

# Sykehusutbrudd; hva er et utbrudd og hvordan skal vi håndtere det?

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# Hva sier MSIS forskriften om utbrudd?

## § 3-4. (Varsling om utbrudd i helseinstitusjon av smittsom sykdom)

- Leger som **mistenker eller påviser** utbrudd av smittsomme sykdommer i sykehus eller annen institusjon som er omfattet av lov om spesialisthelsetjenesten m.m. § 1-2, skal omgående varsle til **kommunelegen og til Folkehelseinstituttet** med kopi til det regionale helseforetakets kompetansesenter for smittevern i helsetjenesten. Folkehelseinstituttet skal varsle Helsedirektoratet om de samme utbruddene, dersom de er alvorlige.
- Leger som mistenker eller påviser utbrudd av smittsomme sykdommer i kommunal helseinstitusjon skal varsle til kommunelegen. Kommunelegen skal, dersom mistanken ikke raskt kan avkrefte, varsle Folkehelseinstituttet. Folkehelseinstituttet skal varsle Helsedirektoratet om de samme utbruddene, dersom de er alvorlige.
- Folkehelseinstituttet skal gi faglig bistand, råd, veiledning og informasjon i forbindelse med samordning, oppklaring og kontroll av utbrudd av smittsom sykdom i helseinstitusjoner.

# Hva mener vi er et utbrudd?

La oss stemme – når skulle dere ha varslet kommunelegen?

- Et tilfelle med HA-MRSA
- En kryssmitte med VRE
- En kryssmitte med KPB
- To tilfeller med Karbapenem/Colisitin resistente Farlig Resistente Bakterier
- Tre tilfeller med Norovirus på en post
- Tre poster med flere Norovirus pasienter
- 100 pasienter med FRB i løpet av ett år
- 300 pasienter med FRB i løpet av 4 år

# Norsk legeforeningen tidsskrift:

## Følger vi forskriften?

- Many of the infection control units stated that they would not always report an outbreak if they found MRSA in only one additional person during a contact tracing.
- During the period, one outbreak was reported by St Olavs University Hospital, one by Haukeland University Hospital and three by Akershus University Hospital
- This study indicates that at least 19 cases of likely cross-infection ought to have been reported.

MRSA prevalence among  
healthcare personnel in contact  
tracings in hospitals

ORIGINALARTIKKEL

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# Hva er et Utbrudd? – vanlige definisjoner

- Flere tilfeller enn forventet av en bestemt sykdom innenfor et område i et gitt tidsrom
- To eller flere tilfeller av samme sykdom som mistenkes å ha felles kilde
  
- Hvor like er like?
  - Klebsiella pneumoniae
  - ST307
  - Plasmid
  - Resistens gener
  - Smittemåte

# Hvor mange utbrudd er rapportert?

Tabell 4. Type institusjon ved utbrudd i helseinstitusjoner varslet i 2018

Type institusjoner	Antall utbrudd	Antall tilfeller
Sykehjem	98	1529
Sykehus	37	386
Annen helseinstitusjon	5	52
<b>Totalt</b>	<b>140</b>	<b>1967</b>

