Outbreak: Prevention Preparedness, Detection and Management

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Author: Outbreak Column JIP
Independent Nurse Consultant Infection Control

Meet the Expert Session 6th Nov 07:00 - 07:45
Expert

- *Noun*
- A person who has a great deal of knowledge or skill in a particular area.
Led the HAI Outbreak Programme of Work at Health Protection Scotland (2006-2015)

Doctor of Nursing

Write the outbreak column
(and other outbreak reports)

Campaign medals:
Legionella, Salmonella, CDI, MRSA, MSSA VISA, RSV, Influenza, Parainfluenza, Infusate-related BSI outbreaks, Gp A Strept, Pseudomonas, Pseudo-outbreaks, CPE, Endoscopy-related outbreaks, BBV, Norovirus, CA-UTI outbreak, etc.
In this session....

• Focus on IPCT errors (not HCW errors)
• 3 tools to reduce error risk
• Biases, bluffs and behaviours
• High-Reliability Theory
• En-route....
  – Please interject with comments and questions...
  – Outbreak Q&A at the end
Why do we need tools?

• Need to be able to demonstrate WE practice optimally

• It's in the best interests of people
  – When we make mistakes, or just delay getting it right, people suffer

Winging it is not a strategy

Good Strategy Bad Strategy
Richard Rumelt
Detection

Prevention
SICPs;
What we do every day;
Removing recognised risks

Preparedness
Its likely to happen;
Get ready – Practice;
Become able to detect;
This is what it looks like / to do...

Management
Stop transmission;
Investigate how / why & prevent recurrence

Detection
From clinical, lab, surveillance data, find outbreaks if present

Outbreak
Outbreaks

• (Tend) not to involve a smoking gun!
• Represent - a chain(s) of events where opportunities for prevention were missed
• The ingredients for an outbreak are present every day, every shift
• Our job is to prevent, prepare for, detect and manage
Its not just the science of IPC

- What it takes to be mindful
- Where & why we and they loose it
- Why it goes wrong: bluffs, biases and behaviours that make us err
- How it goes wrong
- Traditional novice to expert pathway

High-Reliability Theory

Situational Awareness

Biases & Effects – Human Factors

Human Error Theory

Experience - on the job training, Personal reading, Specialist training / qualification
What will this bring to the table?

If we know how errors arise, we can defend against them.
Reason's Swiss Cheese Model, Human Error models and management, 2000 BMJ
Unsafe act

Unintended

Slips
Skill based
Attention failure

Lapses
Skill based
Memory Failure

Intended

Mistakes

Rule Based
Wrong rules
Right rule badly

Knowledge based
No rules T&E

Violations

Intention to commit

Intention to cause harm

From Human Error by Reason 1990, 207p
Unsafe act

Unintended
- Slips
  - Skill based
    - Attention failure
- Lapses
  - Skill based
    - Memory Failure

Intended
- Mistakes
  - Rule Based
    - Wrong rules
    - Right rule badly
    - No rules (No kit)
  - Knowledge based variable
- Violations
  - Intention to commit
  - Intention to cause harm

From Reason Human Error 1990, 207p

If we have the right rules (tools), we can move from trial and error – to if this < outbreak> these < control & investigation measures>
Unsafe act: Failure to decontaminate hands

Problem of association for frontline workers
Often nothing happens after unsafe acts!
Time from unsafe act to infection – so long difficult to believe it was their unsafe act!
Outbreak challenge

• Keep PHVs safe in a potentially unsafe environment
• Whilst allowing other healthcare systems to operate optimally
• Whilst: assessing, communicating, delegating, teaching, advising, documenting, reassuring, explaining, collecting data, collecting specimens, analysing, presenting data, administrating, co-ordinating, learning, epidemiologising, trying to find x,y,z, trying to get hold of a,b,c, minute taking, minute checking, administrating)
• Under extreme time pressures
• Under extreme service (bed) pressures
• Under media spotlight
• Under the control of various legislation
  – HSWA, COSHH, RIDDOR, DATA PROTECTION
Workload during an outbreak

Time available per task
Outbreaks increase our risk of errors
More to do
More to forget
Commonest error – we forget
Goals for tools:

