NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Health and social care directorate

Quality standards and indicators

Briefing paper

Quality standard topic: Pneumonia

Output: Prioritised quality improvement areas for development.

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Contents

1 Introduction

This briefing paper presents a structured overview of potential quality improvement areas for Pneumonia. It provides the Committee with a basis for discussing and prioritising quality improvement areas for development into draft quality statements and measures for public consultation.

1.1 Structure

This briefing paper includes a brief description of the topic, a summary of each of the suggested quality improvement areas and supporting information.

If relevant, recommendations selected from the key development source below are included to help the Committee in considering potential statements and measures.

1.2 Development source

The key development source referenced in this briefing paper is:

Pneumonia. NICE clinical guideline 191 (2014)

2 Overview

2.1 Focus of quality standard

This quality standard will cover adults (18 and older) with a suspected or confirmed diagnosis of community-acquired pneumonia or hospital-acquired pneumonia.

2.2 Definition

Pneumonia is an infection of the lung tissue. When a person has pneumonia the air sacs in their lungs become filled with microorganisms, fluid and inflammatory cells and their lungs are not able to work properly. Diagnosis of pneumonia is based on symptoms and signs of an acute lower respiratory tract infection, and can be confirmed by a chest X-ray showing new shadowing that is not due to any other cause (such as pulmonary oedema or infarction). In this guideline pneumonia is classified as community-acquired or hospital-acquired, based on different microbial causes and patient factors, which need different management strategies.

2.3 Incidence and prevalence

Every year between 0.5% and 1% of adults in the UK will have community-acquired pneumonia. It is diagnosed in 5–12% of adults who present to GPs with symptoms of lower respiratory tract infection, and 22–42% of these are admitted to hospital, where the mortality rate is between 5% and 14%. Between 1.2% and 10% of adults admitted to hospital with community-acquired pneumonia are managed in an intensive care unit, and for these patients the risk of dying is more than 30%. More than half of pneumonia-related deaths occur in people older than 84 years.

Between 0.5% and 1.1% of adults have community-acquired pneumonia every year in the UK. This is equivalent to between 220,000 and 484,000 people in England. It is estimated that 22–42% of these people are admitted to hospital. Around 175,000 people were admitted to hospital with community-acquired pneumonia in 2013/14 based on Hospital Episode Statistics data. The mortality rate in hospital is between 5% and 14%.

2.4 Management

Between 1.2% and 10% of adults admitted to hospital with community-acquired pneumonia are managed in an intensive care unit, and for these patients the risk of dying is more than 30%.

At any time 1.5% of hospital inpatients in England have a hospital-acquired respiratory infection, more than half of which are hospital-acquired pneumonia and are not associated with intubation. Hospital-acquired pneumonia is estimated to increase hospital stay by about 8 days and has a reported mortality rate that ranges from 30–70%. Variations in clinical management and outcome occur across the UK.

2.5 National Outcome Frameworks

Tables 1–2 show the outcomes, overarching indicators and improvement areas from the frameworks that the quality standard could contribute to achieving.

Table 1 NHS Outcomes Framework 2015–16

Domain	Overarching indicators and improvement areas
1 Preventing people from dying prematurely	***Overarching indicators*** 1a Potential Years of Life Lost (PYLL) from causes considered amenable to healthcare i Adults ***Improvement areas*** **Reducing premature mortality from the major causes of death** 1.2 Under 75 mortality rate from respiratory disease*
2 Enhancing quality of life for people with long-term conditions	***Overarching indicator*** 2 Health-related quality of life for people with long-term conditions** ***Improvement areas*** **Ensuring people feel supported to manage their condition** 2.1 Proportion of people feeling supported to manage their condition **Improving functional ability in people with long-term conditions** 2.2 Employment of people with long-term conditions*, ** **Reducing time spent in hospital by people with long-term conditions** 2.3 i Unplanned hospitalisation for chronic ambulatory care sensitive conditions **Enhancing quality of life for carers** 2.4 Health-related quality of life for carers** **Improving quality of life for people with multiple long-term conditions** *2.7 Health-related quality of life for people with three or more long-term conditions***
3 Helping people to recover from episodes of ill health or following injury	***Overarching indicators*** 3a Emergency admissions for acute conditions that should not usually require hospital admission 3b Emergency readmissions within 30 days of discharge from hospital* ***Improvement areas*** **Helping older people to recover their independence after illness or injury** 3.6 i Proportion of older people (65 and over) who were still at home 91 days after discharge from hospital into reablement/rehabilitation service* ii Proportion offered rehabilitation following discharge from acute or community hospital*

