届出：ラッサ熱の場合

- 患者（確定例）
  - 臨床的特徴を有する者を診察した結果、症状や所見からラッサ熱が疑われ、かつ、規定の検査方法によりラッサ熱患者と診断した場合
  - 鑑別を必要とする疾患は、他のウイルス性出血熱、腸チフス、発しんチフス、赤痢、マラリア、デング熱、黄熱である。
- 無症状病原体保有者
  - 臨床的特徴を呈していないが、規定の検査方法によりラッサ熱の無症状病原体保有者と診断した場合
- 疑似症患者
  - 臨床的特徴を有する者を診察した結果、症状や所見から、ラッサ熱の疑似症患者と診断した場合
- 感染症死亡者の死体
  - 臨床的特徴を有する死体を検案した結果、症状や所見から、ラッサ熱が疑われ、かつ、規定の検査方法によりラッサ熱により死亡したと判断した場合
- 感染症死亡疑い者の死体
  - 臨床的特徴を有する死体を検案した結果、症状や所見から、ラッサ熱により死亡したと疑われる場合

13

リスク・コミュニケーション

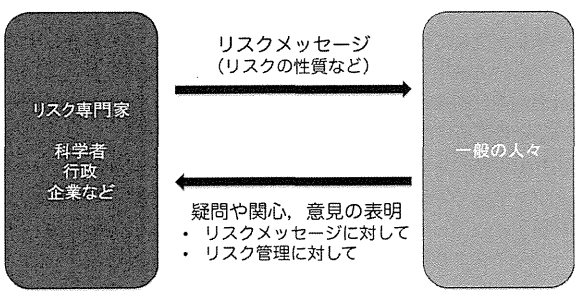
- 個人、集団、機関の間における情報や意見のやりとりの相互作用的過程 *interactive process*
- リスクの性質についてのメッセージや、厳密にいえばリスクについてとは限らないメッセージ（リスクメッセージやリスクマネジメントのための法律や制度に向けられた関心、意見、反応を示すメッセージ）などの多様なメッセージを含む

National Research Council (1989)

14

リスク・コミュニケーションの概念図

一方的な宣伝や説得の過程ではない!!



堀口逸子，丸井英二 (2011)

15

目的・状況に応じたリスクコミュニケーションの分類

- 対応促進のコミュニケーション *care communication*
  - 有害性や対処法がすでに分かっているリスクに関するもの（「説得的コミュニケーション」とも）
  - 保健医療分野、産業保健分野で多い
- 合意形成のコミュニケーション *consensus communication*
  - 狭義の「リスク・コミュニケーション」
  - 有害な可能性のある事柄に対する対処法を利害関係者間で決定するために行うもの
- 危機コミュニケーション *crisis communication*
  - 突発的な危険事象に直面した際に行うもの

16

リスク認知

- リスク評価の結果と人々の受け止め方（リスク認知）にはしばしばギャップがある！
  - 科学的側面（客観的リスク）と感情的側面（主観的リスク）の総合的な判断
  - 個人の価値観、社会的背景などに影響
- リスクの過大評価・過小評価は、それ自体が個人や社会にとってリスク
  - 過大評価による不必要な出費・資源の無駄遣い
  - 過小評価による被害の増大
- リスク・コミュニケーションによるギャップの是正が求められる

17

リスク比較

- 異なる種類のリスクを比べることで
  - ごく小さいリスクを比較により概念化
  - リスク認知の修正
  - ただし，使い方には要注意！

use of these comparisons can seriously damage your credibility

Covello et al.,1988

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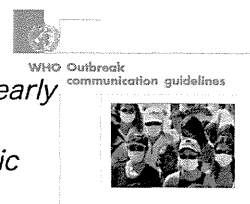
リスク比較

- そもそも比較対象として適切か？
  - 自発的リスク vs 非自発的リスク
  - ベネフィットを伴うリスク vs 伴わないリスク
- 安易なリスク比較の使用は逆効果
  - 「そんなに危なくないよ」と言いたいだけなのでは？
  - 「もっと大きなリスクを受け入れてるんだから」と説得のために使っているのでは？
  - そもそもその数字は正しいのか？
- 住民との信頼関係がある場合に限り有効

19

アウトブレイク・コミュニケーション

- 感染症アウトブレイクに主眼をおいたリスク・コミュニケーション
- 主なポイント
  1. 信頼関係 *Trust*
  2. 早期の公表 *Announcing early*
  3. 透明性 *Transparency*
  4. 公衆を理解する *The public*
  5. プランニング *Planning*



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信頼関係 *Trust*

公衆との信頼関係の構築・維持は最も重要

- 信頼の喪失は健康、政治、経済に悪影響をもたらす
- 信頼の構築・維持は容易ではない
  - 直感的な方法ではうまくいかない
  - （RC担当者-政策立案者-専門家）の間の内部の信頼関係の構築が重要　*trust triangle*
- 公衆への信頼も重要
  - パニックはめったに起こらない！
- 信頼は早急には構築できない
  - 説明責任、積極的な関わり、透明性など
  - 著名な評論家などをあえて巻き込むことも有効

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早期の公表 *Announcing early*

最初の公式発表が信頼関係を左右する

- 情報化が進んだ現在、隠し通すことは無理
  - 風評や誤解を予防する上でも、できるだけ早く公表を！
- 公表が遅れるほど、明らかになった時の公衆の不安や恐怖は増大（とくに、外部により明らかにされた場合）
- 公衆の行動が感染拡大のリスク減少につながる場合は公表は必須
- アウトブレイクの規模によらず、VHFのような散発例でも早期の公表
- 注意！
  - 関連部署や重要な利害関係者との事前調整
  - 情報の修正、更新の可能性

22

透明性 *Transparency*

信頼関係の維持には透明性が重要
情報収集、リスク評価、意思決定のプロセスを公衆に「見える」形で

- 担当者の問題解決までのプロセスを示すことが可能
- 対応の弱点をさらすことにもなる
  →責任ある、熟慮された意思決定へのインセンティブ
- プライバシーの保護を考慮した上で、社会的に重要な情報を提供する
  - 過度なプライバシーの保護は信頼の喪失につながる
- 注意！
  - 経済活動への支障（必ずしも経済活動にマイナスではない）
  - 事前のメディア対策

23

公衆を理解する *The public*

効果的なコミュニケーションの実現には公衆を理解することが不可欠

- コミュニケーション・サーベイランス
  - 当該リスクについての公衆の考え方や知識を把握
- 公衆の代表を意思決定プロセスに参加させる
- 公衆の見解に沿った意思決定
  - 公衆の見解に誤解がある場合でも、それを認めながら修正
- 公衆が自らの健康と安全のために何ができるかを示す

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プランニング *Planning*

リスク・コミュニケーションは感染症対策の計画に組み込む

- リスク・コミュニケーションの計画は事前に用意しておく
- コミュニケーションの計画段階で、上席管理者を巻き込む
- 何をするか？誰に知らせるか？誰がメッセージを伝えるか？主導部局は？誰が行動するか？

25

医療機関におけるコミュニケーション

- 内部の情報共有・連携
  - 病院幹部と診療チーム、ICT、他の診療科、看護部、検査部、委託業者．．．
- 多様な情報源から、一貫した情報を提供
  - With one voice (見解の統一が重要！)
  - 「スポークスパーソンは１人」ということではない。誰が話しても同じ話ができるように
- 情報漏洩に注意
  - スタッフのモラル
  - セキュリティーポリシー

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医療機関におけるコミュニケーション
事前準備（案）

- リスク・コミュニケーションの計画策定
  - 担当者や手続きなどを事前に定めておく
  - 関連各部署や外部（保健所、周辺医療機関、専門機関）を巻き込む
- スタッフへの情報提供・教育
  - 一類感染症患者の診療を行なう施設であることの周知
  - 患者受け入れ時の対応の周知
- 住民への情報提供・啓発
  - 一類感染症患者の診療を行なう施設であることの周知
  - 一類感染症等のリスクについての説明
- メディアへの情報提供・対応マニュアル

27

参考資料

- WHO Outbreak communication guidelines. (WHO, 2005)
- Outbreak communication: Best practices for communicating with the public during an outbreak. (WHO, 2004)
- Crisis and emergency risk communication 2012 edition. (CDC, 2012)
- 危機管理マニュアル：どう伝え合う クライシスコミュニケーション.（吉川肇子 他，2009）
- 新型インフルエンザ：健康危機管理の理論と実際.（岩崎恵美子監修 佐藤元編集, 2008）

