Update on the UKNEQAS Interpretative Comments scheme in Microbiology

Paul Chadwick Scheme Organizer 2012-15

December 2015

Review of scheme

- Established 2009
- Reports to UKNEQAS Microbiology Steering Group
- Scenarios cover Microbiology & Virology (2015)
- Focus on pre-analytical, post-analytical & clinical
- Supports
  - CPD
  - ISO15189:2012
  - Revalidation?

Distributions

- Educational scenarios based on real cases
- Links to guidelines and SMIs
- Peer review by scheme panel
- Standard template:
  - Scenario
  - Investigations & results
  - Questions
- One month later:
  - Answers (not formally scored)
  - Commentary and references

UK National External Quality Assessment Service for

UKNEQAS for Interpretative Comments[M]	La
Distribution : **3189**	Pa
Specimen : 3189	

CLINICAL INFORMATION : A 79 year old man with poorly controlled diabetes was admitted to the hospital with a two week history of swelling of right side of the neck for 3 months. He underwent a dental extraction 3 month previously. Originally from Yemen, he had b and there was no recent history of travel abroad. Ongoing medical issues included COPD, pulmonary fibrosis and cervical spondylitis On examination he was apyrexial and haemodynamically stable. There was a tender soft tissue swelling on the right side of neck, but inflammation, erythema or sinuses. There were no other significant findings on examination. White blood cell count (9.0 x 10^9 /L) was blood sugar (27.4 mmol/L) were elevated. CT scan of neck demonstrated a collection associated with lymph nodes in the right side of

SAMPLE SUBMITTED: Pus from lymph node

INVESTIGATION REQUESTED: Microscopy and culture

RESULT: Pus cells seen. No organisms seen. Auramine stain negative.
On culture highly mucoid colonies of Gram negative bacilli were seen on CLED agar.

QUESTION:
What is the likely organism?
How should this infection be managed?

YOUR RESPONSE :

UK NEQAS for Microbiology
An International Quality Assessment Service for Microbiology

UK NEQAS for Microbiology PO Box 63003, NW9 1GH
Tel: + 44 (0)20 8905 9890 Fax: + 44 (0)20 8205 1488 E-mail: organiser@ukneqasmicro.org.uk web:http://www.ukneqasmicro.org.uk

Associated Images

Distribution No. 3189 – Interpretative comments

Distribution date 1 August 2012

Closing date 30 September 2012

Figure 1

Answers
1. Hypervirulent strain of *Klebsiella pneumoniae*

2. The abscess should be drained and the patient should be treated with an antimicrobial agent according to the results of susceptibility tests. The organism is likely to be resistant to amoxicillin, but susceptible to cephalosporins, beta-lactam-inhibitor combinations, quinolones and carbapenems.

Comment
The organism was identified as *Klebsiella pneumoniae* and was resistant to amoxicillin. The isolate was referred to a reference laboratory for further characterisation as it was suspected to be a hypervirulent strain. The isolate was positive for K20 (a rare capsular type associated with pathogenicity or invasive disease) by a multiplex PCR, rmpA positive (a regulator of mucoviscosity phenotype A) and wcaG negative (a capsular fucose synthesis gene). Cultures for Actinomyces and mycobacteria were negative. The same organism was also isolated from a throat swab. The abscess was drained and the patient received oral co-amoxiclav for two weeks. Imaging of chest and abdomen did not show any other collections.

The infective aetiology of unilateral sub-acute or lymph node swelling includes pyogenic cold abscess, mycobacterial infection, actinomycosis, cat scratch disease, viral infections, toxoplasmosis and dimorphic fungal infections.

Infection due to hypervirulent strains of *Klebsiella pneumoniae* may occur in otherwise healthy individuals as community-acquired infections and may be associated with liver abscess. Five major virulence factors of *K. pneumoniae* are known to contribute to the pathogenesis of infection: capsular serotype, hypermucoviscosity phenotype, lipopolysaccharide, iron chelators (siderophores), and pili.