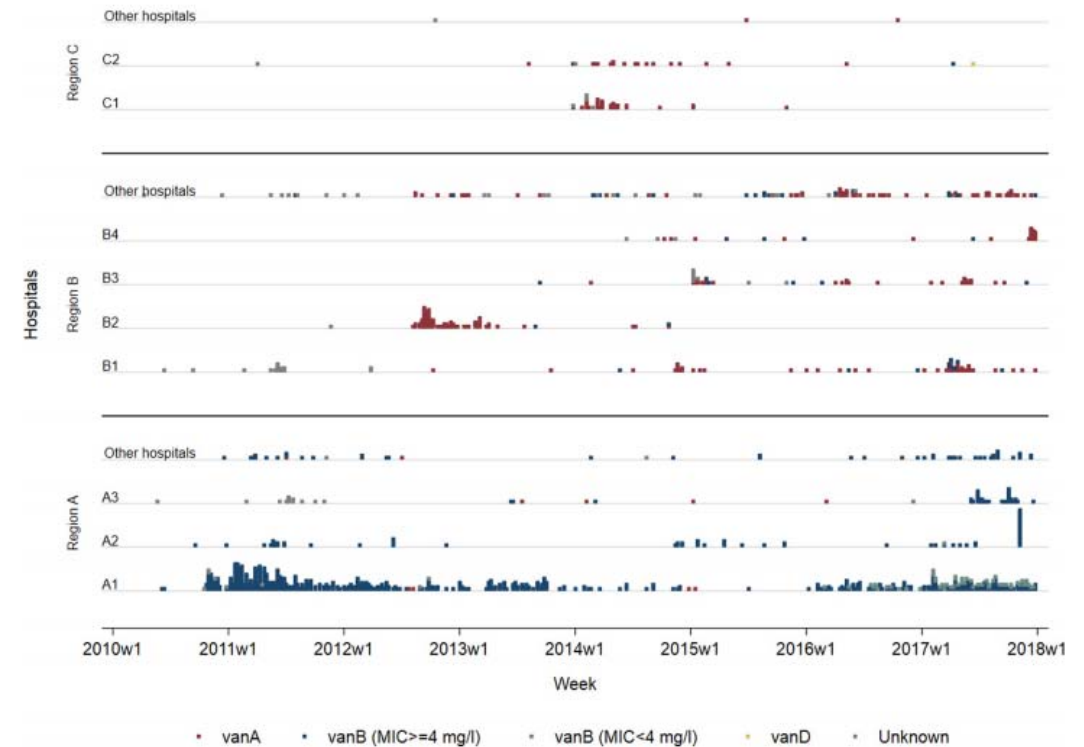
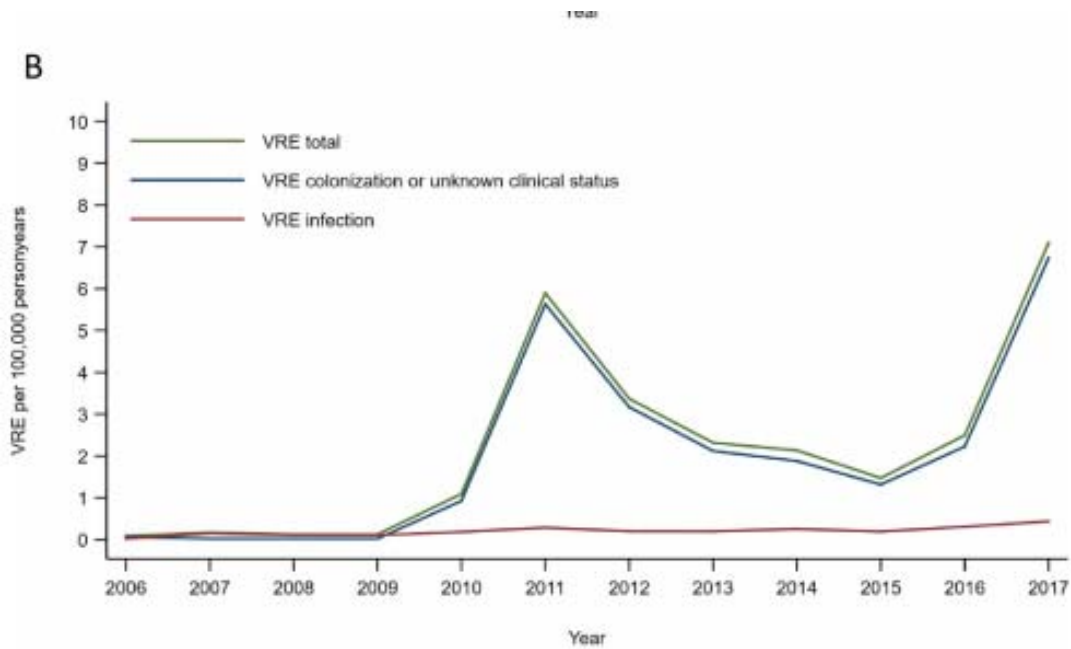
Smittestoff	2014	2015	2016	2017	2018	Sykehjem (2018)	Sykehus (2018)
Norovirus	42	75	62	47	82	64	16
Influenza	4	11	4	11	17		
MRSA	10	10	8	11	12		
ESBL E.coli	2	4	3	1	7		
Skabb	1		2		5		
VRE	4	1	1	9	4		

- HSØ varsler over 50% av alle Norovirus utbrudd ved sykehus



# Hvorfor er utbrudd viktige?

Endre epidemiologi og har alvorlige konsekvenser



In total 1,261 (94%) of the VRE cases were diagnosed in hospitals and over 85% of all persons notified were associated with recognised hospital outbreaks.

# Vi er ikke alene

## Noen aktuelle eksempler av utbrudd i Europa



RAPID RISK ASSESSMENT

### Regional outbreak of New Delhi metallo-beta-lactamase-producing carbapenem-resistant Enterobacteriaceae, Italy, 2018–2019

4 June 2019

#### Summary

A large outbreak of New Delhi metallo-beta-lactamase (NDM)-producing carbapenem-resistant Enterobacteriaceae (CRE) has been reported from the Tuscany region in Italy. Between November 2018 and May 2019, seven Tuscan hospitals notified a total of 350 cases. Due to its size and the resulting change in the epidemiology of CRE, the reported outbreak is a significant event, despite previous endemicity of *Klebsiella pneumoniae* carbapenemase (KPC)-producing CRE in this geographic area. The change in the type of carbapenemase further reduces treatment options because NDM-producing CRE are not susceptible to some of the new beta-lactam/beta-lactamase inhibitor combinations such as ceftazidime-avibactam and meropenem-vaborbactam.

