No	No	No
Episode 2; died	28/F/nurse	Phlebotomy	Needlestick	No	Yes (3)	Yes
Episode 3; died	41/M/physician	Resuscitation	Aerosol and droplet	–	Yes (0)	No
	26/M/physician	Nasal tamponade	Indirect contact	–	Yes (0)	No
	29/M/physician	Nasal tamponade	Indirect contact	–	Yes (0)	No
Episode 4; survived	30/M/nurse	Phlebotomy	Needlestick	No	Yes (1)	No
Episode 5; survived	30/F/nurse	Phlebotomy	Needlestick	Yes	–	No
Episode 6; survived	24/F/physician	Phlebotomy	Needlestick	Yes	–	No

\*HCW, health care worker; –, ribavirin not necessary.

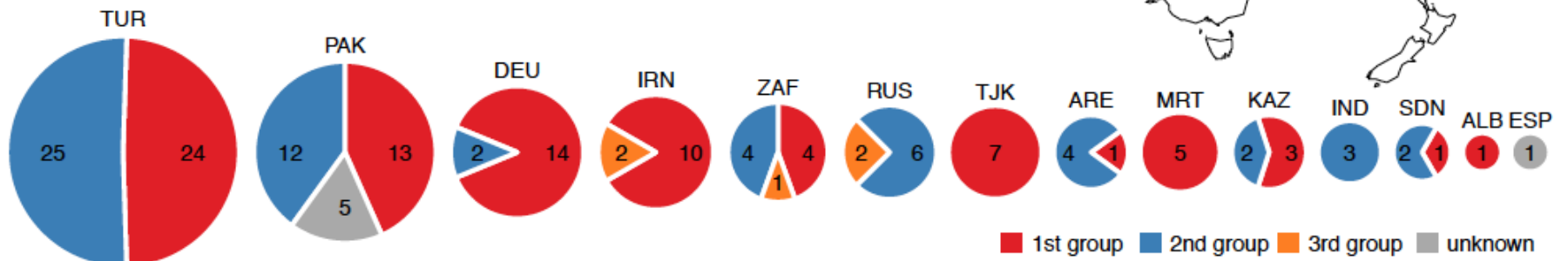
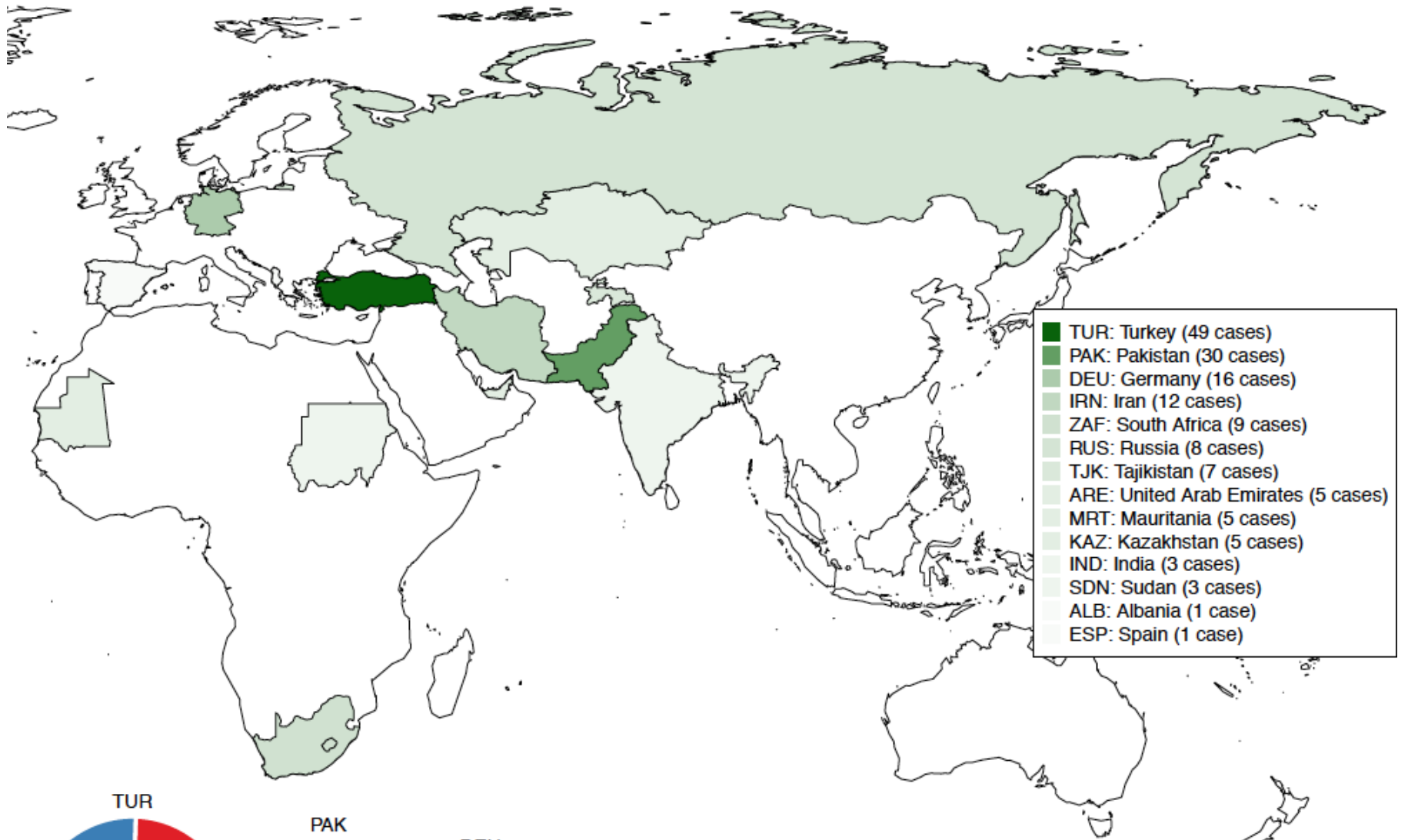