- Eliminate omission error
- Simple
- Standardise
- Don’t diminish insights
- Increase time available
Seeing what others don’t: the remarkable ways we gain insights
Gary Kelin, Nicholas Brealey Publishing
Tool 1: Checklist & Algorithm

• Equivalent pilot response
• Not to undermine experts – but support them
• Do / confirm done (not read / do)

The Checklist Manifesto: How to get things right, Atul Gawande
Healthcare Outbreak Algorithm
For Patient, Healthcare Worker and Visitor (PHV) Safety

- Normal background levels of alert organisms/communicable diseases and no clinical alerts
- Alert signal: from microbiological, surveillance or clinical data
  - IPC Assessment: Is it an outbreak?
    - No
      - Put initial control measures in place for Patients, Healthcare workers and Visitors (PHV) safety
    - Yes
      - Investigate outbreak and add further PHV control measures as considered necessary
        - Confirm that all recommended control measures are being effectively applied
          - IPC Assessment: Are control measures working, i.e. no new cases?
            - Yes
              - Take actions to ensure the environment / equipment are safe, e.g. terminally clean ward and equipment
              - Undertake a debrief include all staff involved to identify learning points with regards to prevention, early detection and management of the outbreak.
            - No
              - Resumes normal services
  - IPC Assessment: Is it safe to resume to normal services?
    - Yes
      - Resumes normal services
    - No
      - Undertake a debrief include all staff involved to identify learning points with regards to prevention, early detection and management of the outbreak.

Concurrent activities: Document all decisions and actions. Communicate internal and external. NB if new cases arise in Phase 3, return to Phase 2. Infection Prevention & Control (IPC) Assessment includes all relevant persons.

Healthcare Outbreak Checklist
For Patient, Healthcare Worker and Visitor (PHV) Safety

- N.B. Document and communicate all decisions/actions throughout the outbreak

**Phase 1**
- IPC Assessment: Is this an outbreak, or pseudo outbreak?
  - Are the patients infected? Are the patients infected? Has patient exposure occurred?

**Phase 2**
- Investigations and actions by the Outbreak/Incident Management Team
  - Define a case (confirmed/probable/possible/collected) (may be redefined over time)
  - Identify and count all cases (consider laboratory back-up [local and national], room-mate screening, microbiology sampling of symptomatic patients)
  - Describe the cases – time, place, person (from notes, questioning, admission history)
  - Look for a change in the system that could have provoked the outbreak (changes in people, equipment, procedures, information or the environment)
  - Prevent the data entering all presentations up to date, e.g., case curve, time line, the list, transmission plot or ward map. Annotate charts with key information.
  - Develop hypotheses consider Case Control study if no obvious source
  - Consider the need for additional case finding, e.g., discharged transferred patients
  - Take microbiological samples to test hypotheses & identify reservoirs. (Use Ref Labs)
  - IPC/ to observe step-by-step any relevant suspect procedures
  - Confirm through audit and data review that Standard Infection Control Precautions and Transmission Based Precautions (as required) are being complied with
  - Continue to assess and communicate updates. Involve other experts as required

**Phase 3**
- IPC Assessment: Control measures working? If new cases still arising re-check control measures application. Proceed to Phase 3 if control measures are working

**Phase 4**
- IPC Assessment: Is it safe to resume services? If safe to resume services proceed to Phase 4.
  - Undertake a debrief include all staff involved to identify learning points with regards to prevention, early detection and management of the outbreak.
  - Complete an action plan following the debrief to identify actions for the local IPC, clinical areas, local NHS Board and other partners – include timescale for action.
  - Conduct a debrief and share with colleagues in NHS Scotland to prevent similar outbreaks in healthcare settings. A final report should be produced.

HP2: Version 2: May 2013
Normal background levels of alert organisms/communicable diseases and no clinical alerts

Alert Signal: from microbiological, surveillance or clinical data

No

IPC Assessment – Is it an outbreak?

Yes

Put initial control measures in place for Patients, Healthcare workers and Visitors’ (PHV) safety
Investigate outbreak and add further PHV control measures as considered necessary. Confirm that all recommended control measures are being effectively applied.