Numerous reported outbreaks and examples of cross-border transmission of NDM-producing CRE in the European Union/European Economic Area (EU/EEA) demonstrate the transmission potential of NDM-producing CRE in European healthcare systems. Outbreaks such as the one in Tuscany present a risk for cross-border transmission and further spread to other EU/EEA countries, especially since the affected area is a major tourist destination. Given the previous rapid establishment of KPC-producing CRE in Italy (which resulted in an endemic situation), the risk for further spread of NDM-producing CRE from the current outbreak is considered to be high for Italy and moderate for cross-border spread to other EU/EEA countries.

Sporadic cases of community acquisition of NDM-producing CRE have also been described for other European countries. However, the introduction and dissemination of these bacteria have mainly been associated with healthcare settings. Therefore, the risk of acquisition of NDM-producing CRE related to this outbreak is likely restricted to persons with recent healthcare contact.



RAPID RISK ASSESSMENT

### Outbreak of carbapenemase-producing (NDM-1 and OXA-48) and colistin-resistant *Klebsiella pneumoniae* ST307, north-east Germany, 2019

28 October 2019

#### Summary

Germany has reported an outbreak of carbapenemase-producing (NDM-1 and OXA-48) and colistin-resistant *Klebsiella pneumoniae* sequence type (ST) 307. As of 21 October 2019, 17 patients in three hospitals and one rehabilitation clinic in Mecklenburg-West Pomerania in north-east Germany have been affected. Six of the 17 cases presented with clinical symptoms of infection, while 11 were identified as carriers. This is the first reported outbreak in Germany of *K. pneumoniae* that produce both NDM-1 and OXA-48 while also involving the emerging clone ST307. The outbreak strain is closely related to a *K. pneumoniae* ST307 isolate producing the same carbapenemases detected earlier in Finland from a patient previously hospitalised in Russia, yet there is no epidemiological link between the Finnish case and the outbreak in Germany.

*K. pneumoniae* ST307 is a high-risk clone expanding globally, including in the EU/EEA. The specific German outbreak strain carries virulence markers associated with increased ability to cause disease. Genetic characteristics related to a potential survival advantage in the environment have also been described for *K. pneumoniae* ST307. The combination of extensive antimicrobial resistance, increased virulence and capacity to persist in the environment result in a high risk for dissemination and future healthcare-associated outbreaks of this *K. pneumoniae* ST307 outbreak strain in hospitals and other healthcare settings. By contrast, the risk of transmission for individuals outside healthcare settings is low. Enhanced control measures have been implemented in the involved German hospitals, and no further cases have been detected since the end of September 2019.

The highly virulent and resistant *K. pneumoniae* strain of this outbreak was introduced to the EU/EEA in at least two countries in 2019: Germany and in Finland. As not all EU/EEA countries have an effective screening system for carbapenemase-producing Enterobacteriaceae (CRE) in high-risk patients and may also lack the capacity to perform whole genome sequencing (WGS) – or do not routinely employ WGS on all carbapenem-resistant *K. pneumoniae* isolates collected at the national level – the number of such imported events may be considerably underestimated. In addition, several other high-risk clones of carbapenemase-producing *K. pneumoniae* have been spreading in hospitals and other healthcare settings in the EU/EEA in recent years. Hospital admissions of patients with previous hospitalisations, including prior hospitalisation in another country, are a daily occurrence in the EU/EEA, and the risk for further introduction of such high-risk clones of *K. pneumoniae* to hospitals in the EU/EEA, possibly resulting in other hospital outbreaks, is therefore high. This outbreak also highlights the concomitant increase in virulence, transmissibility and antimicrobial resistance among certain *K. pneumoniae* strains, which are posing a considerably higher risk to human health than has



RAPID RISK ASSESSMENT

### Combined clonal and plasmid-mediated outbreak of carbapenemase-producing Enterobacteriales, Lithuania, 2019–2020

3 February 2020

#### Summary

Lithuania reported an outbreak of carbapenem-resistant, and for some cases, colistin-resistant Enterobacteriales, including 223 cases detected between 1 February 2019 and 7 January 2020. The majority of cases (208 cases) occurred in one single hospital (Hospital 1). Most of the carbapenem-resistant Enterobacteriales (CRE) isolates detected from cases were *Klebsiella pneumoniae* (199 cases, 89%), followed by *Escherichia coli* (21 cases, 9%). Whole genome sequencing (WGS) of 97 isolates revealed one major strain of *K. pneumoniae* ST392 responsible for the outbreak in Hospital 1 and detected in five additional hospitals. This *K. pneumoniae* ST392 outbreak strain carried a plasmid containing the bla<sub>KPC-2</sub> gene. The same plasmid was also found in isolates of carbapenem-resistant *K. pneumoniae* of different sequence types and in *E. coli* and *Citrobacter* spp., thus indicating plasmid-mediated spread of carbapenem resistance in addition to clonal expansion of one single CRE strain. The number of CRE cases reported here represents a large increase compared with the total number of CRE cases for the whole country in previous years (five and 12 cases in 2017 and 2018, respectively).