The hypermucoviscous phenotype (regulated by rmpA) has been associated with strains that cause community-acquired liver abscess and non-hepatic infections, including deep neck and other abscesses and musculoskeletal infections. This phenotype has been semi-quantitatively defined by a positive "string test" (formation of a viscous string >5mm in length when bacterial colonies on an agar plate are stretched by an inoculation loop). Hypervirulent strains of *K. pneumoniae* may cause metastatic infection to the central nervous system, liver, lungs, bone and joint, pleura and eyes: this may be associated with severe morbidity. Hypermucoviscous phenotypes have been found in 38% of *K. pneumonia* bacteraemia isolates. The rate was higher with community-acquired compared to nosocomial infections (49% versus 15%), a finding that is consistent with the association of the tissue abscess syndrome with community-acquired infections.

Therapy should be based on the results of antimicrobial susceptibility testing and an antibiotic with good tissue penetration should be chosen for treatment.

References

Yu WL, Ko WC, Cheng KC, Lee HC, Ke DS, Lee CC, Fung CP, Chuang YC. Association between rmpA and magA genes and clinical syndromes caused by Klebsiella pneumoniae in Taiwan. Clin Infect Dis. 2006: 42: 1351-8. doi: 10.1086/503420. http://cid.oxfordjournals.org/content/42/10/1351.full.pdf+html?sid=8e9b9ff5-0d1d-4cab-9bd6-60151fcd7d93

Turton JF, Perry C, Elgohari S, Hampton C. PCR characterization and typing of Klebsiella pneumoniae using capsular type-specific, variable number tandem repeat and virulence gene targets. J Med Microbiol 2010; 5: 541-547. doi: 10.1099/jmm.0.015198-0. http://jmm.sgmjournals.org/content/59/5/541.full

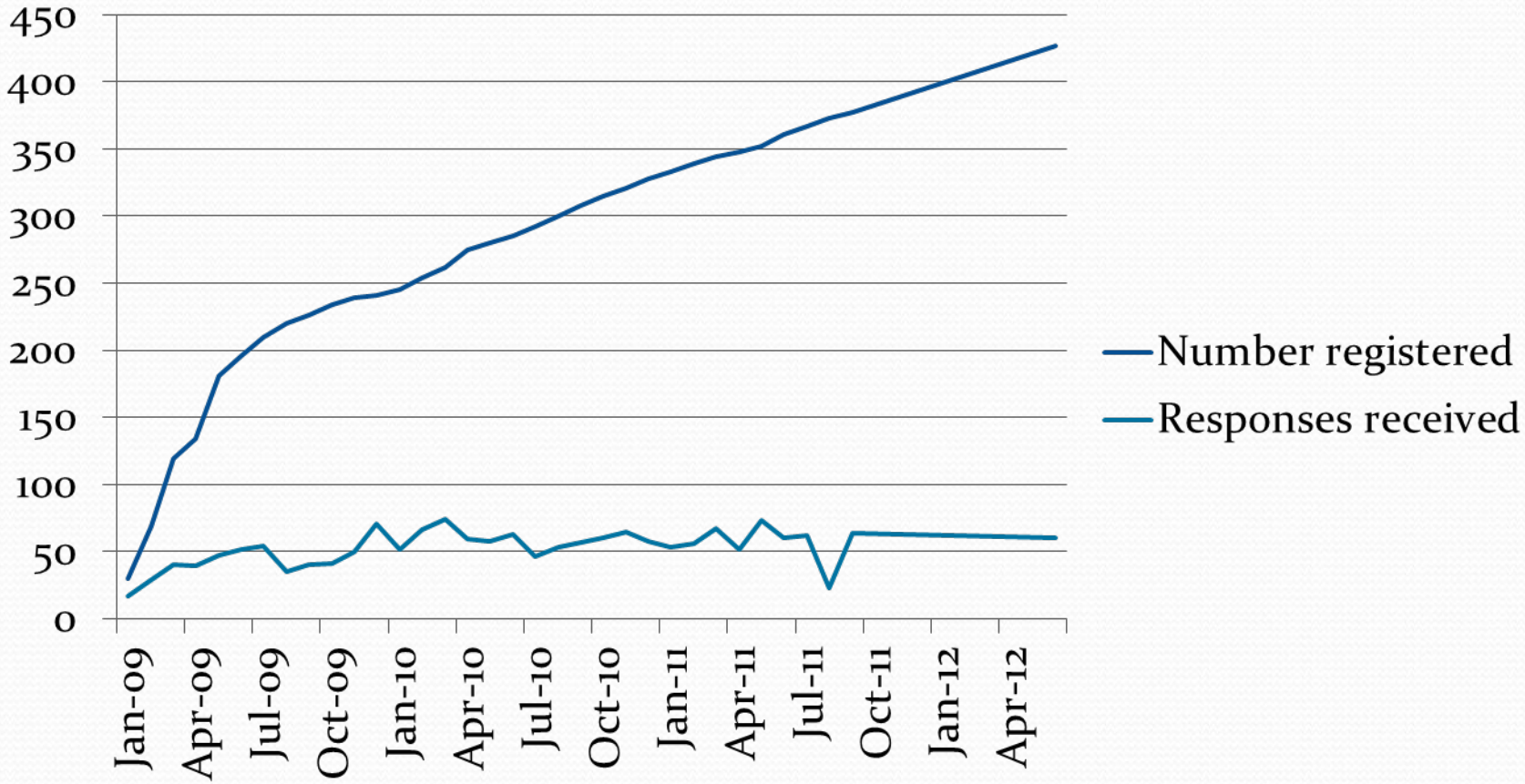
Russo TA, Shon AS, Beanan JM, Olson R, MacDonald U, et al. Hypervirulent K. pneumoniae secretes more and more active iron-acquisition molecules than "classical" K. pneumoniae thereby enhancing its virulence. 2011. PLoS ONE 6(10): e26734. doi:10.1371/journal.pone.0026734 http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0026734