**IPC Assessment:** Are control measures working, i.e. no new cases?

- **No**
  - Take actions to ensure the environment / equipment are safe, e.g. terminally clean ward and equipment.

- **Yes**
  - **IPC Assessment:** Is it safe to resume to normal services?
    - **No**
      - Take actions to ensure the environment / equipment are safe, e.g. terminally clean ward and equipment.
    - **Yes**
      - Resume normal services

- **Phase 3**

**Phase 4**

- **Undertake a debrief** include all staff involved to identify learning points with regards to prevention, early detection and management of the outbreak.
- **Complete an action plan** following the debrief to identify actions for the local IPCT, clinical areas, local NHS Board and other partners – include timescale for action.
- **Identify and share lessons** with colleagues in NHSScotland to prevent similar outbreaks in other healthcare settings. A final report should be produced.
<table>
<thead>
<tr>
<th>Phase</th>
<th>N.B. Document and communicate all decisions/actions throughout the outbreak</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alert signal – laboratory, clinical, surveillance data</td>
</tr>
<tr>
<td></td>
<td>IPC Assessment: is this an outbreak or pseudo outbreak? Are the patients infected? Are the patients linked? Has patient exposure occurred?</td>
</tr>
<tr>
<td>2a</td>
<td>Put in place initial control measures for PHV safety, e.g. close ward, isolate/cohort cases, stop suspect procedures, confirm SICPs and TRPs, deploy a Control Measure Trigger Tool</td>
</tr>
<tr>
<td>2b</td>
<td>Investigations and actions by the Outbreak/Incident Management Team</td>
</tr>
<tr>
<td></td>
<td>- Define a case (confirmed/probable/possible/colonised) (may be refined over time)</td>
</tr>
<tr>
<td></td>
<td>- Identify and count all cases (consider laboratory look-back [local and national], room-mate screening, microbiology sampling of symptomatic patients)</td>
</tr>
<tr>
<td></td>
<td>- Describe the cases – time, place, person (from notes, questioning, admission history)</td>
</tr>
<tr>
<td></td>
<td>- Look for a change in the system that could have provoked the outbreak (changes in people, equipment, procedures, information or the environment)</td>
</tr>
<tr>
<td></td>
<td>- Present the data keeping all presentations up to date, e.g. epi curve, time line, line list, confirm control measures are being effectively applied in all relevant locations.</td>
</tr>
<tr>
<td>2c</td>
<td>Reassess HIAT and update communications to SGHD and HPS</td>
</tr>
<tr>
<td>2d</td>
<td>IPC Assessment: control measures working? If new cases still arising: re-check control measures application. Proceed to Phase 3 if control measures are working</td>
</tr>
<tr>
<td>3</td>
<td>IPC Assessment: Is it safe to resume services? If safe to resume services proceed to Phase 4. If not, take actions to make safe before resuming normal services</td>
</tr>
<tr>
<td>4</td>
<td>Undertake a debrief include all staff involved to identify learning points with regards to prevention, early detection and management of the outbreak</td>
</tr>
<tr>
<td></td>
<td>Complete an action plan following the debrief to identify actions for the local IPCT, clinical areas, local NHS Board and other partners – include timescale for action.</td>
</tr>
<tr>
<td></td>
<td>Identify and share lessons with colleagues in NHSScotland to prevent similar outbreaks in other healthcare settings</td>
</tr>
<tr>
<td></td>
<td>Produce a final report.</td>
</tr>
</tbody>
</table>
Algorithm & Checklist

• Tackles omission error
• Speeds up the process
• More time for the investigation....
What outbreak process tools do you have?
Tool 2 – Control Measure Trigger Tool

• If trigger or alert signal
• Deploy tool
  – can you eliminate the possibility of an outbreak?
    • Yes -- stop
    • No -- use the Control Measure Trigger Tool
Outbreak epidemiology in Scotland

1. Norovirus
2. *Clostridium difficile*
3. Influenza
4. *Staph aureus* (MRSA, PVL+, MSSA)
5. Gram negatives (including non-enterobacteriaceae)
6. Group A Streptococcus
7. No-Infection Outbreaks
Nosocomial outbreaks

- Investigations differ by organism
- Control measures categories for many outbreaks are similar
- Therefore generic control measure tool is possible
What’s included