4 Ensuring that people have a positive experience of care	***Overarching indicators*** 4a Patient experience of primary care i GP services ii GP Out-of-hours services 4b Patient experience of hospital care 4c *Friends and family test* *4d Patient experience characterised as poor or worse* *I Primary care* *ii Hospital care* ***Improvement areas*** **Improving people's experience of outpatient care** 4.1 Patient experience of outpatient services **Improving hospitals' responsiveness to personal needs** 4.2 Responsiveness to inpatients' personal needs **Improving people's experience of accident and emergency services** 4.3 Patient experience of A&E services **Improving access to primary care services** 4.4 Access to i GP services **Improving the experience of care for people at the end of their lives** 4.6 Bereaved carers' views on the quality of care in the last 3 months of life **Improving people's experience of integrated care** *4.9 People's experience of integrated care***
5 Treating and caring for people in a safe environment and protecting them from avoidable harm	***Overarching indicators*** *5a Deaths attributable to problems in healthcare* *5b Severe harm attributable to problems in healthcare* ***Improvement areas*** **Reducing the incidence of avoidable harm** 5.2 Incidence of healthcare associated infection (HCAI) i MRSA ii C. difficile
Alignment with Public Health Outcomes Framework * Indicator is shared ** Indicator is complementary *Indicators in italics in development*	

Table 2 Public health outcomes framework for England, 2013–2016

Domain	Objectives and indicators
1 Improving the wider determinants of health	***Objective*** Improvements against wider factors that affect health and wellbeing and health inequalities ***Indicators*** 1.8 Employment for those with long-term health conditions including adults with a learning disability or who are in contact with secondary mental health services*,**
4 Healthcare public health and preventing premature mortality	***Objective*** Reduced numbers of people living with preventable ill health and people dying prematurely, whilst reducing the gap between communities ***Indicators*** 4.3 Mortality rate from causes considered preventable** 4.7 Under 75 mortality rate from respiratory diseases* 4.11 Emergency readmissions within 30 days of discharge from hospital* 4.13 Health-related quality of life for older people 4.15 Excess winter deaths
Alignment with NHS Outcomes Framework * Indicator is shared ** Indicator is complementary *Indicators in italics in development*	

3 Summary of suggestions

3.1 Responses

In total 10 stakeholders responded to the 2-week engagement exercise 08/04/15-22/04/15.

Stakeholders were asked to suggest up to 5 areas for quality improvement. Specialist committee members were also invited to provide suggestions. The responses have been merged and summarised in table 3 for further consideration by the Committee.

NHS England's patient safety division did not submit any data for this topic.

Full details of all the suggestions provided are given in Appendix 4 for information.

Table 3 Summary of suggested quality improvement areas

Suggested area for improvement	Stakeholders
Presentation with lower respiratory tract infection	SCM
Community-acquired pneumonia (CAP) • Severity assessment in primary care • Severity assessment in hospital • Microbiological tests • Timely diagnosis and treatment • Antibiotic therapy- Low-severity CAP • Antibiotic therapy- Moderate- and high-severity CAP • Monitoring in hospital • Safe discharge from hospital • Patient information	BGS, BTS, RCGP, SCM
Additional areas • Home treatments - oxygen use with monitoring • CAP care bundles • Adoption of direct referrals from primary care to community rehabilitation services • Minimum competency or core quality indicators for service provision and management • Pneumococcal vaccine • Making Every Contact Count: behaviour change framework • Management in elderly patients • Management in obese patients • Public reporting of hospital antibiotic timing scores • Excess winter deaths and morbidity and the health risks associated with cold homes (NG6, 2015) • Ventilator acquired pneumonia in the HAP context • HAP microbiology data • Availability of pulse oximetry • Smoking cessation advice • Development of antibiotic alternatives	BGS, BSAC, BTS, MRSA, NHSE, PFZ, RDSH NHSFT, SCM

BGS, British Geriatrics Society
BLF, British Lung Foundation
BTS, British Thoracic Society
BSAC, British Society for Antimicrobial Chemotherapy
MRSA, MRSA Action UK
NHSE, NHS England
PFZ, Pfizer Limited
RCGP, Royal College of General Practitioners
RCP, Royal College of Physicians
RDSH NHSFT, Rotherham Doncaster & South Humber NHS Trust
SCM, Specialist Committee Member

4 Suggested improvement areas

4.1 Presentation with lower respiratory tract infection

4.1.1 Summary of suggestions

Stakeholders highlighted the importance of undertaking a point-of-care C-reactive protein test in primary care for patients presenting with lower respiratory tract infection (LTRI) if after clinical assessment a pneumonia diagnosis has not been made. Excessive and frequent unnecessary antibiotic use was raised as a concern for reducing their effectiveness. Results from the C-reactive protein test was supported to guide appropriate antibiotic use.

4.1.2 Selected recommendations from development source

Table 4 below highlights recommendations that have been provisionally selected from the development source that may support potential statement development. These are presented in full after table 4 to help inform the Committee's discussion.

Table 4 Specific areas for quality improvement

Suggested quality improvement area	Suggested source guidance recommendations
Presentation with lower respiratory tract infection	**Presentation with lower respiratory tract infection** NICE CG191 Recommendation 1.1.1 (KPI)

Presentation with lower respiratory tract infection

NICE CG191 – Recommendation 1.1.1 (key priority for implementation)

For people presenting with symptoms of lower respiratory tract infection in primary care, consider a point of care C-reactive protein test if after clinical assessment a diagnosis of pneumonia has not been made and it is not clear whether antibiotics should be prescribed. Use the results of the C-reactive protein test to guide antibiotic prescribing in people without a clinical diagnosis of pneumonia as follows:

- Do not routinely offer antibiotic therapy if the C-reactive protein concentration is less than 20 mg/litre.