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症例シナリオ

あなたは第一種感染症指定医療機関に勤務する（医師・看護師）です。

アフリカ某国で医療ボランティアをしていた看護師が、帰国後に食欲がないとのことであなたの病院の外来を受診しました。現地では、発熱、下痢、嘔吐などを呈する患者を多数診察していたとのことです。このとき体温は 37.1℃ であり、身体診察、スクリーニング検査とも特異的所見はなく、いったん帰宅して経過を見ることになりました。

翌日、38℃ の熱と、ムカムカして食事が摂れないとのことで再受診しました。咳などの呼吸器症状はなく、X 線写真で肺野病変もありません。マラリア検査は陰性で、精査のため入院となりました。折りしも、滞在国でエボラ出血熱が発生しているとのニュースがあったため、患者の了解を得て個室隔離とし、スタッフは個人用防護具（PPE）を着用して診療にあたることにしました。

1. **この時点で、どの PPE が選択されているでしょうか?**

入院することになった患者は、帰国後 3 日間一緒に過ごしている夫と小学生の子どもへの感染が心配なので、まだ症状はないが受診した方がいいですかとあなたに質問しました。

2. **患者の心配に、どのように答えますか?**

a. 心配いらない
b. 外来で経過をみる必要がある
c. 直ちに入院すべきである
d. 保健所に聞いてください

入院翌日にエボラ出血熱と確定診断され、さすがに病棟には緊張が走りましたが、皆でもう一度、対応手順に間違いのないことを確認しています。

3. **この時点で、病院内外の誰に連絡して、どのような手続きを取りますか?**

あなたの PHS に病院の総合案内から連絡がありました。テレビ局から取材の申し込みがあり、病院玄関前にカメラクルーと一緒に来ており、短時間でよいのでお会いできないかと言っているそうです。

4. **この電話に、どのように対応するのが適切でしょうか?**

患者は意識ははっきりしているものの、38°C 台の熱があり、まだ回復の兆候はみられません。ナースステーションの TV モニタで見ていると、患者はベッドからふらふらと立ち上がり、床の上に黒褐色の液体を嘔吐してしまいました。

5. **嘔吐物を処理するにあたって、手順を適切な順序に並べてください。適切でない選択肢には、×をつけてください。**

a. 同僚を呼んで助けを求める
b. 病室と前室のドアをいずれも開放して、外から状況が分かるようにする
c. 廊下から前室に入り、前室のドアを閉める
d. 前室から病室に入り、病室のドアを閉める
e. 二重手袋を含む PPE を着用する
f. N95 マスクを付ける
g. 患者の状況を確認する
h. 消毒薬を散布して 5 分間待つ
i. 嘔吐物全体をタオルで覆う

手順どおりに病室に入り、嘔吐物の処理が終わりました。あなたの手袋ほか PPE にも、目で見て分かる汚れが付きました。

現在あなたが装着しているPPE：二重手袋、ボディスーツ型ガウン、ディスポエプロン、ゴーグル、N95マスク、シューカバー

6. **PPEの外し方を、適切な順序に並べてください。適切でない選択肢には、×をつけてください。**

a. 手袋（外側）に手指衛生を行う
b. ディスポエプロンを外す
c. ボディスーツ型ガウンを脱ぎ、裏表にしながら丸めて廃棄物ボックスに入れる
d. 手袋（外側）を外す
e. 病室と前室間のドアを閉める
f. 病室と前室間のドアを開けて通過する
g. シューカバーを外す
h. 手袋（内側）に手指衛生を行う
i. 手袋（内側）を外す
j. 素手に手指衛生を行う
k. 廊下に出る
l. マスクを外す
m. ゴーグルを外す

入院3日目、今朝の採血はあなたが担当です。PPEを装着して病室に入り、採血そのものは問題なく終わりましたが、試験管に分注する際に、あなたは指先にチクリと鋭い痛みを感じました。二重手袋の上からははっきり見えませんが、針刺ししてしまったようです。しまった!

7. **次にどのような行動を取るべきでしょうか?**

Management of Highly Infectious Diseases –

A German solution with European perspective

Stefan Schilling
Germany

Management of Highly Infectious Diseases

- ❖ Laws and Guidelines
- ❖ The European Network for Highly Infectious Diseases
- ❖ HID preparedness in Germany
  - ❖ Overview
  - ❖ The Frankfurt High Level Isolation Unit
  - ❖ A case of severe Lassa fever (2006)

Laws and legal entities:

European Union: *27 countries*
Population: *500 Million*

+ associated neighbors (e.g. EFTA)

The EU "four freedoms":

Free movement of

- Goods
- People
- Service
- Capital

- Infectious diseases?

Laws and legal entities:

World Health Organisation/ WHO
International Health Regulations (IHR)
"To prevent and respond to acute public health risks that have the potential to cross borders and threaten people worldwide."

European Center for Disease Prevention and Control/ ECDC
Interface agency for EU member states
„To identify, assess and communicate current and emerging threats posed by infectious diseases."

GERMANY: Robert Koch Institut/ RKI
Infection Protection Law (Infektionsschutzgesetz)
„Prevention of communicable diseases, early identification and prevention of (further) spread"

Laws and guidelines: **Two continents, one approach**

Provision of specialised clinical care facilities to manage highly infectious diseases:

'Designing a Biocontainment Unit to Care for Patients with Serious Communicable Diseases: A Consensus Statement'
Smith et al. Biosecur Bioterror. 2006; 4(4):351-65

,Framework for the design and operation of high-level isolation units: consensus of the European Network of Infectious Diseases'
Bannister et al. Lancet Infect Dis 2009; 9: 45–56

- ❖ For single cases/ small clusters, only
- ❖ No alternative for surge capacity in major outbreaks

Laws and guidelines: **Two continents, one approach**

Providing optimal care under maximum infection control

In Europe:

High Level Isolation Units/ HLIU

"health-care facilities specifically designed to provide safe, secure, high-quality, and appropriate care, with optimal infection containment and infection prevention and control procedures...".

In the United States:

Biocontainment patient care units/ BPCU

"...clinical facilities specifically designed to minimize nosocomial transmission ... designed and operated to maximize patient care with appropriate infection control practices and procedures."

Including intensvie care and care for paediatric patients

Management of Highly Infectious Diseases – Reality in Europe

In brief, recommendations define „Isoaltion Units" as:

(i) **Functionally independent** from other hospital recources; and

(ii) **Specifically equipped** for infection control and medical care.

Problem:

In Europe, every country has its own laws and system of isolation facitities.

Solution:

European Network for Highly Infectious Diseases – EuroNHID/ 2007 – 2010

Method: Checklists and on-site visits

Aim: Assess capacity; compare recommendations with reality

Management of Highly Infectious Diseases – Reality in Europe

European Network for Highly Infectious Diseases – EuroNHID/ 2007 – 2010

Data collected by EuroNHID:

- **only 19/48** centres evaluated do fulfil those recommendations and represent HLIUs as defined.
- **> 50%** of all centres [n=24] did fulfil recommendations regarding specific equipment , but are not functionally independent.
- few centres [n=5] lack most equipment and procedurs recommended, thus are fully depending on other hospital resources and external equipment supply.

Reality does not reflect recommendations published!

Management of Highly Infectious Diseases – Germany

Laws and legal entities: GERMANY

Robert Koch Institut
Infection Protection Law

The Infection Protection Law

Issued by national authority, legally binding for all governmental regions (so-called *Bundeslaender;* n=16)

Notifiable diseases: § 6 In case of clinical suspicion

e.g. Viral Haemorrhagic Fevers
Plague
SARS

§ 7 When detected by laboratory
§ 8 Person in bond to notify
In case of § 6 The clinician
In case of § 7 The detecting lab

Management of Highly Infectious Diseases – Germany

Laws and legal entities: GERMANY

Robert Koch Institut
Infection Protection Law

The Infection Protection Law

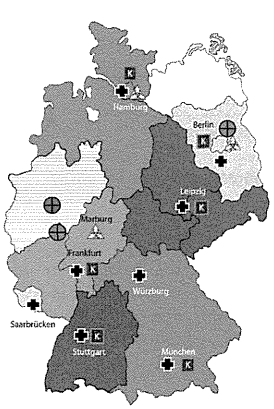
Issued by national authority, **BUT**:

Regional authorities are responsible for implementation and funding:

- **Provision of care capacities**
- Disaster control
- Surveillance

Until 2012, no legal regulation defined the construction or operational procedures of isolation facilities.