• Who is responsible for what
• Assessment:
  – Is this really an outbreak?
  – If yes, how bad an outbreak is it?
• Key information: survival, presentation, transmission, specimens, key procedures that spread more
• What needs done on day 0
  – If its going person-to-person; then assume environments are contaminated and decontaminate
• What needs done every day until its over
• (It becomes a reminder and a record)
10 categories of control measures

1. Patients Placement
2. Admission restrictions
3. Transfer and discharge restrictions
4. Patient care checks (cases and non cases)
5. Healthcare worker practices and restrictions
6. HH and PPE
7. Safe Patient Environment
8. Safe Patient Equipment
9. Communications & Knowledge management
10. Microbiological screening of people
### Patients Placement:

- Isolate/cohort case patient(s)  
- Close doors to isolation cohort areas (undertake safety risk assessment for door closure).  
- Place signage on entry to isolation/cohort areas indicating admission restrictions.  
- Check admitted patients for being previously unassessed in terms of placement.

### Healthcare worker (HCW) Practices and Restrictions

- Ensure that all **staff on duty** are asymptomatic (See: Relevant Symptoms).  
- Refer all symptomatic staff to Occupational Health/GP.  
- As far as is practical allocate staff to care for cases or, non-cases for the duration of the incident.  
- If they are considered to present an infection control risk, modify ways of working for staff scheduled to work in multiple clinical areas - including closed ward areas, e.g. phlebotomists, physiotherapists, occupational therapists. (Reiterate SICPs and TBPs are required).

### Patient Care Checks (Cases and non-cases)

- Ensure patients have had their **clinical condition reviewed today** and if clinically indicated, been referred to a specialist for their infection condition, e.g. microbiologist, infectious disease physician, respiratory physician.  
- Ensure patients are not at increased risk due to **inappropriate medications** e.g. antibiotics.  
- Ensure patients are not at increased risk due **inappropriate use of invasive devices** (i.e. invasive devices that are no longer clinically required or that have signs of inflammation/infection).  
- From the High-Contamination Procedures, identify the patient specific modifications in routine practice that could reduce personal, equipment and environment contamination, See High-Contamination Procedures.
Daily Outbreak GAS Checklist for IPCT & Nurse in Charge complete daily until Outbreak is resolved

