

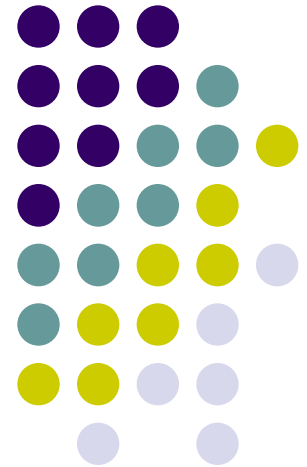
Fighting the last war: *MRSA, Gram-negatives* *and NDM-1*

Maryn McKenna

Author, ***SUPERBUG: The Fatal
Menace of MRSA***

“Healthcare: Policy to Patient”

Lexington, KY, 11 Nov 2011





“As we look at the mistakes in generalship over the past 100 years, the common theme is that the general did not understand the technology of his time — or, as they say, he elected to fight the last war rather than the one he happened to be in.”

-- Gen. John R. Galvin

Supreme Allied Commander, NATO (Europe)

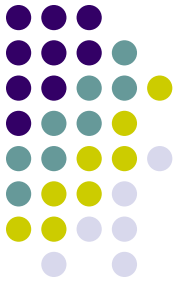
Editorial

TRIBUTE TO 'JUST A MAN'

The world is made up of "average" people, and that is probably why editorials are not usually written about any one of them. Yet among these average people, who are not "great" in political, social, religious, economic, educational or other specialized fields, there are sometimes those who stand out above the rest; stand out for qualities that are intangible, that we can't put our finger on.

Such a man, it seems, was Joe McKenna, who died in the prime of life Friday. Joe was no one of the "greats" in any field, not even in his favorite sport, basketball. An excellent player, he was nevertheless not classified among the game's immortals. No, Joe McKenna was "just a man."

Yet few men, probably, have been mourned by more of their neighbors—mourned sincerely, and sorrowfully—than this red-haired young man. It was not our good fortune ever to have met Joe, and so we were not prepared for what happened when he was ill and when he died. What happened was an amazing number of requests for information, first, as to his state of health, and then, as to details of the arrangements for his funeral services.

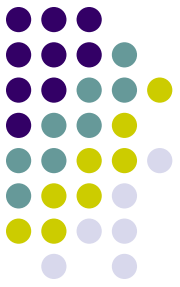


The 50-year problem: MRSA



- 19,000 deaths/year
 - “swine flu” H1N1 ~12,000, HIV ~18,000
- 369,000 hospitalizations
- ~7 million primary care/ER visits
- Longer lengths of stay and higher cost for any hospital visit
- Billions of dollars in additional healthcare costs

A hospital bug from the start



- 1961: 3 cases MRSA, 1 hospital, UK
- 1968: first appearance in US, 18 cases
Boston City Hospital
- 1980: massive outbreak Harborview Medical
Center, Seattle: 15 months, 2 ward closures,
27 cases, 17 deaths



But not only a hospital bug

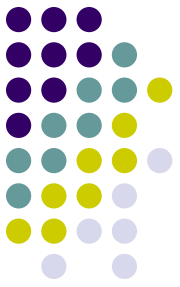
- 1st epidemic, HA-MRSA: hospitals (from 1968)
 - ICU, burn, surgery patients
 - Surgical-site infections, septicemia, VAP
- 2nd epidemic, CA-MRSA: everyday life (from 1998)
 - Prisoners, military, athletes, gym-users, children
 - SSTIs, osteomyelitis, DVTs, necrotizing pneumonia
- 3rd epidemic, LA-MRSA: livestock (from 2004)
 - From pigs into farm workers, HCWs, general population
 - SSTIs, diabetic foot ulcers, endocarditis
- ***CA-MRSA and LA-MRSA now in hospitals***

Infectious, virulent & resistant



- “Methicillin-resistant” =
 - Any beta-lactam antibiotic
 - Penicillins, carbapenems, monobactams, 3+ generations cephalosporins
 - Macrolides, streptogramins, lincosamides
- Emerging resistance to tetracycline, sulfa
- Emerging resistance to clindamycin, mupirocin
- Still (somewhat) susceptible to vancomycin, daptomycin, linezolid
- *Carried by ~ 2% US population*

Should not have been surprised



- 1928: discovery of penicillin
- 1945: Alexander Fleming, Nobel Prize speech:
 - *“There is the danger that the ignorant man may easily underdose himself, and by exposing his microbes to nonlethal qualities of the drug, make them resistant.”*
- 1947: pandemic: phage type 80/81
- 1953: emergency AMA summit on resistant staph
 - Complaint: over-reliable on new drugs, lack of attention to basic hygiene
- 1960: introduction of methicillin

Response: Improve hand hygiene & detection



- *Focus: patient colonization, HCW transport*
- 1978: active surveillance
- 2000: Problem Pathogen Partnership
- 2006: murky HICPAC guidelines
- 2007: VA “search & destroy”
- 2010: Agency for Healthcare Research and Quality:
“Very little progress has been made on eliminating health care-associated infections.”

The 15-year problem: CRKP



- Resistant to:
 - penicillins, cephalosporins, monobactams, beta-lactamase inhibitors, carbapenems
- 1996: first isolate, unidentified NC hospital
- 2000: 24 ICU patients, NYU-Langone
- 2002: 32 patients, SUNY Brooklyn
- 2005-2010: France, Israel, Greece, Brazil, China, England, Norway, Italy, Poland
- 2011: 37 US states (known)

Response: Improve environmental cleaning



- *Focus: Add environmental hygiene to hand hygiene*
- Langone, NY: splashes from Foleys
- Bicetre, Paris: endoscope
- Jackson Memorial, FL:
 - “hemodialysis machine, bedside tables, bed rails, mattresses, the mechanical ventilator control panel and corrugated ventilator tubing, intravenous poles, television monitors, vital-sign monitors, keyboards of portable computer stations, and the door handle and hopper of a communal waste disposal room”
- Langone: “Clean Team”
 - Infection control + building services
 - Reduction within 6 months



The new problem: NDM-1

- Gene (+ enzyme) present in:
 - *Klebsiella, Enterobacteriaceae, E. coli*
- Resistant to: almost everything
 - Susceptible to tigecycline, colistin
- 2008: Index patient hospitalized in India, then Sweden
- 2009: Nationwide alert UK
- 2010: 3 patients, 3 states, US
- 2011: Israel, Turkey, China, India, Australia, France, Japan, Kenya, Singapore, Taiwan...



Response: ???

- Community, sewage spread South Asia
- Colonization gut flora
- Carried asymptotically across national borders, into health care institutions
- Contaminates skin, surfaces, instruments
- Mobile-element transfer to gut flora HCWs?
- *France, 2011: anal swab + culture all admits*

Hospitals are the last defense



- Current last-resort drugs date to the 1950s
- Most antibiotic-focused companies have withdrawn from the market
- Old drugs more toxic, incur more drug-drug interactions
- New-drug pipeline running dry
 - “Me-too” formulations only gain months
 - Truly new compounds, possibly a year
 - Multiple new-new compounds withdrawn from trials



For more:

- Wired.com/wiredscience/superbug
- Superbugthebook.com
- *SUPERBUG: The Fatal Menace of MRSA*
(Free Press/Simon & Schuster 2010)
- marynmckenna@gmail.com
- About.me/marynmck