†Outcome for the index case-patient in each episode.

# Ribavirin in Post-Exposure Prophylaxis for Lassa Fever

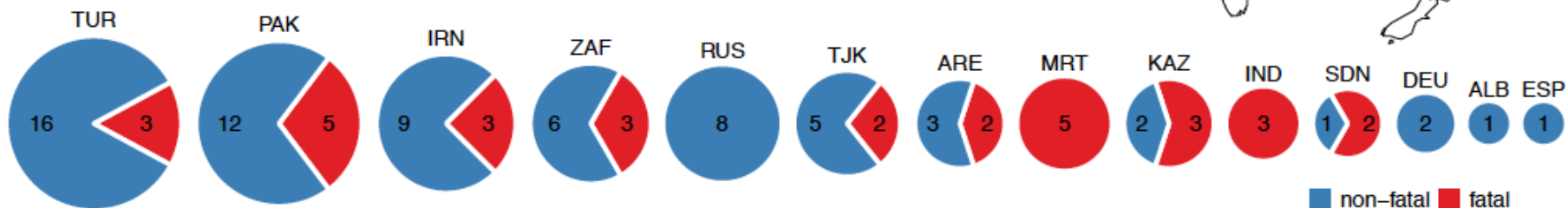
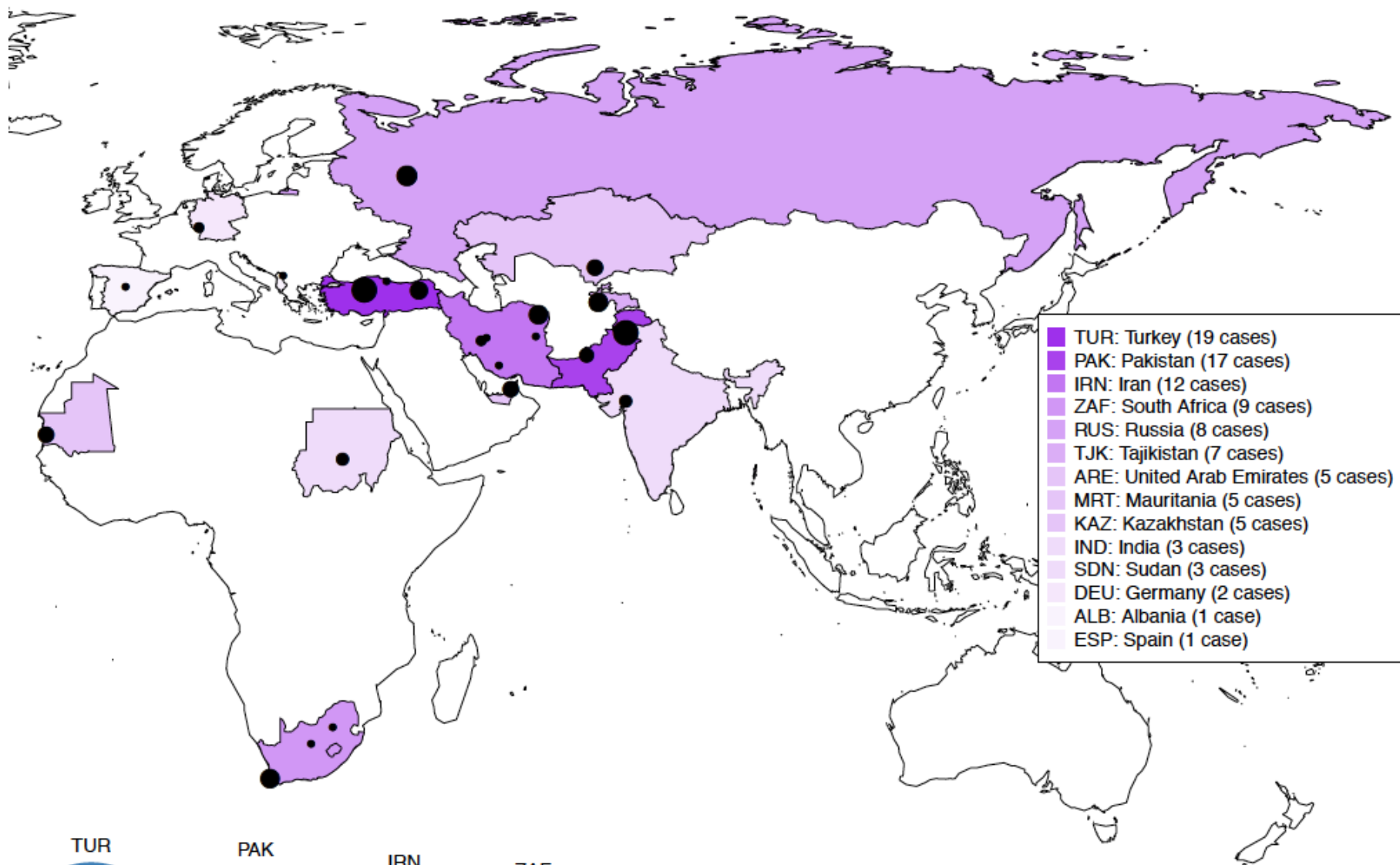
The authors recommend oral ribavirin postexposure prophylaxis for Lassa fever exclusively for definitive high-risk exposures.