Yu WL, Chuang YC. Microbiology and pathogenesis of Klebsiella pneumoniae infection. 2012. http://www.uptodate.com

UK NEQAS for Microbiology PO Box 63003, NW9 1GH
Tel: + 44 (0)20 8905 9890 Fax: + 44 (0)20 8205 1488 E-mail: organiser@ukneqasmicro.org.uk web:http://www.ukneqasmicro.org.uk

COMMENTS 3189
1. Burkholderia pseudomallei activation of chronic latent infection originally acquired in Yemen or other nearby high-endemicity countries. 2. Adequate drainage of collection (theatre infection control precautions) and isolation in side-room; empirical intravenous meropenem; handle specimens / isolate in category 3 containment pending confirmation of identification.
Possible organisms (highly mucoid NLF): Pseudomonas aeruginosa, Klebsiella pneumoniae (usually LF), Klebsiella rhinoscleromatis. Mx: Drain collection, identify isolate & perform susceptibility testing. Treat with IV ceftazidime.
Likely Klebsiella pneumoniae with hypermucoviscosity virulence factor (positive string test) Surgical drainage of the lymph node with antibiotic treatment with a third generation cephalosproin if sensitive or carbapenem for at least 2 weeks
1. Klebsiella pneumoniae associated with mucoviscosity gene. 2. Broad spectrum antibiotics eg meropenem plus drainage as required.
Organism: Actinobacillus (Aggregatibacter) actinomycetemcomitans. Oral infections associated with actinomycetes. Management: surgical debridement/drainage when possible; amoxicillin and metronidazole for 1 month, then amoxicillin for further 5 months - association with actinomycetes needing prolonged treatment echocardiogram - associated with insidious endocarditis, developed at time of presentation of oral disease
1. Klebsiella pneumoniae 2. Adequate surgical drainage is most important. Antibiotics of secondary importance. Organism may be multi-resistant so needs reliable antibiotic sensitivity tests. As patient appears systemically quite well, could wait for sensitivities before choosing an appropriate (oral) antibiotic - ?cipro or cotrim. In mean time, if signs of sepsis give meropenem.
1. The organism is likely to be a halophilic vibrio (? V alginolyticus/ vulnificus). 2. Management: The abscess should be drained and the patient should be treated with a third generation cephalosporin (ceftriaxone). Treatment should be continued for several weeks until the CRP is normal.
Mucoid Pseudomonas aeruginosa. Drain collection. Initially IV antibiotics (e.g. tazocin or if non-severe pen allergy ceftazidime), rationalise with susceptibility testing, oral option PO cipro if sensitive. Duration of treatment depends on extend of drainage and clinical progress but should be a minimum of 2 weeks. Control BMs, also ensure no other collections e.g. dental abscess.
Klebsiella pneumoniae subspecies ozaenae Ensure adequate surgical drainage. Startt antibiotics eg. piperacillin/tazobactam. Modify with sensitivities. Beta-lactam and quinolone resistace occurs, but rare. Duration dependant on response & whether full drainage achieved. Control diabetes. Assess for distant abscesses eg liver.
klebsiella pneumonia Surgical drainage plus ab to which Kleb and anaerobes would be sens eg co-amoxiclav