The risk of further spread of CRE in the most-affected hospital appears to persist as new cases continue to be detected at the time of this risk assessment update, despite the implementation of enhanced infection control measures. The risk of further spread in the Lithuanian healthcare system is also likely to be high as WGS data indicated that the outbreak strain had been detected in five hospitals in addition to Hospital 1. By contrast, the risk of transmission for individuals outside healthcare settings is low. There is also no evidence, so far, for cross-border transmission related to transfer of patients with CRE from the hospitals affected by the outbreak, to healthcare facilities in other countries.

This outbreak highlights the high transmissibility of CRE, and in particular KPC-producing *K. pneumoniae* in healthcare settings. The outbreak is further complicated by parallel clonal expansion and plasmid spread including to other species. Early detection of outbreaks and close cooperation between healthcare units, clinicians and public health services are crucial to control the spread of CRE in the hospitalised patient population. Moreover, this outbreak highlights the importance of early detection of CRE in countries and settings with low incidence. To improve early detection and the control of CRE high-risk clones, and to better target control measures in healthcare facilities, there is a need for increased laboratory capacity in the European Union (EU)/European Economic Area (EEA) to support outbreak investigations and surveillance with real-time WGS in order to avoid further spread.

Available options for response are in the relevant section below.

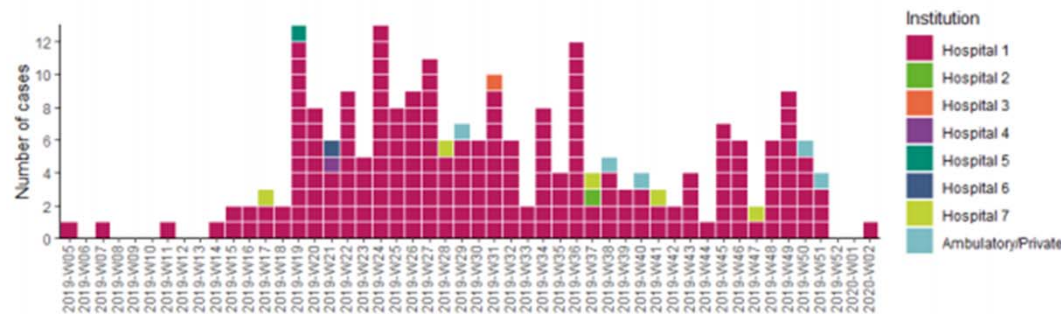


# Litauen

## De var bedre enn oss!

- The first case was a patient with a SSI in ICU (Hospital 1) in January 2019.
- KPC-CRE were isolated from clinical samples of additional patients treated in the same ICU.
- The outbreak was identified in April 2019, when the information about the resistance mechanism (KPC) of the CRE isolates was obtained from the National Reference Laboratory (NRL), as initially only phenotypic resistance testing was performed at the local clinical microbiology laboratory.
- 208 KPC-CRE cases occurred in the most-affected hospital, Hospital 1.
- Hospital 2, one case; Hospital 3, one case; Hospital 4, one case, Hospital 5, one case, Hospital 6, one case; and Hospital 7, five cases; and in ambulatory care, five cases.

**Figure 1. Epidemic curve of the outbreak of KPC-producing carbapenem-resistant Enterobacterales (KPC-CRE), Lithuania, 1 February 2019–7 January 2020**



Cases are presented per week of sampling. Only the first isolate per case was included.

# Tyskland

- Utbrudd av 17 tilfeller med *K. pneumoniae* (NDM-1 og OXA-48) pluss resistens mot Kolistin
- ST307

# Toscana

- Between November 2018 and May 2019, seven Tuscan hospitals notified a total of 350 cases.
- 50 with bloodstream infection, 43 from urine, 15 respiratory tract samples
- Isolates are mostly clonal.
- In the same geographic area, KPC-producing CRE have been endemic since early 2010, while metallo-beta-lactamase (MBL)-producing CRE such as VIM- or NDM-producing CRE had remained sporadic.