<table>
<thead>
<tr>
<th>Date (dd/mm/yy)</th>
<th>Completed by (initials)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New symptomatic pts today</td>
<td></td>
</tr>
<tr>
<td>New positive (micro)</td>
<td></td>
</tr>
<tr>
<td>Total symptomatic pts today</td>
<td></td>
</tr>
<tr>
<td>Total positive today (include sym)</td>
<td></td>
</tr>
<tr>
<td>Increase or Decrease from yesterday</td>
<td></td>
</tr>
<tr>
<td>Are any patients giving cause for concern due to outbreak organism/infection?</td>
<td>Y/N</td>
</tr>
<tr>
<td>New symptomatic staff today</td>
<td></td>
</tr>
<tr>
<td><strong>Patients Placement:</strong> Isolation/cohort procedures are effectively established.</td>
<td></td>
</tr>
<tr>
<td><strong>Admission Restrictions:</strong> Are complied with, includes previously positive checks pre-placement.</td>
<td></td>
</tr>
<tr>
<td><strong>Discharge/Transfer Restrictions:</strong> Inter-care facility transfers are pre-agreed with IPCT. Intra-hospital transfers are only if clinically necessary and the receiving area is infection prepared.</td>
<td></td>
</tr>
<tr>
<td><strong>Patient care checks:</strong> Clinical assessments are completed for today.</td>
<td></td>
</tr>
<tr>
<td><strong>Patient care checks:</strong> Antibiotic prescribing for all patients has been reviewed today.</td>
<td></td>
</tr>
<tr>
<td><strong>Patient care checks:</strong> A daily invasive device check has been completed today.</td>
<td></td>
</tr>
<tr>
<td><strong>Patient care checks:</strong> High-contamination procedures are modified to reduce contamination.</td>
<td></td>
</tr>
<tr>
<td><strong>Microbiological screening of people:</strong> Any new symptomatic patients are screened</td>
<td></td>
</tr>
<tr>
<td><strong>HCW practices and restrictions:</strong> Staff on duty are asymptomatic.</td>
<td></td>
</tr>
<tr>
<td><strong>HCW practices and restrictions:</strong> Sufficient staff are on duty for all areas.</td>
<td></td>
</tr>
<tr>
<td><strong>HCW practices and restrictions:</strong> Staff are allocated to isolation area or non-isolation area.</td>
<td></td>
</tr>
<tr>
<td><strong>HH and PPE:</strong> Soap and water if hands visibly soiled. HH before PPE, PPE before entry to area; PPE removed before exit, HH after PPE removed (4 surgical mask if advocated by the IPCT).</td>
<td></td>
</tr>
<tr>
<td><strong>Equipment:</strong> There is sufficient dedicated equipment available in isolation/cohort areas.</td>
<td></td>
</tr>
<tr>
<td><strong>Knowledge Management:</strong> HCWs know how the organism spreads, and how to practice safely.</td>
<td></td>
</tr>
<tr>
<td><strong>Knowledge Management:</strong> Patients/relatives/GPs know the situation and what precautions to take (includes patients being discharged).</td>
<td></td>
</tr>
<tr>
<td><strong>Knowledge Management:</strong> For discharged patients, GPs are being informed of any additional ongoing monitoring needed and, any actions should symptoms develop post discharge.</td>
<td></td>
</tr>
<tr>
<td>IPCT to advise on ward status (open/closed) and <strong>patients placement</strong></td>
<td></td>
</tr>
<tr>
<td>HIAT assessment today</td>
<td>Red/Amb/Green</td>
</tr>
<tr>
<td>IPCT to advise if daily actions checklist still required</td>
<td></td>
</tr>
<tr>
<td>If daily actions checklist no longer required - book terminal clean</td>
<td></td>
</tr>
<tr>
<td>IPCT to confirm if re-opening criteria have been met</td>
<td></td>
</tr>
<tr>
<td>Communicate all changes to email group</td>
<td></td>
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</tbody>
</table>
Problems / insights with applying control measures checklists?
So thus far

- A simple checklist & algorithm
- Control Measure Trigger Tool
  - (Generic & organism specific)
- Crib cards for Rare Outbreaks
- HIIAT – outbreak assessment tool
- Guidance on local surveillance – agreed alert organism list!
- Noro evaluation – every year
- On line training (NES)
- Single generic policy
- Debrief Tool
- To do list: Aspergillus / PJP etc., etc.
# Healthcare Outbreak Debrief Tool

## Outbreak Summary

<table>
<thead>
<tr>
<th>Outbreak summary</th>
<th>An outbreak of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outbreak Duration</td>
<td>Date first case identified: Date last case identified:</td>
</tr>
<tr>
<td>Location(s) of outbreak</td>
<td></td>
</tr>
<tr>
<td>Final case definition(s)</td>
<td></td>
</tr>
<tr>
<td>Modes of transmission (including any implicated equipment)</td>
<td></td>
</tr>
<tr>
<td>Consequences</td>
<td>Total numbers of definite, probable and possible (confirmed or suspected) cases:</td>
</tr>
<tr>
<td></td>
<td>Outcomes (including service impact):</td>
</tr>
<tr>
<td></td>
<td>Reputational (media):</td>
</tr>
<tr>
<td></td>
<td>Number of meetings held:</td>
</tr>
<tr>
<td>Who is leading the debrief</td>
<td>If possible, the person leading the debrief should not have been involved in the outbreak</td>
</tr>
<tr>
<td>List all those present at the debrief (include designation). The debrief should involve representatives from clinical, management, communications and the IPCT.</td>
<td></td>
</tr>
<tr>
<td>Documents to have available: Minutes of all meetings and any SBARs used; All data presentations including line listings; Annotated epi curve showing times of outbreak recognition, reporting, and when control measures were applied.</td>
<td></td>
</tr>
</tbody>
</table>
Healthcare Outbreak Debrief Tool

Overall what worked well?