Management of Highly Infectious Diseases – Germany



Network of HLIUs in Germany

6 ‚Centres of Competence'
HLIU + regional Health Authority
On-call 24/7

2 Specialised ‚Care Facilities'
1 HLIU, 1 Isolation Ward

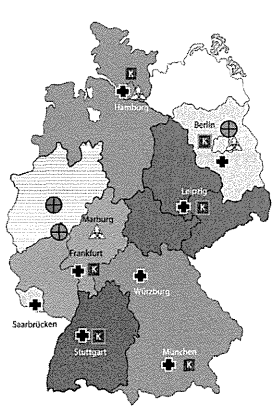
2 fully operating P4 laboratories
(Hamburg/ Marburg)
[+1 under constrcution (Berlin)]

2 additional army hospitals
(Koblenz, Berlin)

1 additional Care Facility
(Düsseldorf, awaiting legal clearance)

Gottschalk R et al. Bundesgesundheitsbl-Gesundheitsforsch-Gesundheitsschutz 2009(52):183–192

Management of Highly Infectious Diseases – Germany



Network of HLIUs in Germany

Why so many?

Legal and operational reasons

Federal structure of Germany
(responsibility of ‚Bundeslaender')

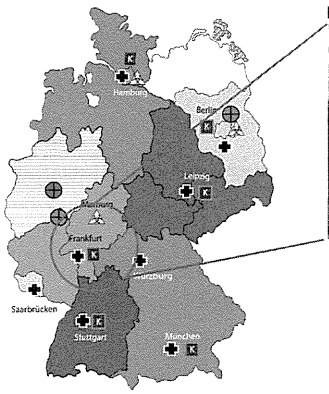
No fixed/ rotary wing transport allowed

No approval for transport isolators
based on medical limitations (historically)

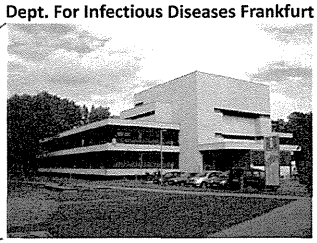
No ‚outreach teams'

Gottschalk R et al. Bundesgesundheitsbl-Gesundheitsforsch-Gesundheitsschutz 2009(52):183–192

High Level Isolation Unit Frankfurt - Introduction to the facility



Dept. For Infectious Diseases Frankfurt



In-/ Out-patient care for:
HIV/AIDS, (MR)TB, HCAI, tropical diseases

As part of the HID Network:
Responsible for assessment, isolation and treatment of HID cases

Population covered: ~ 10.000.000

Gottschalk R et al. Bundesgesundheitsbl-Gesundheitsforsch-Gesundheitsschutz 2009(52):183–192

High Level Isolation Unit Frankfurt - Introduction to the facility

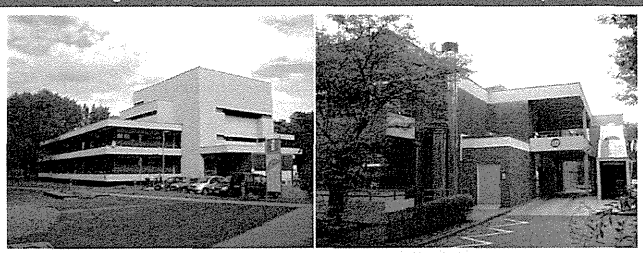
High Level Isolation Unit Frankfurt am Main

Building constructed in **1962** for Smallpox cases imported via FRAPORT

First proven Viral Haemorrhagic Fever in **1967** (Marburg Virus)

HLIU built in **2001/ 2002** and incorporated into existing building

High Level Isolation Unit Frankfurt - Introduction to the facility



Initial Investment in (2000/2001): Covered by:	**2 Million Deutsche Mark** Regional government
Operating expenses (Maintenance + personell) Covered by:	**~ 300.000 €/anno** Clinic (75%) Regional government (25%)
Current need for investment (equipment) Covered by:	**~ 450.000 €** ? (ongoing discussion)

High Level Isolation Unit Frankfurt – infrastructure

Mission:

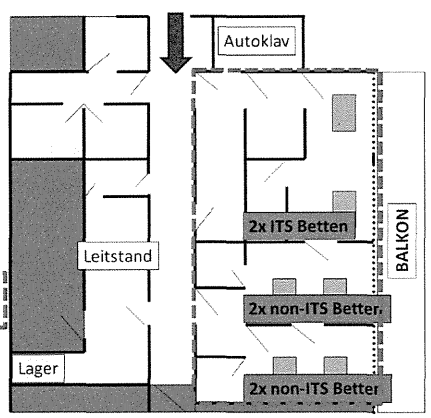
‚to care for 3 cases with different causative agents'

Capacity:

ITS Beds n = 2
Non-ITS Beds n = 4

All rooms with negative pressure, but not single use.

Connected by doors, *functionally separated.*



High Level Isolation Unit Frankfurt – infrastructure

Mission:

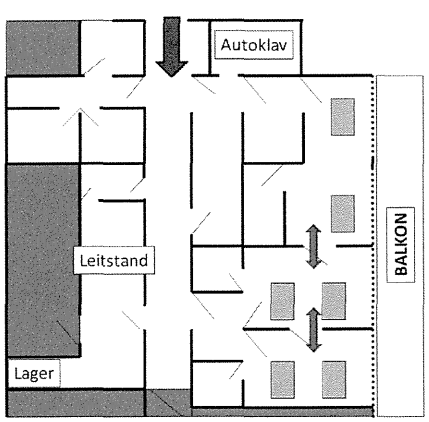
‚to care for 3 cases with different causative agents'

Capacity:

ITS Beds n = 2
Non-ITS Beds n = 4

All rooms with negative pressure, but not single use.

Connected by doors, *functionally separated.*



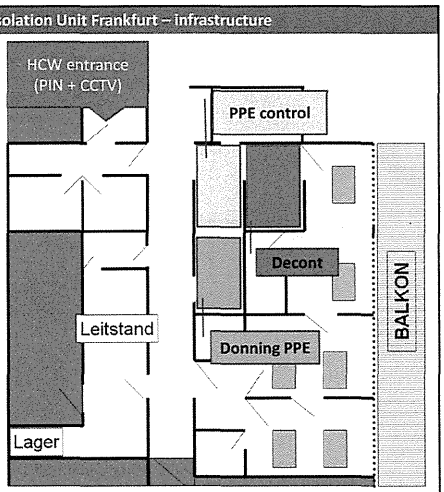
High Level Isolation Unit Frankfurt – infrastructure

ANTEROOM
Ideal: One way

De facto:
2-way, using decont room

Pro:
- cost-reduction (in 2001)
- Same infection control level

Contra:
- Air management
-Maximum adherence to Decont-procedures needed



Chain of reaction

Suspected case:
Evaluation by
HLIU doctor +
Health Authorities

Alerting of:
- Transport team
- HLIU team
- Intensive care

Reaction:
- Timeframe 2 h
- Equipping HLIU

=> Patient can enter HLIU

Chain of reaction – pre-hospital

Suspected case: Emergency physician contacts Health Authorities (on call 24/7)

Index of *suspicion* checked:

Checklist for HID cases at hand of Health Authorities

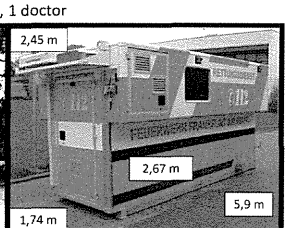
1. Clinical signs
2. Incubation period(s)
3. Recent travel to endemic regions
4. Relevant exposure

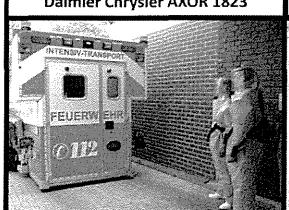
If case meets criteria:

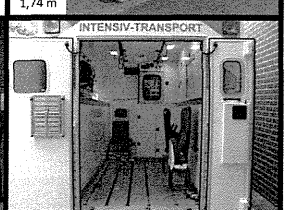
- Re-confirmation of ***probability*** with HLIU consultant on call;
- Activation of transport team.