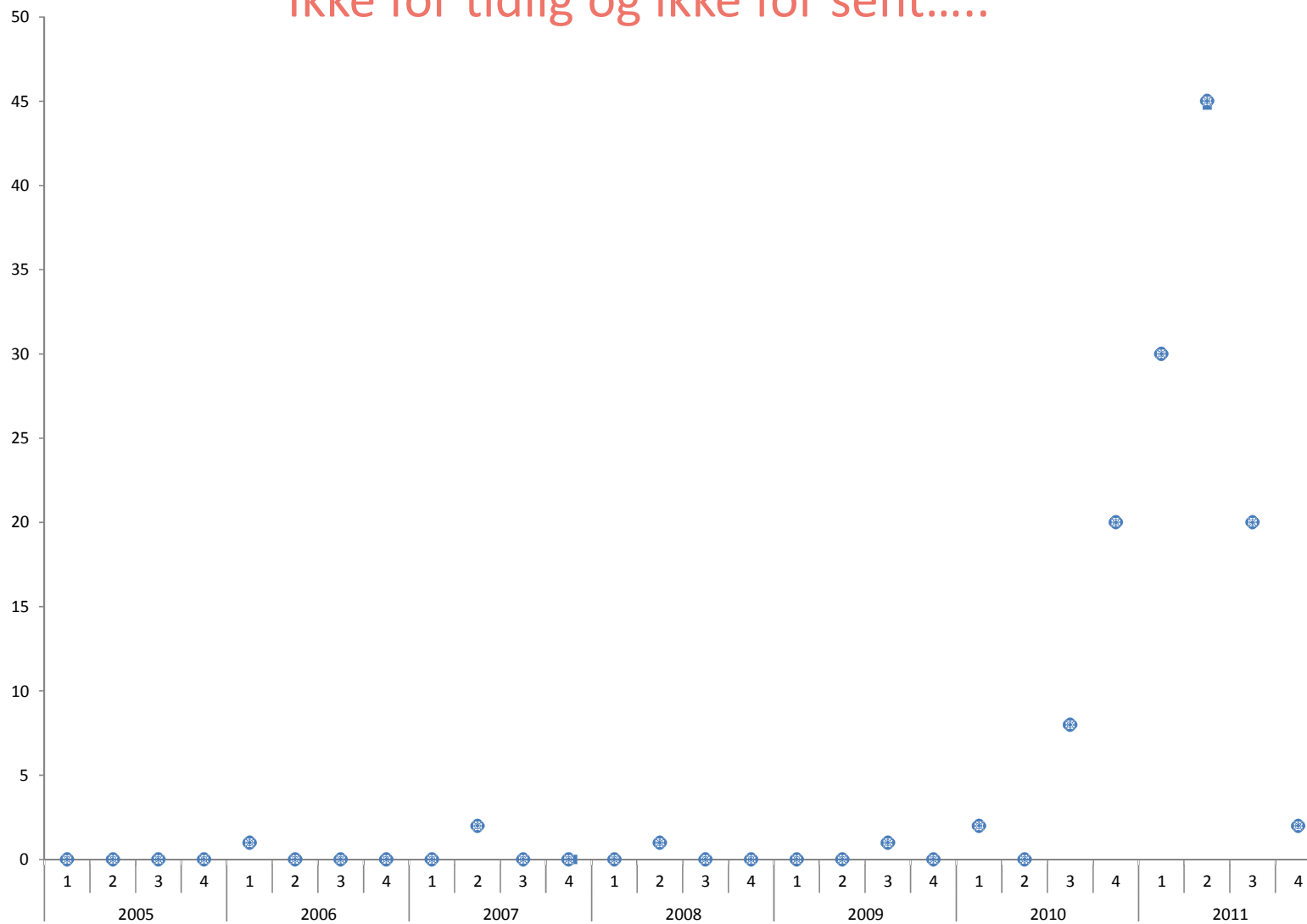
# Utbruddsetterforskning?

## Og hvorfor

- Oppdage utbrudd tidlig
  - Vite når det er et problem
  - Alvorlig syke
  - Ukjent kilde
  - Terskel for intervensjon
- Stoppe utbruddet
  - Raskt reaksjon
  - Beskrive hendelsene og identifisere intervensjoner
  - Implementere kontrolltiltak
- Evaluere
  - Identifisere hva gikk bra og dårlig under utbruddet
  - Øke kunnskap om årsaksforhold
  - Lære
  - Risiko for gjentakelse?


# Men, når skal vi sette i gang?

Ikke for tidlig og ikke for sent.....



# Steps of an outbreak investigation

Logical, but not temporal sequence

- 
1. Establish the existence of a real outbreak
  2. Confirm the diagnosis
  3. Define a case
  4. Search for cases
  5. Generate hypotheses using descriptive findings
  6. Test hypotheses based using analytical epidemiology
  7. Draw conclusions
  8. Conduct additional investigations
  9. Communicate findings
  10. Execute prevention measures