The most likely organsim is either a Klebsiella or a pseudomonas aeruginosa. An oxidase test would help distinguish the two. We would identify this by MALDI TOF the same day. A dental origin infection of the head and neck should be treated with antibiotics to cover streptococci and anerobes as well as the gram negative. I would normally start with piperacillin tazobactam and metronidazole. A surgical review is needed to ensure necrotic material is debrided and pus drained.
1. Klebsiella pneumoniae deep neck abscess. Probably odontogenic origin following dental extraction. Diabetes is risk factor. 2. Drainage of the collection and antibiotics based on susceptibility results. Empirical treatment options are ciprofloxacin and metronidazole, or tazocin, or meropenem.
Culture is very blue- suggests pyocyanin production ie this is a mucoid Pseudomonas aeruginosa. Often multi resistant so start treatment with a beta lactam plus aminoglycoside (eg tazocin plus gentamicin) pending sensitivities. Those with COPD often colonised, difficult to eradicate, so treatment is to alleviate symptoms only. Given history of migration from Yemen and description of cold abscess in neck TB still possible - would request chest X-ray, sputum for AFB as well as awaiting culture.
1. Klebsiella pneumoniae. 2. Careful review of systems and examination to exclude another abscess. Surgical drainage, antibiotics – co-amoxyclav or Piperacillin-tazobactam first line – most community acquired Klebsiella will be sensitive; 3rd generation cefs would increase the risk of C difficile especially at his age. Modify antibiotic on basis of susceptibility testing; ESBL producers are possible and would require meropenem.
The history is suggestive of melioidosis caused by Burkholderia pseudomallei, although this is more often acquired in SE Asia or N Australia. The isolate should be referred to a reference laboratory to confirm its identity, after informing them of its potentially hazardous nature. Treatment is initially with i.v. ceftriaxone or meropenem, followed by oral co-trimoxazole for 12 weeks for 'eradication'.
Probable invasive Klebsiella pneumoniae. Positive hypermucoviscosity test correlates with invasiveness. Management will involve surgical drainage, appropriate IV antibiotic treament according to sensitivities for up to 6/52 according to response and imaging (MRI) to search for abscesses in other organs eg kidneys, liver, lung, brain, pleural space, mediastinum.
1.Klebsiella pneumoniae demonstrating hypermucoviscosity - positive string test 2.Drainage, control of blood sugar, IV antibiotic definitive choice guided by susceptibility testing, give eg piperacillin-tazobactam as empirical choice, look for other metastatic foci eg liver, endophthalmitis. Follow up inflammatory markers, may require prolonged therapy. Ensure specimen cultured for TB.
Burkholderia pseudomallei. Incision & drainage of abscess. 10-14days IV ceftazidime or imipenem +/- cotrimoxazole, then prolonged contrimoxazole +/- doxycycline. Infection control precautions to prevent person to person spread.
1. Klebsiella pneumoniae (hypermucoviscous) 2. Drainage of abscess and meropenem pending sensitivity results.
Klebsiella pneumoniae infection - positive string test suggests potentially hypermucoid invasive strain associated with community acquired sepsis in parts of Asia and recently France. Treat by drainage and appropriate antibiotic according to antibiogram - probably a cephalosporin, aminoglycoside or fluoroquinolone.