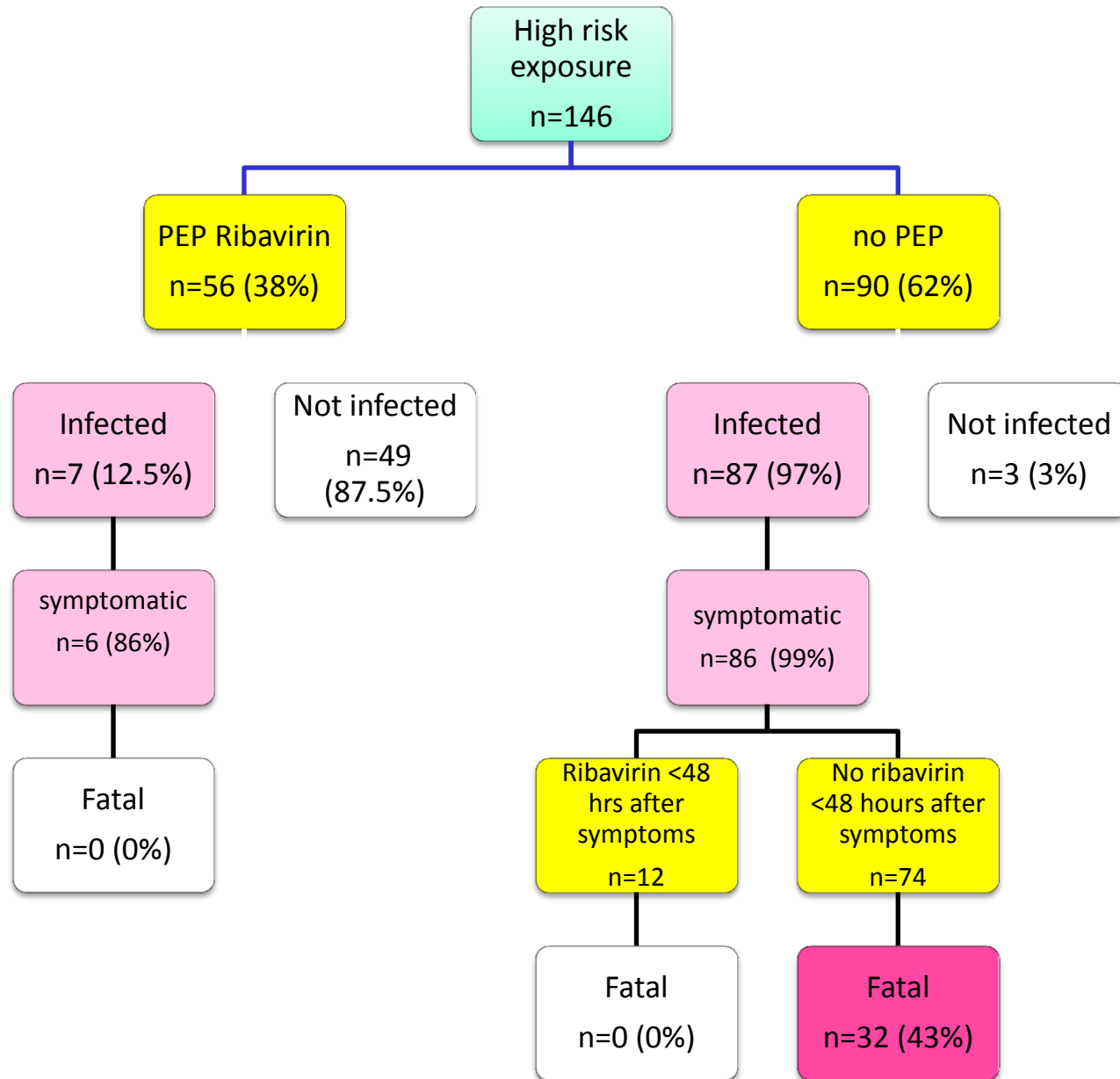
Bausch DG, et al. Review of the literature and proposed guidelines for the use of oral ribavirin as postexposure prophylaxis for Lassa fever. Clin Infect Dis 2010