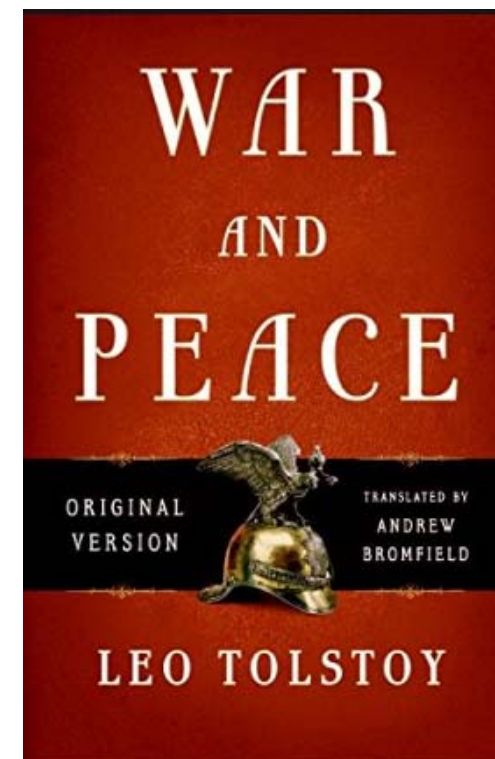
# Spesielle oppgaver ved utbrudd på sykehus

Easier said than done....

- Aktivere/opprette utbruddsgruppen og samle informasjon
- Varsle alle nivåer av sykehus
- Vurdere mulige smitteverntiltak
- Hvem har ansvar for utbruddet og hvem betaler?
- Kommunikasjon

# Hva er freds aktiviteter og hva er krigens?

- Utbruddsgruppe?
- Hvem eier utbrudd?
- Beredskapsplaner?
- Vet vi hva er vanlig?





# Lag en kasusdefinisjon

## 3. Define a case

- Tid
  - Sted
  - Person
  - Kliniske symptomer
  - Laboratorieresultater
- 
- *«En person innlagt i avdeling 3 som etter juli 2007 innen 14 dager utvikler diaré med positiv avføringsprøve for salmonella Enteritidis PT 14»*

# To screen or not to screen – that is the question?

- Uten screening bare vet om «tip of the iceberg»
- Trenger å vite for å implementere tiltak
- Hvem, hvor og hvor mange ganger?
- Hva gjør vi med informasjonen?
- Veldig dyrt?



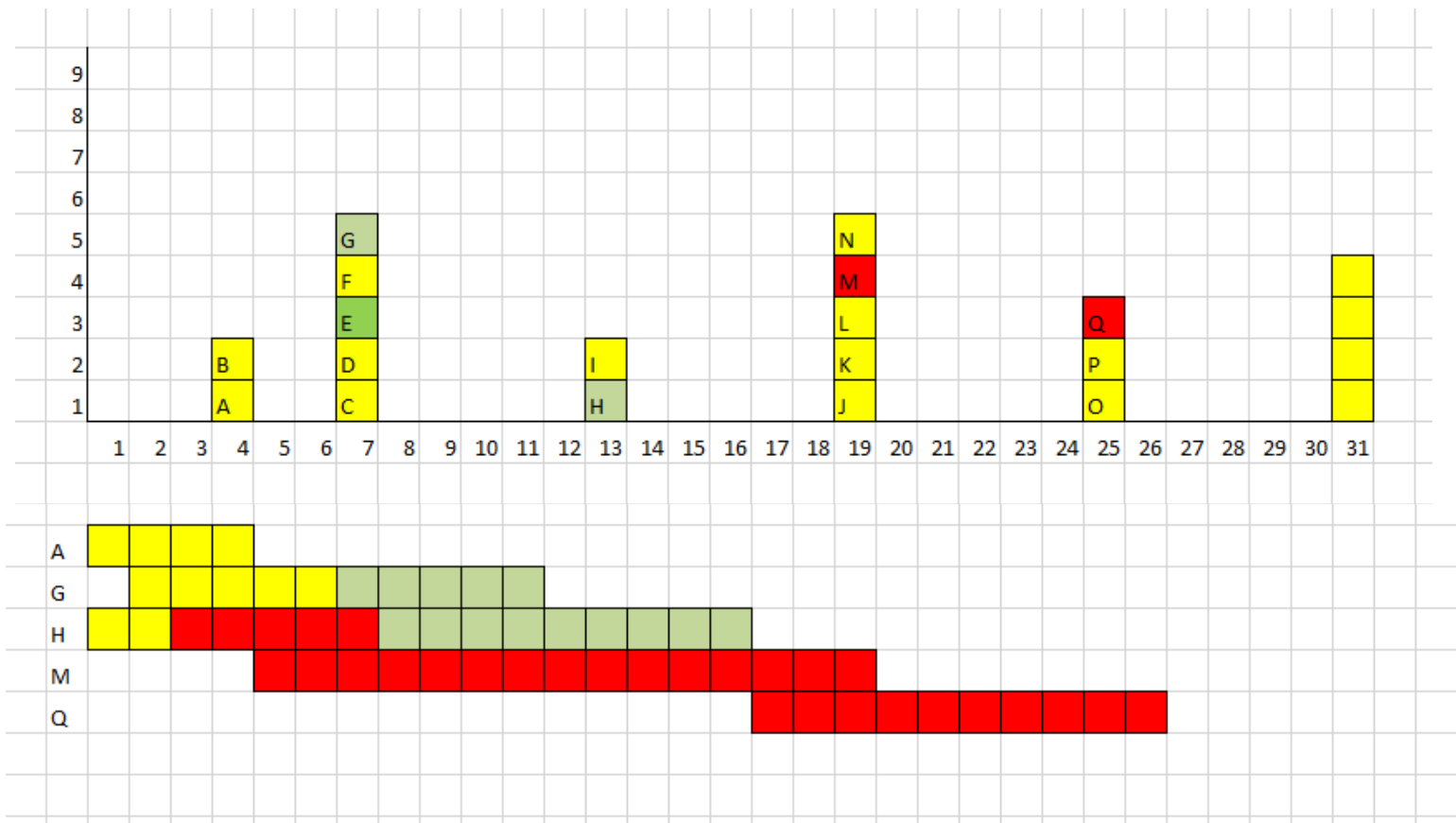
SJEKKET: Alle pasientene ble sjekket for smitte. (Foto: Kent Inge Olsen)