Alerting time ~ 1.5h, AirCon; HEPA, stand-alone container ~ 3.5t
Personell on board 1 driver; 2 HCWs, 1 doctor

Daimler Chrysler AXOR 1823







Chain of reaction – HLIU

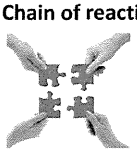
Probable case: Health Authorities activate transport team;
ID consultant activates HLIU team and informs P4 lab about incoming sample;

HCW at work
responsible for getting the HLIU operational

HCW at home
Report their availability

ID Consultant
Co-ordinates actions

Chain of reaction – HLIU



Probable case: Health Authorities activate transport team;
ID consultant activates HLIU team and informs P4 lab about incoming sample;

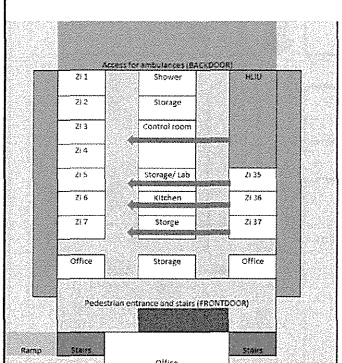
HCW at work
responsible for getting the HLIU operational

HCW at home
Report their availability

HCW at work follow SOPs for
- evacuating patients from HLIU
- equipping the HLIU
- Call technicians to activate negative pressure
- reporting to pre-hospital team when ready

Chain of reaction – HLIU

HCW at work
responsible for getting the HLIU operational



- **evacuating patients from HLIU**

All patients are moved to other floor of building

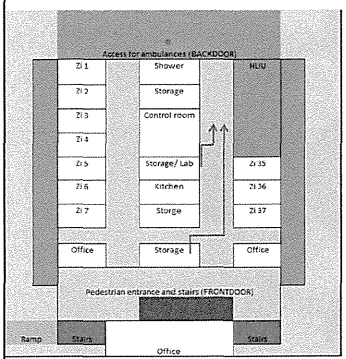
Head of ED is informed and responsible to re-distribute patients to other wards/ hospitals

NB:
There is no financial compensation for beds not used!

High Level Isolation Unit Frankfurt – operational management

Chain of reaction – HLIU

HCW at work responsible for getting the *HLIU operational*



- **equipping the HLIU**

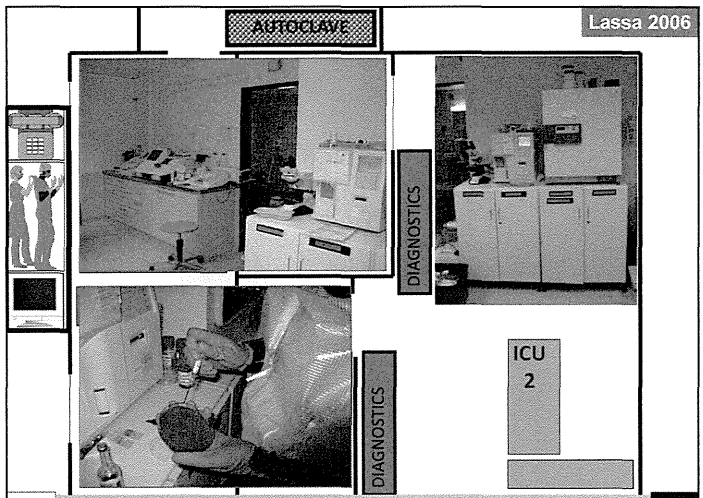
Pre-packed contaniers with medical and diagnsotic equipment;

Ultrasound;

Portable X-ray;

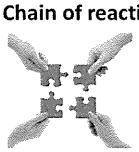
First aid kit and defibrillator.

When fully equipped:
Activate negative pressure.



High Level Isolation Unit Frankfurt – operational management

Chain of reaction – HLIU



Probable case:

Health Authorities activate transport team;

ID consultant activates HLIU team and informs P4 lab about incoming sample;

HCW at work responsible for getting the *HLIU operational*

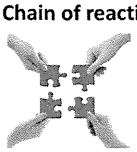
HCW at home
Report their availability

ID Consultant
Designs shift-plan for 72h

High Level Isolation Unit Frankfurt – operational management

Chain of reaction – HLIU

ID Consultant
Designs shift-plan for 72h



General requirements for team members:

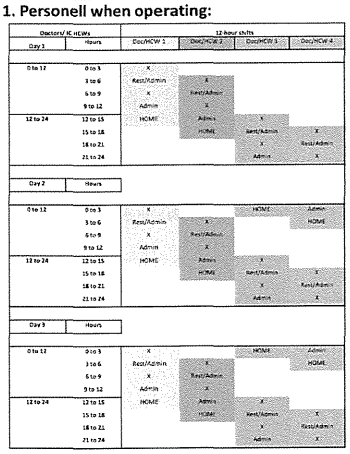
- Periodical training in PPE:	every 6 months
- Periodical occupational health checks	Standard plus Respiratory

Requirements for team AT BEDSIDE:

-Intensive care training	Docs: 1 year Nurses: permanent

High Level Isolation Unit Frankfurt – operational management

1. Personell when operating:



Generic shift-plan for HCWs AT BEDSIDE:

- Calculated on 12-h-shift basis

- All personell is working 2x4h/shift in full PPE

For the first 72 hours of a single-case event,

n=4 intensive care Nurses as well as

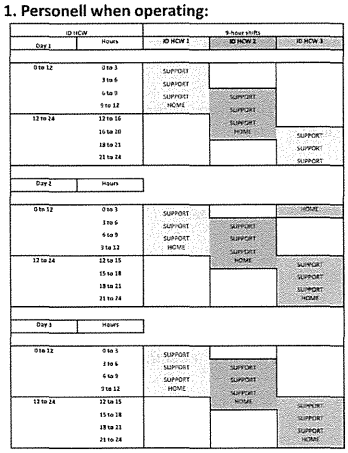
n=4 intensive care trained ID doctors

are needed.

This number of personell applies to ***direct bedside-care***, only!

High Level Isolation Unit Frankfurt – operational management

1. Personell when operating:



Generic shift-plan for HCWs outside the HLIU:

- Calculated on 9-h-shift basis

- Personell is **NOT** involved into direct bedside-care, but supportive duties:

❖ Re-supplying PPE and medical equipment,

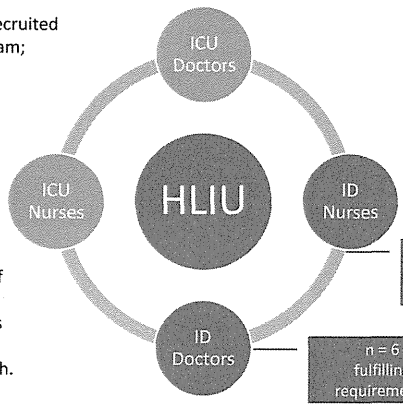
❖ Decont of persoell leaving the isolation area,

❖ Waste-management (Autoclave)

For the first 72 hours of a single-case event,

n=3 ID HCWs are needed.

For the first 72 hours,
4 doctors and
3 nurses are recruited from the ID team;
plus
4 ICU-nurses.

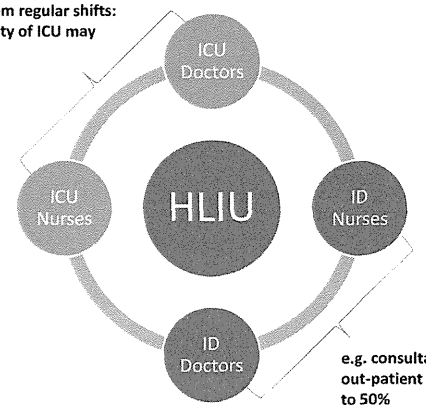


n = 10 fulfilling requirements

n = 6 fulfilling requirements

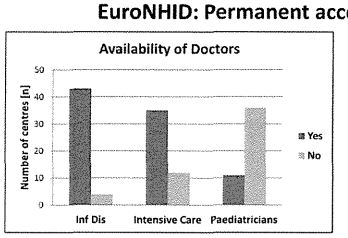
Hence,
additional staff from other wards or HLIUs is needed if operating > 72h.

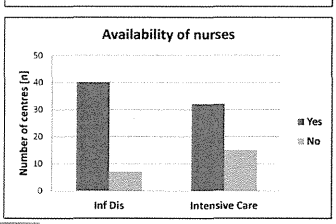
Withdrawn from regular shifts:
Routine capacity of ICU may be reduced!



e.g. consultancy and out-patient care reduced to 50%

EuroNHID: Permanent access to trained personnel





Infectious Diseases doctors and nurses

Permanently available > 85% of centres, but not all.

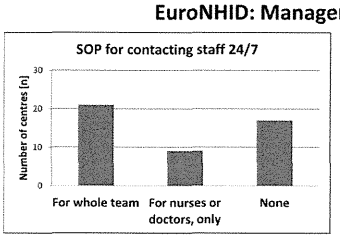
ICU doctors and nurses

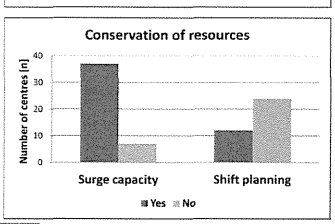
20-27% do not have access to intensive care staff, but > 90% provide ICU care.

Pediatricians

Availabel in 11 centres only, but 33 centres provide care for children.