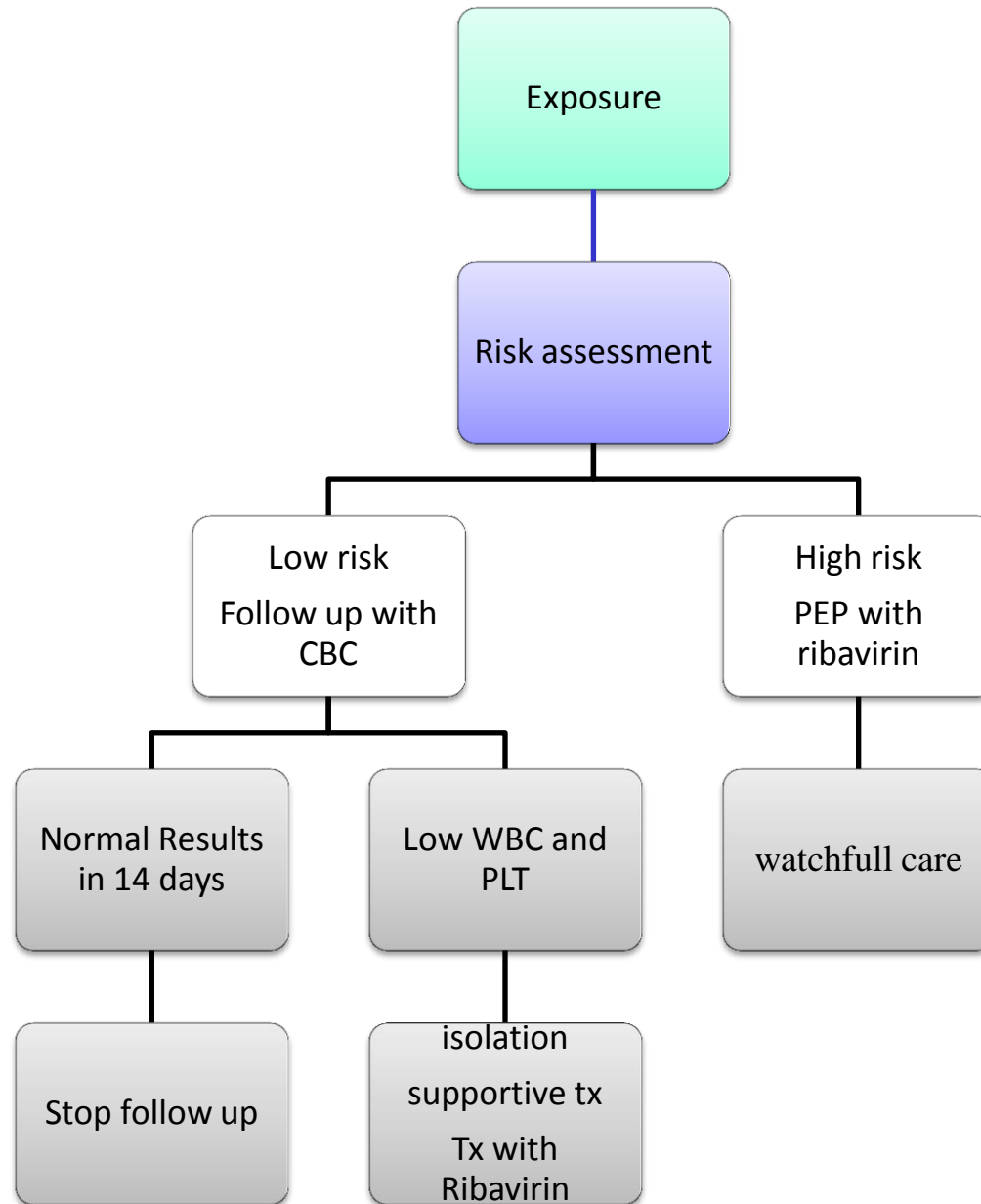




● 12 cases ● 8 cases ● 7 cases ● 6 cases ● 5 cases ● 3 cases ● 2 cases ● 1 case







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