[Kjøp bilde](#)

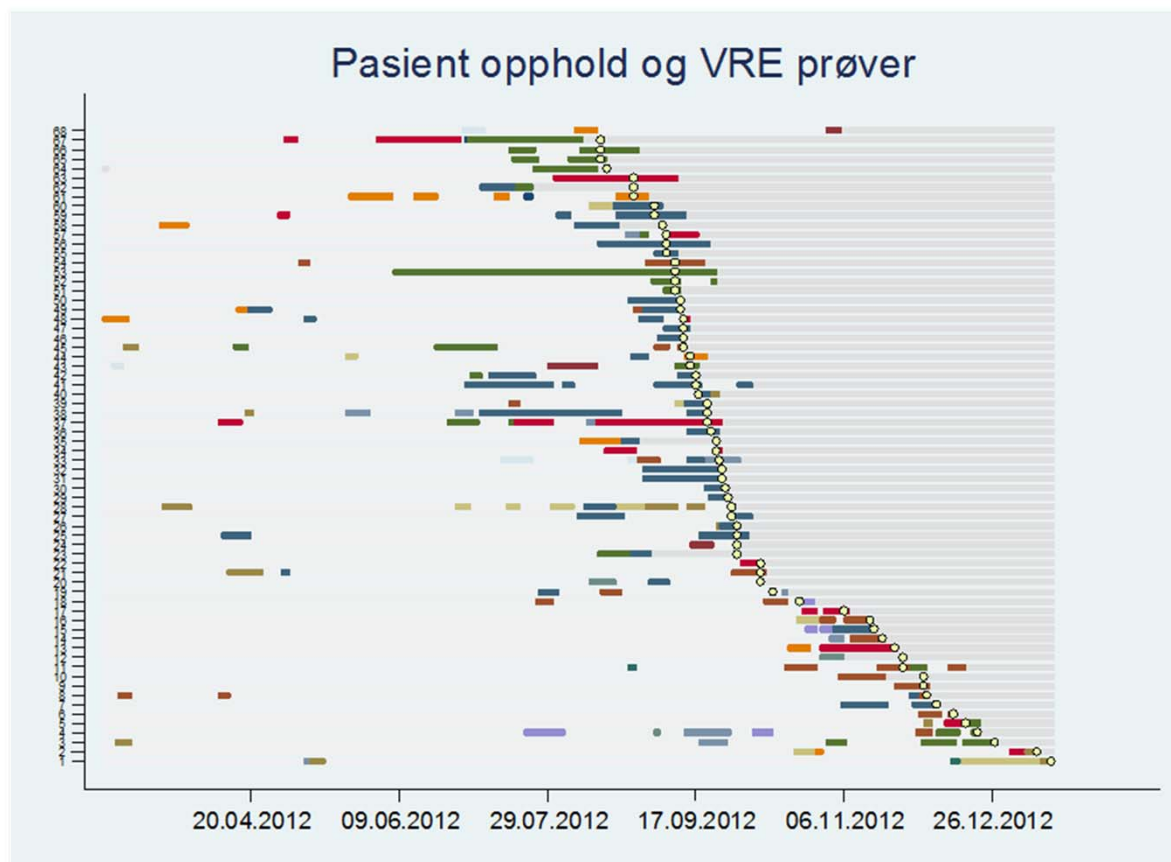
## Alle pasientene blir sjekket for bakteriesmitte

Sykehusledelsen har satt inn store ressurser på å få kontroll på utbredelsen av den resistente bakterien VRE, som i verste fall kan føre til blodforgiftning. Syv personer er allerede smittet.