EuroNHID: Management of personnel





Availability of specifically trained doctors and nurses

On 24-basis in less than 50% of centres. 17 centres have no procedures to contact staff.

Surge capacity planning

exists in the majority of centres

Shift plans

often absent; most frequent in centres with „real" case experience.

Summary: **Personell when operating**

To maintain an appropriate number of staff to operate the HLIU as requested, theoretical and practical training of HCWs is most essential, but

(i) time-consuming,

(ii) not (fully) financially compensated.

Problems arise with

(i) fluctuation of staff (mostly IC nurses) to other hospitals,

(ii) frequency of occupational health assessment, and

(iii) quantity of personell available if opertaing > 7 days.

Chain of reaction – HLIU

HCW at work
HLIU is operational

ID Consultant
Designed shift-plan

HLIU is ecavuated/equipped
Negative pressure active

Called-in first team
Cross-checked equipment

Reporting to pre-hospital team: HLIU is ready !

High Level Isolation Unit Frankfurt – infrastructure


High Level Isolation Units: Problem or benefit?

HLIU rooms

If used for routine patinets
- need to be evacuated when alerted
- need to be fully (re-) equipped
- may develop damage in routine use

but
- are cost-effective
- HCWs are familiar with management
- no extra staff for maintenance/ control
- needs are identified on daily basis

High Level Isolation Unit Frankfurt – infrastructure


High Level Isolation Units: Problem or benefit?

HLIUs in Europe

European Training in Infectious Disease Emergencies/ ETIDE
Common curricum
Funded by the EU until 2007, but currently ‚on hold'
No EU wide accreditation, no funds for exchange of teams

European Network of P4-Laboratories/ EuroP4
Harmonisation of diagnostic standards
But no central EU Lab

Future tasks:

Harmonisation of response plans
Regulation of cross-border transportation
Preparedness in Emergency Departments

High Level Isolation Unit Frankfurt


Questions?

High Level Isolation Unit Frankfurt – Lessons learned

(Highly) Infectious Disease Emergencies managed in Frankfurt:

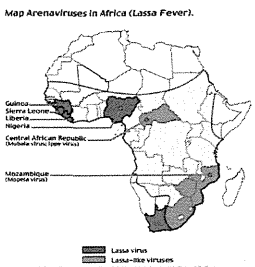
SARS 2003
Lassa 2006
H1N1 2009
EHEC 2011

Common grounds:

- **Unpredictable (out of nowhere)**
- **Initially, number of cases unclear**
- **Need of supportive intensive care**

High Level Isolation Unit Frankfurt – Lessons learned

A case of severe Lassa fever (2006)



LASSA VIRUS (LASV)

Family *ARENAVIRIDAE*

Old World (LCMV, LASV, LuJo,...)
New World (Machupo, Junin,...)

Incubation 6 - 21 days
~ 80% asymptomatic – mild course
~ 20% severe multisystem disease

Reservoir: *Mastomys natalensis*

Rodent-to-human transmission:

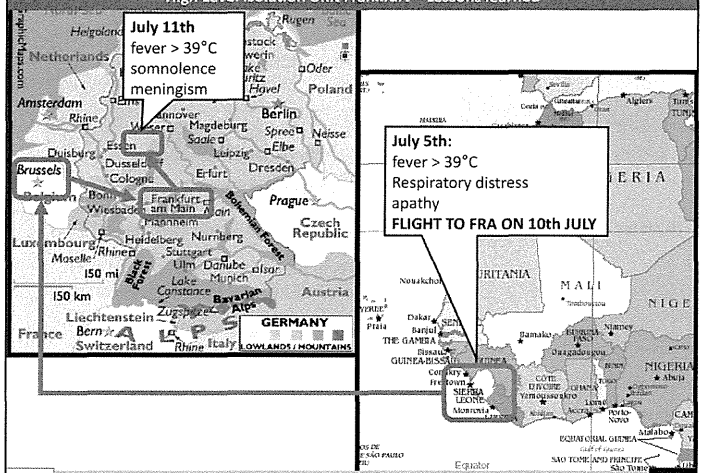
- Inhalation of urine/ blood
- Ingestion

High Level Isolation Unit Frankfurt – Lessons learned

MEDICAL HISTORY

BORN 1936	Married, 1 daughter
PROFESSION	Orthopedic Surgeon/ Politician
PRIOR MEDICATION:	Ramipril 10mg, Allopurinol 300mg, HCT 25mg
PRIOR ILLNESS:	Arterial hypertension, pulmonary fibrosis, renal impairment (Krea ~ 1.3 mg/dl)
	Progressive confusion and weakness of limbs since March 2006
	Frequent artesunate – selfmedication
	Frequent travelling in south-eastern Sierra-Leone

High Level Isolation Unit Frankfurt – Lessons learned



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High Level Isolation Unit Frankfurt – Lessons learned

1st hospital	
BLOODCOUNT	**leukopenia** (3,2/nl), Hb 13 g/dl, platelets 143000/µl AST/ALT > 2000 U exclusion of malaria, **HIV POSITIVE**
CCT SCAN **CSF**	hypodense areas periventricular in the white matter 26 Lymph, protein 572 mg/l, Glc 91 mg/dl, Lac 2,16 **Dx: *AIDS-related encephalitis*** **Tx:** ACICLOVIR (2x500mg), CEFTRIAXON (1x2g)
NCU/ ICU	**Hepatitis, renal and respiratory impairment** **Mech. ventilation** **Tx:** CASPOFUNGIN, MERONEM, VANCOMYCIN
July 20th (BNITM)	**anti-LASV IgM POSITIVE (serum)** **LASV-RT-PCR POSITIVE (CSF)**
July 21st	**FRA UNIV. HOSPITAL** schock, anuria, GSC 7, disseminated oedema pleural drainge, atrial fibrillation

High Level Isolation Unit Frankfurt – Lessons learned

PARAMETERS PREDICTING POOR OUTCOME

- HIGH VIREMIA > $10^{3.6}$ cop/ml ◄
- SERUM AST LEVEL > 150 IU/L ◄
- BLEEDING Ø
- ENCEPHALITIS (◄)
- EDEMA ◄
- THIRD TRIMESTER OF PREGNANCY Ø
- DELAYED SEROCONVERSION AND CYTOKINE RESPONSE Ø

McCormick JB et al and Johnson KM et al J Infekt Dis 1987 (155)
Schmitz H et al Microbes and Infection 2002 (4)

High Level Isolation Unit Frankfurt – Lessons learned

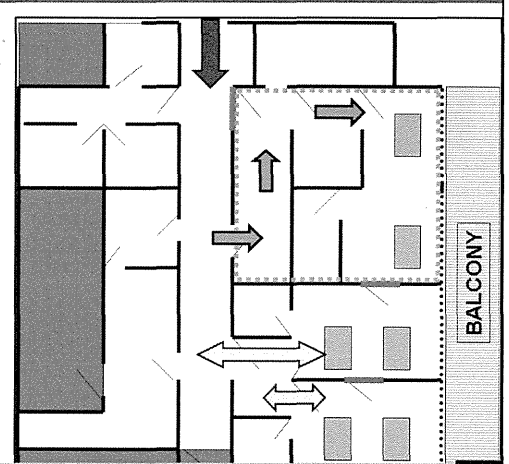
AIR MANAGEMENT LEVEL I

Day 0

1 symptomatic Index case

Plus

2 asymptomatic relatives, exposed during flight and prior hospital stay



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AIR MANAGEMENT LEVEL I

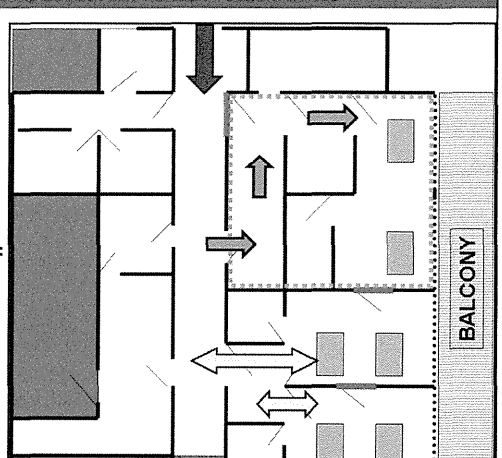
Day 3

PCRs from relatives turned out negative:
Quarantine lifted

Stayed in hospital hotel:

Fever monitoring

No Seroconverion



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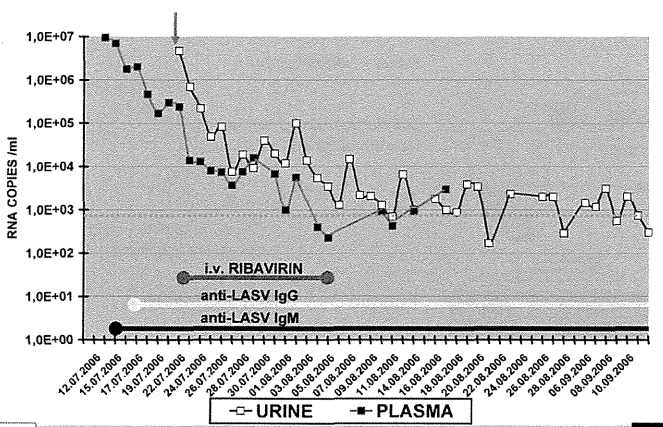
VIRAL LOAD AND SEROCONVERSION 1



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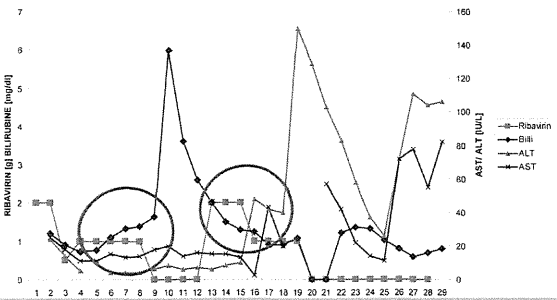
High Level Isolation Unit Frankfurt – Lessons learned

ORGAN INVOLVED	SYNDROME / SYMPTOM	CLINICAL FINDING	PUTATIVE CAUSE		
			Virus	History	Therapy
LIVER	Hepatitis	Elevated	X		X



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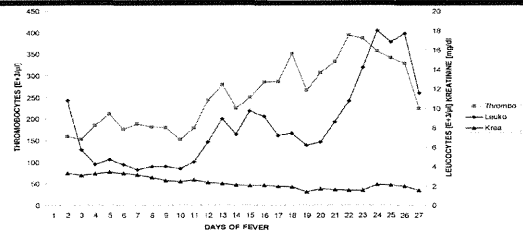
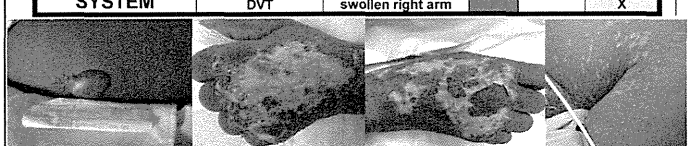
High Level Isolation Unit Frankfurt – Lessons learned

ORGAN INVOLVED	SYNDROME / SYMPTOM	CLINICAL FINDING	PUTATIVE CAUSE		
			Virus	History	Therapy
HEMATOPOETIC SYSTEM		Neutropenia	X		
		Lymphopenia	X	X	
	Ecchymosis	Thrombopenia	X		
		Anaemia	X		X
KIDNEY	Renal insufficiency	low urin output			
		kreatenin elevation			
		proteinuria	X	X	X



High Level Isolation Unit Frankfurt – Lessons learned

ORGAN INVOLVED	SYNDROME / SYMPTOM	CLINICAL FINDING	PUTATIVE CAUSE		
			Virus	History	Therapy
VASCULAR SYSTEM	SCLS	generalized edema			
		ascites			
		pleural effusion	X		
	SHOCK	hypotention			
		lactate acidodis	X		
	DVT	swollen right arm			X



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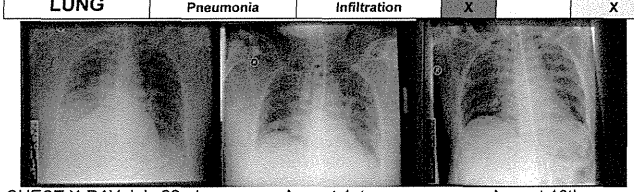
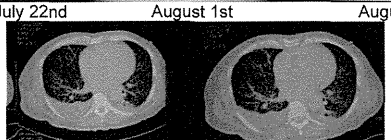
High Level Isolation Unit Frankfurt – Lessons learned

ORGAN INVOLVED	SYNDROME / SYMPTOM	CLINICAL FINDING	PUTATIVE CAUSE		
			Virus	History	Therapy
LUNG	Pulmonary edema	Respiratory failiure	X		X
	Pneumonia	*Infiltration*	X		X



CHEST X-RAY July 22nd August 1st August 10th



CT SCAN August 16th

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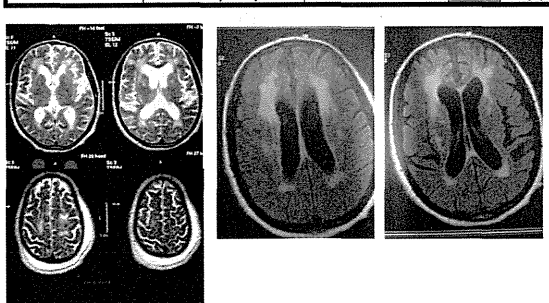
High Level Isolation Unit Frankfurt – Lessons learned

ORGAN INVOLVED	SYNDROME / SYMPTOM	CLINICAL FINDING	PUTATIVE CAUSE		
			Virus	History	Therapy
CNS	Coma	Breathing rate < 10	X		
	Leucencephalopathia	GCS = 6-7	X	(X)	



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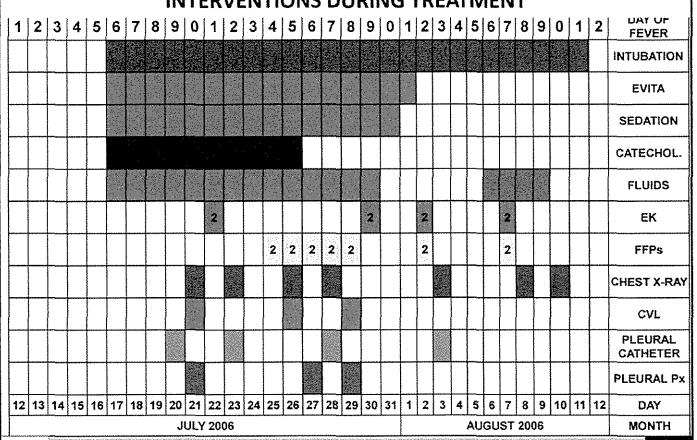
High Level Isolation Unit Frankfurt – Lessons learned

INTERVENTIONS DURING TREATMENT



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Clinical summary

- **VHFs** ARE RARE BUT DO OCCUR AS IMPORTED CASES
- **HIV** INFECTION DOES NOT RULE OUT OTHER CAUSES
- MULTISYSTEM INFECTIONS CAN PRESENT **WITHOUT HEMORRHAGE**, BUT NEUROLOGICAL AND CARDIOVASCULAR SYMPTOMS
- DISSEMINATED LASV-INFECTION IS CUREABLE, IF **ICU TREATMENT** IS AVAILIABLE
- **SECONDARY** ICU-RELATED **COMPLICATIONS** HAVE STRONG IMPACT ON OUTCOME

Overall period of treatment in HLIU: July 21st – August 28th

July 21st

Initially, ID team was set up to care for patient (+ ICU nurses) based on shift-plan

After 48h, patient was more stable and long-term need of personell expected:

- ❖ Hospital reduced ICU-beds to provide nurses
- ❖ Other departments allocted doctors
- ❖ Call for help issued via HLIU-network

Overall period of treatment in HLIU: July 21st – August 28th

July 21st

After 6 days, 4 German HLIUs sent doctors to work in Frankfurt

Problem: Different PPEs in other HLIUs
Insurance for work in HLIU
Costs for travel and accomodation

After 14 days, doctor's shifts were extended to 4 days (not 3)

Problem: By EU-law not allowed

Overall period of treatment in HLIU: July 21st – August 28th

August 15th

After 25 days, viraemia was eliminated and patient alert:

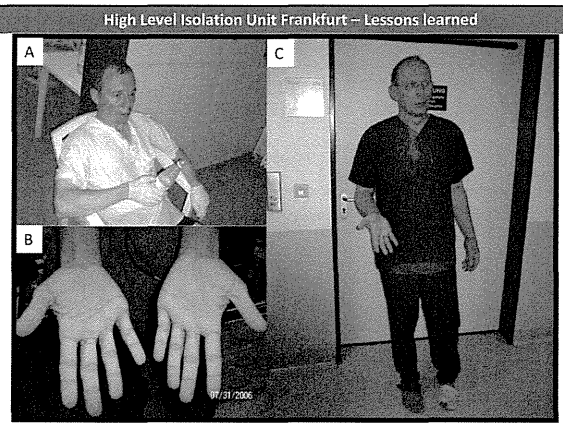
- ❖ Level of PPE reduced to respiratory precautions
- ❖ Team at bedside reduced to one nurse (no doctor)

Overall period of treatment in HLIU: July 21st – August 28th

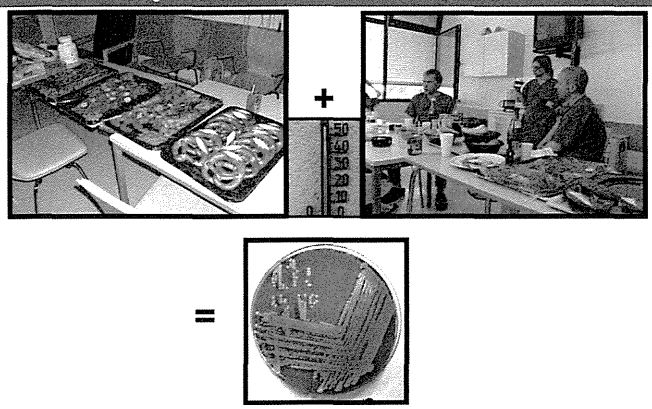
August 28th

After 38 days, no virus was detected in urine:

- ❖ Level of PPE reduced to standard precautions (VRE +)
- ❖ Patient transferred to standard room.