Participants registered… & responses received 2009-12



Breakdown of bi-monthly scenarios 2012-15

- Bacteriology 12
- Mycology 3
- Parasitology 2
- Virology 1

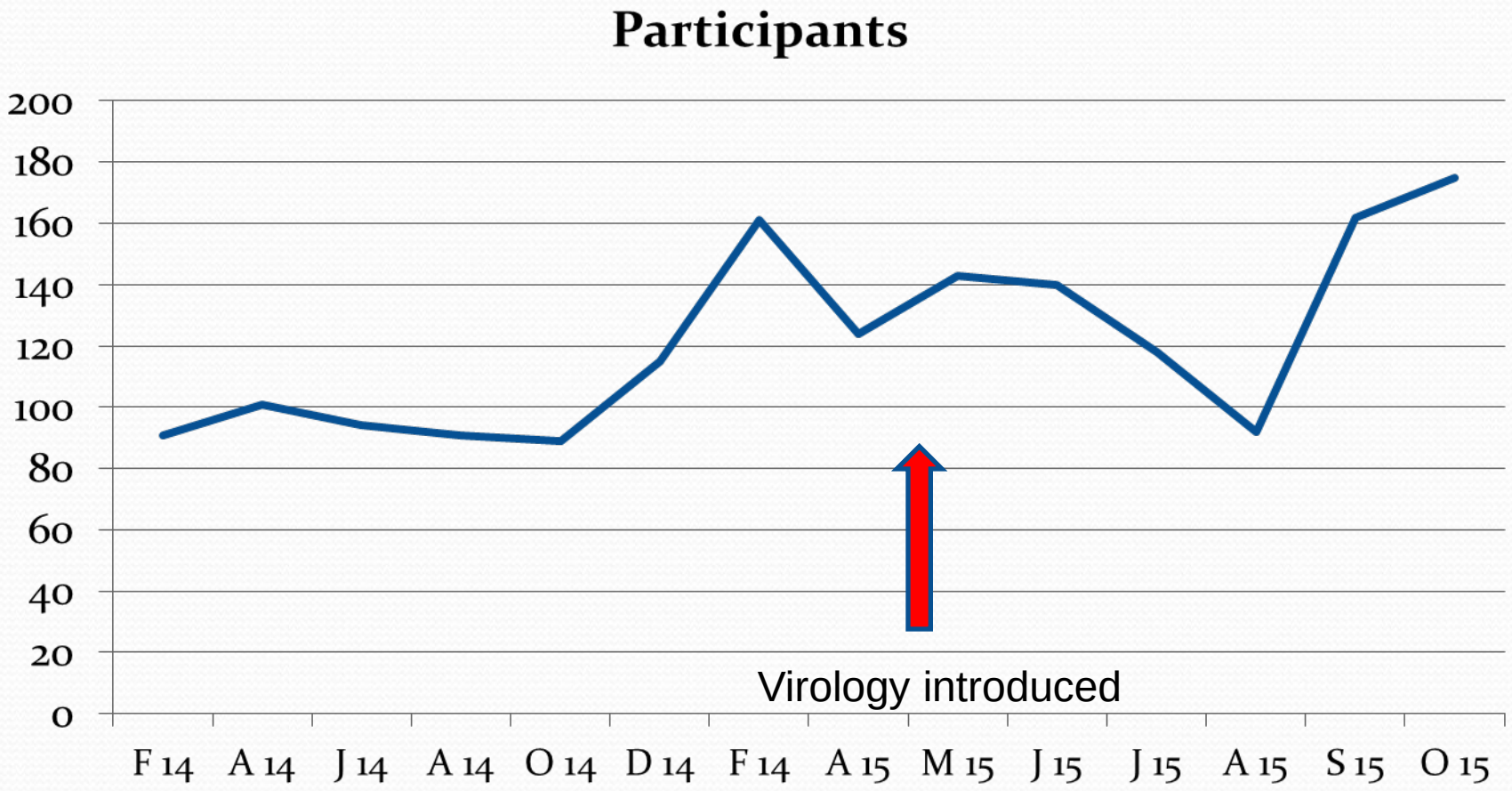
Changes to scheme April 2015

- Increase in frequency to monthly overall
- Introduction of virology distributions (bi-monthly)
- Q&As mainly MCQ format
- Continues not to be scored at present, but….
- Discussions with RCPath Personal Proficiency
- Working towards introducing scoring:
  - Ongoing assessment of results consensus
  - Exploring new web-based platform to collate scores

Breakdown of monthly scenarios since April 2015

- Bacteriology 3
- Mycology 1
- Virology 4

Active participation 2014-15



Consensus scoring in 2015

Distribution	Q1	Q2	Q3	Q4
May (V)	39%	59%		
June (M)	84%	64%	96%	38%
July (V)	39%	62%		
Aug (M)	89%	86%	85%	29%
Sep (V)	83%	98%	86%	
Oct (M)	*75% / 96%	99%	95%	

Next steps

- Survey participants re virology scheme
- Move to new web platform
  - Collate generic info re participants
  - Monthly distribution reports
  - Provide individual feedback to participants?
  - Evidence for appraisal & revalidation?

Questions

?