# To versjoner av epidemikurver



# Et eksempel fra virkeligheten



# Linelist

- Husk
  - Pasient eller post
  - Pasient journal
  - Administrasjon
  - Mikrobiologi
  - Ansatte
  - Rekkefølger
  - Tall
  - Standardisering

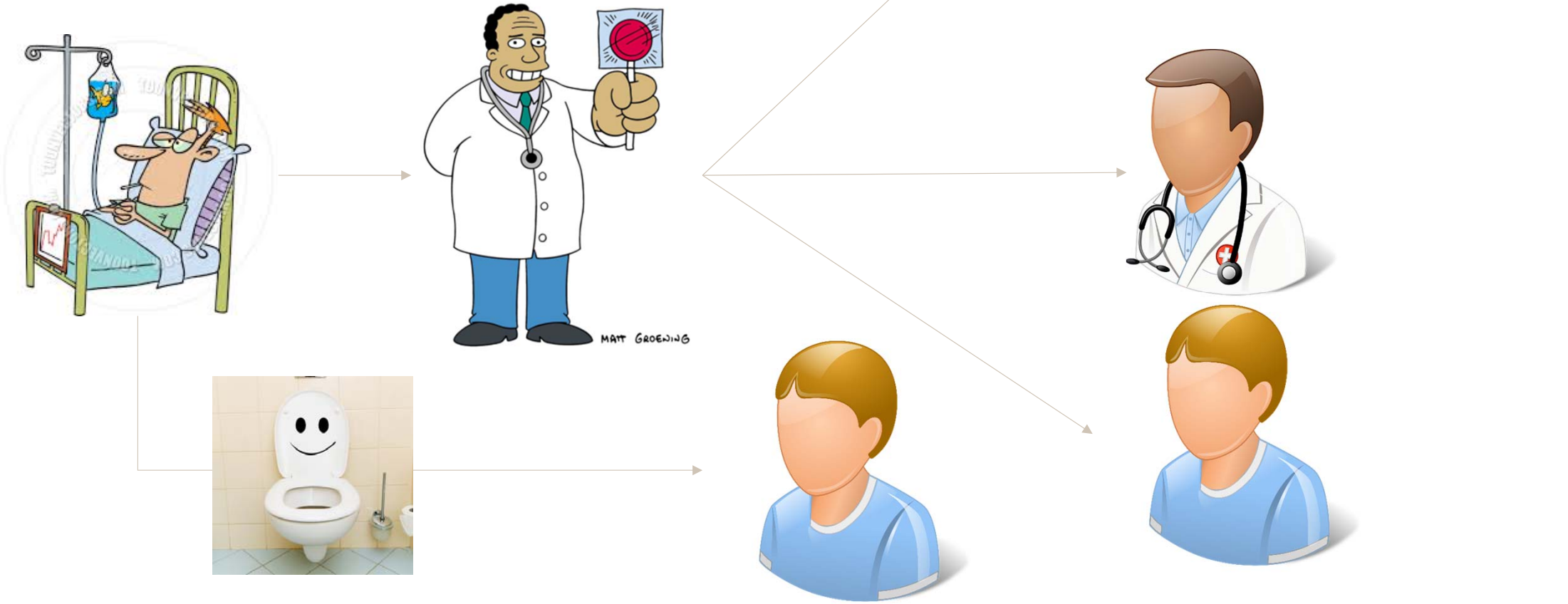
Unique ID	Diag date	Ward	Room	In date	Out date	Age	sex	HCW	UTI catheter	Metronidazole
1	04.12.14	A	1	xx.xx.xx	yy.yy.yy	23	0	0	1	1
2	05.12.14	A	3			37	0	0	1	1
3	05.12.14	B	2			48	1	0	1	1
4	19.12.14	A	.			78	0	1	0	0

# Test hypotheses based using analytical epidemiology

## Sammenligning studiedesign

Kohort	Kasus-Kontrol
Sykdommen skjer blant en liten, veldefinert populasjon F. eks selskap, hotell, møte etc.	Sykdommen skjer i en stor, åpen populasjon F. eks kommune, fylke, hele landet
Sammenligne antall syke blant de med risikofaktor og de uten risikofaktor	Sammenligne eksponering blant personer med sykdom og personer uten sykdom
Relativ risiko (RR)	Odds ratio (OR)

# Utbrudd - best of smittevern!



# EVALUERING OG LÆRING

## TRIZ

1. How would you ensure that the outbreak happens again and that 100% patients get MDRO X?





# Etter utbruddet

Når er det over?

- Hvor lenger skal vi ha tiltakene?
- Hvor lenger skal vi screene?
- Kan en FRB bli «endemisk på sykehus» men ikke i regionen?

# Utbrudd i helsetjenesten

- De fleste Helsetjeneste assosierte infeksjoner er endogen men...
- Utbrudd skjer
- Mange er oppdaget for seint
- De kan være veldig kostbart og resurskrevende
- De ofte rammer våre mest sårbare pasienter
- Og helsearbeidere

Thank you very much

I hope it was useful

# Vi jobber med verktøy