AFTER 4-HOURS TRANSPORT [A] OR SHIFT [B+C]:
Loss of 2-3 kg bodyweight due to transpiration
Temperature measured inside vehicle ~55°C resp. ~45°C in PPE



Lesson learned: Surge capacity is vital!

Discussion:

How do we calculate a capacity needed?

How do we define a minimum level of care?

How do we maintain a level of training for personell?

How do we harmonise data collection for future outbreaks?

Thank you for your attention !

Additional material:

Lessons learned from EHEC

Data from the EuroNHID survey

Entero-haemorrhagic E. coli Infections (2011)

Out of nowhere, into the heart of the society

May 19th 2011
Multiple cases of diarrhoea in emplyees of one company (Hamburg and Frankfurt)

May 20th 2011
On site investigation by Health Authorities
Univ. Clinic: Interdisciplinary meeting

May 23rd 2011
Eating salad coincided with 9-fold risk of illness
Comparable data from Hamburg

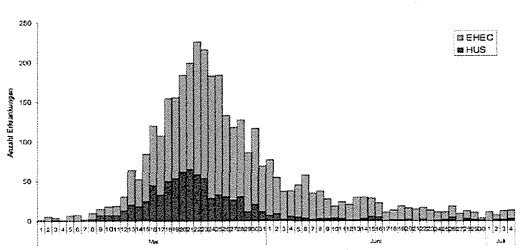


Abbildung 2: Epidemiologische Kurve der HUS- und EHEC-Ausbruchsfälle (809 HUS- und 2.717 EHEC-Fälle mit bekanntem Erkrankungsbeginn an Durchfall im Ausbruchszeitraum).

Robert Koch-Institut. Bericht: Abschließende Darstellung und Bewertung der epidemiologischen Erkenntnisse im EHEC O104:H4 Ausbruch, Deutschland 2011. Berlin 2011.

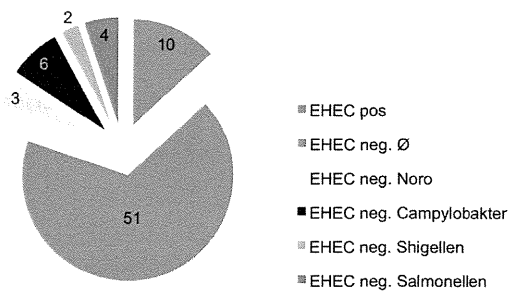
In patient cases (Univ. Clinic Frankfurt, only)

		Frankfurt Univ. Hospital cumulative
In-Patients	**With EHEC and/or HUS**	
	• overall	22
	• Female	17 (77%)
	• EHEC-Toxin-proven in FRA lab	16
	• Transfer from other hospital with external proof	3
	• Clinically HUS, EHEC-Toxin not proven	3
	with HUS (definied as stay in Nephrology or ICU)	
	• overall	11
	• plus Dialysis/Haemofiltration	11
	• *plus ICU stay (mech. Ventilated)*	3
Deaths due to HUS		0

Courtesy of J. Kessel, Frankfurt

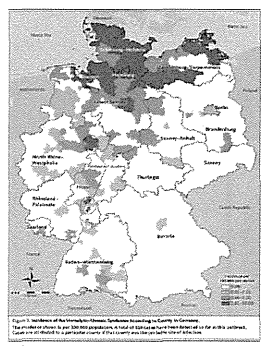
Ambulatory cases (Univ. Clinic Frankfurt, only)

Infectious Diseases out-patients
May 25th – July 4th 2011 (n=76)



Courtesy of J. Kessel, Frankfurt

EHEC and HUS in Germany



Quelle: Frank et al.:
Epidemic Profile of Shiga-Toxin–Producing *Escherichia coli* O104:H4 Outbreak in Germany — Preliminary Report. NEJM. June 22 2011

Proven Cases until 30.06.2011		
	Cases (%w)	Deaths (%)
EHEC	2987 (58)	18 (0,6)
HUS (23%)	855 (68)	35 (4,1)
Median age: 42 years		

Robert Koch-Institut. Bericht: Abschließende Darstellung und Bewertung der epidemiologischen Erkenntnisse im EHEC O104:H4 Ausbruch. Deutschland 2011. Berlin 2011.

Entero-haemorrhagic E. coli Infections (2011)

Out of nowhere, into the heart of the society

- **Severe infectious diseases may occur anywhere, anytime**

- **Common risk assessment (e.g. specific exposure during travel) may not apply**

- **The Worried Well need to be assessed and treated, also**

SARS 2003
Lassa 2006
H1N1 2009
EHEC 2011

Lessons learned:

- **A HLIU is of use in the beginning of an epidemic, only**

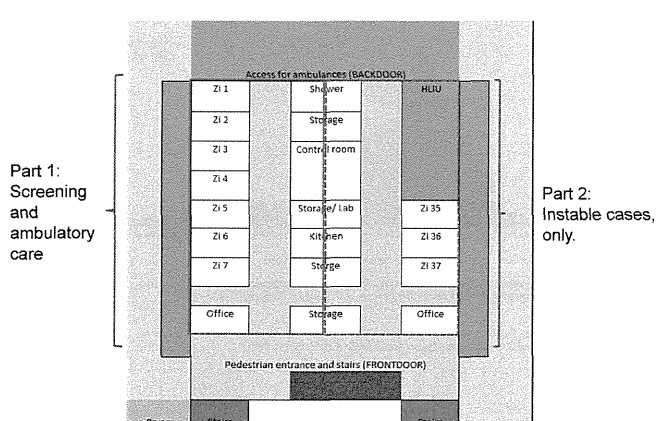
- **The shortage is the personnel, not the beds**

- **Vital infrastructures need protection (routine emergencies!)**

Szenario: > n+6 instable cases

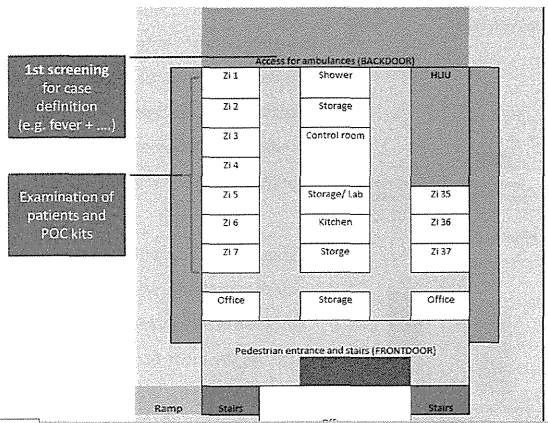
Run the whole building under infection control precautions !