Overall what could have worked better?
<table>
<thead>
<tr>
<th>Debrief Questions</th>
<th>Response</th>
<th>Suggested system changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Awareness/Preparedness:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Before the outbreak were the clinical team aware that their patients were</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vulnerable to this type of outbreak?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. <strong>Alert Signal and pre-outbreak Surveillance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• How and by whom was the alert signal recognised?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Could the alert signal have been recognised more promptly?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Could pre-outbreak surveillance have resulted in earlier detection?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. <strong>Control Measures (Patient, Healthcare Worker, Visitor):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Were initial control measures appropriate?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Were initial control measures implemented both timeously and effectively?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• As the investigation progressed, was the need for additional control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>measures identified (and if necessary implemented)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• If control measures were not working, i.e. more cases after the incubation</td>
<td></td>
<td></td>
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<tr>
<td>period, was an assessment made of existing controls and the need for</td>
<td></td>
<td></td>
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<tr>
<td>additional control measures?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Outbreak management is decision-making during uncertainty

“Problems happen in any system with a blind spot.... a system whose instruments do not show up enough to overcome a powerful human tendency to jump to conclusions when under stress.”

Inviting Disaster, James R Chiles
| Action bias | Endowment effect | Introspection illusion | Procrastination |
| Affect heuristic | Envy | It will get worse before it gets better | Pseudocertainty effect |
| Ambiguity aversion | Expectations | Liking bias | Reciprocity |
| Authority bias | Experimenters expectation bias | Loss aversion | Rhyme as reason bias |
| Availability cascade | Failure to close doors | More credential effect | Scarcity error |
| Backfire effect | Fear of neglect | Motivation crowding | Social comparison bias |
| 'Because ' effect | Forecast illusion | Negativity effect | Social desirability bias |
| Belief bias | Fundamental attribution error | Neomania | Social loafing |
| Bias blind spot | Gambler's fallacy | News illusion | Social proof |
| Chauffer knowledge | Group think | Not invented here syndrome | Story bias |
| Choice-supportive | Halo effect | Normalcy bias | Strategic misrepresentation |
| Cognitive Dissonance | Hedonic treadmill | Omission bias | Subjective validation |
| Confirmation bias | | Optimism bias | Sunk cost fallacy |
| Contagion bias | Hindsight bias | Ostrich effect | Twaddle tendency |
| Contrast effect | | Over-confidence bias | Volunteer's folly |
| Curse of knowledge | | Over-thinking | Winner's curse |
| Decision fatigue | | Pareidolia | Zeigarnik effect |
| Deformation Professionelle | | Personification | |
| Default effect | | Planning fallacy | |
| Domain dependence | | Planning fallacy | |
| Effort justification | | Post-purchase rationalisation | |
| Empathy gap bias | | | |

**Outbreak Column 16: Cognitive errors in outbreak decision making**
It is not difficult to observe at an IMT..

• **Oversimplifying causality**
  – Too guided by what has happened in the past
  – Fail to identify what is different about this one

• **Availability heuristic**
  – WYSIATI – black swan effect
  – Missing jigsaw pieces
  – The curious incident of the dog in night

• **Confirmation bias**
  – Set on a wrong hypothesis
  – Even after now more robust data – don’t let go

Thinking Fast and Slow. D Kahneman
‘The “point” of bias research is, of course that where people have no good reason to act sub-optimally, [the study of] errors suggest that they just do not know any better.’

Reliability – high or low?

High-Reliability Theory
Weick et al (2008)

- Deference to Expertise – consults experts
- Sensitivity to operations – mindful of failure modes
- Pre-occupation with failure – where will we go wrong next
- Reluctance to simplify – deep investigation of alert signals
- Commitment to resilience – good as we are how can we be better

Low-Reliability

- Consults with non-experts (mainly self)
- Fails to comprehend infection prone environment
- Does not consider failure risks… Blames frontline workers
- Quick to decide and stick….
- Content with the status quo – entropy

High Reliability Theory
Consults with non-experts (mainly self)

Low Reliability
Consults with non-experts (mainly self)
Fails to comprehend infection prone environment
Does not consider failure risks… Blames frontline workers
Quick to decide and stick….
Content with the status quo – entropy
What would you like to share?

Tool

Scenario

Comments and questions
What collectively would make outbreak management safer?