Concept for pandemic setting/ screening of ambulatory cases:



High Level Isolation Unit Frankfurt – Lessons learned

Concept for pandemic setting/ screening of ambulatory cases:



High Level Isolation Unit Frankfurt – Lessons learned

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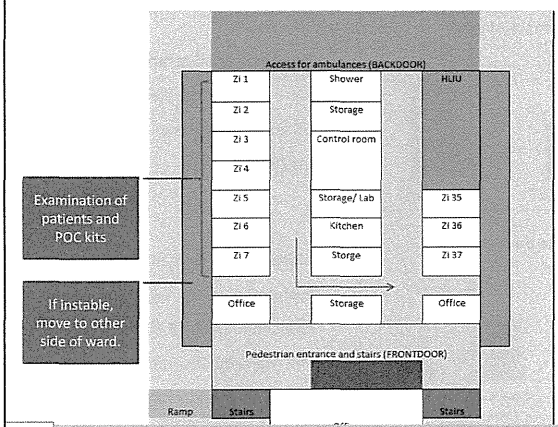

High Level Isolation Unit Frankfurt – Lessons learned

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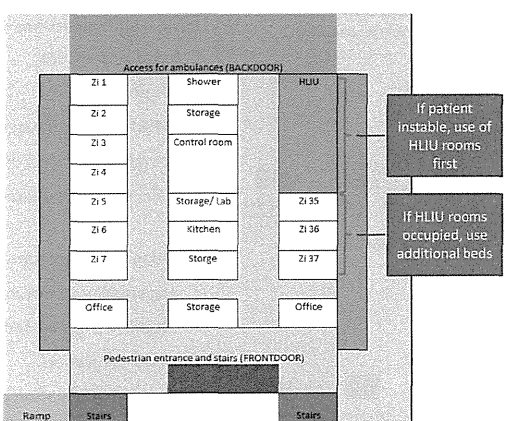
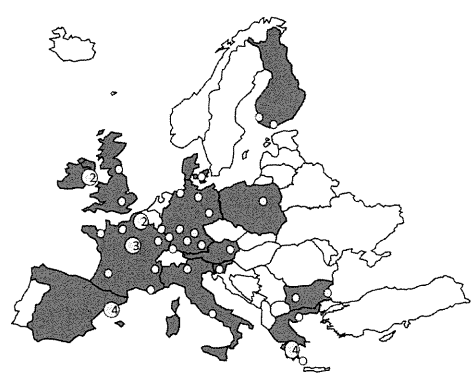


The European Network for Highly Infectious Diseases



Management of Highly Infectious Diseases – Europe

Problem: In the EU, every country has ist own laws and system of isolation facitities.

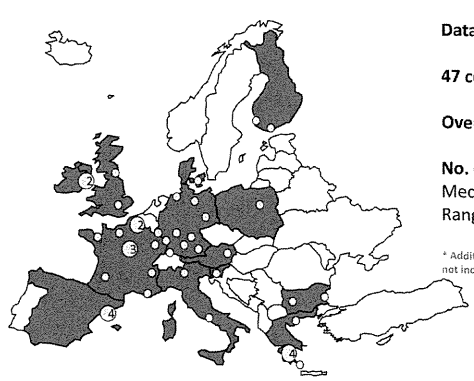
European Network for Highly Infectious Diseases - EuroNHID
2007 - 2010

To develop and conduct a cross-sectional analysis of current European capacities in the clinical management of HIDs

2007/ 2008		**consensus on methodology**
- Checklists	I.	infrastructure/ equipment/ personnel management
	II.	hospital procedures (e.g. hygiene and transport)
	III.	HCW safety, education and tranining
- Identification		*of facilities enlisted by national health administrations*
2008/ 2009		**data collection (including personal visits)**
2009/ 2010		**data analysis**

Management of Highly Infectious Diseases – Europe

Background data on evaluated centres



Database 2010:

47 centres in 15 countries*

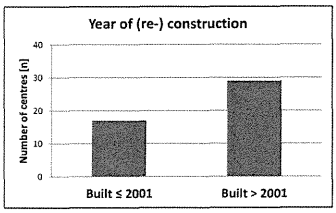
Overall feedback rate 95%

No. of centres/ country:
Median: 2
Range: 1; 12

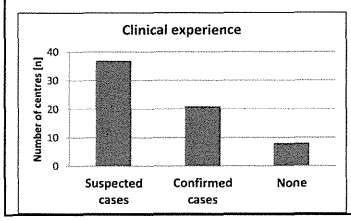
* Additional data provided from Norway are not included here.

Isolation facilities in Europe — General aspects

Background data on evaluated centres



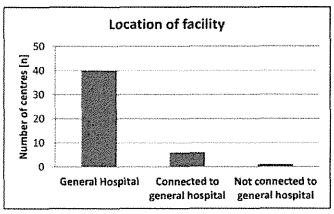
Two-thrid of all centres evaluated were (re-) constructed following the US anthrax events in 2001 [n=29/46; 63%].



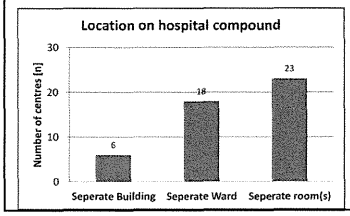
More than 75% of all centres evaluted have managed suspected cases [n=37/47; 78,8%].
The majority of confirmed cases were SARS and Lassa patients.

Isolation facilities in Europe — Specific aspect: Location

Location and connection with other care facilities



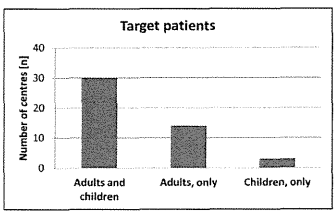
The majority of centres are located on the compound of a general hospital. Thus, access to a variety of medical specialties is granted (e.g. surgical/endoscopic interventions).



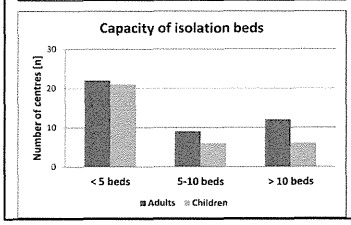
„Stand alone" facilities are few, whereas seperate wards or rooms within structures used for routine care are the most common (n=41/47 centres; 87%).

Isolation facilities in Europe — Specific aspect: Resources

Target patients and capacity of beds



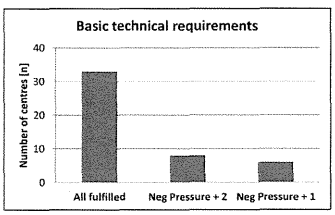
Two-third of all centres evaluated are able to provide care for both adult and paedriatric patients [n=30/47; 63%]; three centres are specifically equipped for children, only.



The number of patients care can be provided for significantly differs [range: 1-56/center; median: 4] but is independ from the number of centers/ country.

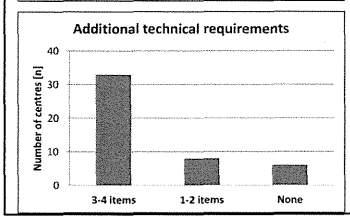
Isolation facilities in Europe — Specific aspect: Equipment

Technical equipment for infrastructure



Basic requirements are defined as:

- Negative pressure
- Anteroom
- HEPA filtered exhaused air
- Doors/ windows aerosol-tight
- Walls withstand decontamination

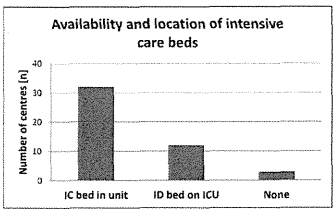


Additional requirements are:

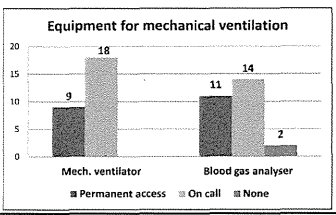
- High quality communication system
- Negative pressure indicators
- Self closing doors
- Separate evacuation pathway

Isolation facilities in Europe — Specific aspect: Medical care

Intensive care capacity



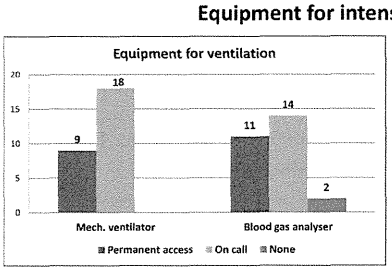
44/47 centres indicate to provide intensive care for adult patients.
Of those, the isolation rooms can be used for IC care in the majority [n=32/44; 68%].



Out of all centres with intensive care capacity, only 27/44 gave a feedback on ventliation equipment:
Out of those, all have access to ventilators, but 2 have no access at all to a blood gas analyser.

Isolation facilities in Europe — Specific aspect: Medical care

Equipment for intensive care



OPTIMUM:
"HLIUs should be equipped to provide the level of care available in an ICU."

Availability	Ultra-sonography	Portable radiography	Mechanical ventilator	Minor surgery sets	Renal replacement system
Permanently	8	17	12	12	2
On-call	35	27	31	34	39
Neither	4	3	4	1	6

	ECG/BP monitors	Perfusors	Blood gas analyzers	Bronchoscope	Gastroscope
Permanently	33	27	14	2	3
On-call	14	19	27	38	42
Neither	0	1	6	2	2

MINIMUM:
"Equipment for monitoring of vital signs"

Emergency care sets:
oro-tracheal tubes, anaesthetics, bag valve masks