- Consider a delayed antibiotic prescription (a prescription for use at a later date if symptoms worsen) if the C-reactive protein concentration is between 20 mg/litre and100 mg/litre.

- Offer antibiotic therapy if the C-reactive protein concentration is greater than 100 mg/ litre.

4.1.3 Current UK practice

Presentation with lower respiratory tract infection

NICE costing report[1] (2014) estimated that analyser machines for C-reactive protein testing may be needed by approximately 5,500 GP practices. This is estimated to be a one-off cost of £3.8 million in England.

The Guideline Development Group (GDG) for NICE Clinical Guideline 191 advised that currently C-reactive protein tests are rarely used in primary care when clinical assessment is not clear about the need for antibiotic prescription.

[1] NICE Costing statement for clinical guideline 191

4.2 Community-acquired pneumonia

4.2.1 Summary of suggestions

Stakeholders highlighted how severity assessment is key to appropriate management strategies in community-acquired pneumonia (CAP). The CURB65 score is an internationally validated severity score for CAP. It also guides antimicrobial sampling and treatment. Stakeholders supported the CURB65 score as being easy to measure which also provides a reliable indication of severity and mortality associated with pneumonia.

Severity assessment in primary care

When a clinical CAP diagnosis is made in primary care stakeholders supported the use of the documented CURB65 score together with clinical judgement to assess pneumonia severity.

Severity assessment in hospital

When a clinical CAP diagnosis is made in hospital stakeholders also supported the use of a documented CURB65 score together with clinical judgement to assess pneumonia severity.

Microbiological tests

A stakeholder highlighted that there is a spectrum of microbials which cause pneumonia. These differ in various age groups. Measuring pneumococcal urine antigen was recommended by a stakeholder to provide an immediate diagnosis.

Timely diagnosis and treatment

Stakeholders highlighted the importance of undertaking a chest x-ray within 4 hours of hospital admission in all patients with suspected CAP. It was reported as the gold standard for pneumonia diagnosis. An early accurate CAP diagnosis will determine the appropriate treatment pathway which is in turn is associated with improved clinical outcomes such as reduced morbidity and mortality.

Antibiotic administration within 4 hours of presentation to hospital was also highlighted as important for all CAP patients. The sooner antibiotics are given in the treatment of CAP, the better the outcome particularly for patients with moderate to high-severity CAP.

Antibiotic therapy- Low-severity CAP

A stakeholder suggested that all patients with low-severity CAP must receive single antibiotic therapy as mortality is reported as low (9%) in this group in hospital.

Limiting antibiotic use without compromising recovery was highlighted by a stakeholder as key. Inappropriate use of broad spectrum antibiotics, or dual therapy where it is not indicated may harmfully contribute to antibiotic resistance and patient may experience increased or unnecessary side effects. Under treating however may also lead to increased morbidity or mortality.

Another stakeholder reported how antibiotic monitoring and duration is key as historically in both primary and secondary care antibiotic therapy has been offered for at least 7 days. This stakeholder recommended an initial treatment of 5 days as a key improvement area which is difficult to implement in practice.

Antibiotic therapy- Moderate- and high-severity CAP

Administration of dual combination antibiotics for patients with moderate to high-severity CAP was supported by a stakeholder as being associated with better clinical outcomes. Mortality in this group was reported as high (25% in moderate and 47% in high-severity CAP) therefore appropriate antibiotic therapy for example dual combination was highlighted as important for limiting mortality.

Monitoring in hospital

A stakeholder highlighted that patients with severe pneumonia who fail to improve in hospital after 72hrs should be critically reviewed by an appropriately trained clinician.

Failure to respond may suggest the wrong antibiotic or dosage of antibiotic; an empyema; a cavitating pneumonia; a lung abscess; a pleural effusion. An atypical infection may require a change in antibiotic therapy, further sputum sampling, bronchoscopy and bronchial lavage. Failure to treat pneumonia will significantly increase hospital length of stay and pneumonia morbidity.

Safe discharge from hospital

A stakeholder raised the importance of oxygen saturation assessment in all CAP admitted patients and to prescribe oxygen supplementation where appropriate. Oxygen assessment in CAP was supported as being associated with improved prognosis.

Patient information

A stakeholder highlighted the importance of patient information to provide reassurance to the patient in relation to their symptoms and their recovery programme.

4.2.2 Selected recommendations from development source

Table 5 below highlights recommendations that have been provisionally selected from the development source that may support potential statement development. These are presented in full after table 5 to help inform the Committee's discussion.

Table 5 Specific areas for quality improvement

Suggested quality improvement area	Selected source guidance recommendations
Severity assessment in primary care	**Severity assessment in primary care** NICE CG191 Recommendations 1.2.1 and 1.2.2
Severity assessment in hospital	**Severity assessment in hospital** NICE CG191 Recommendations 1.2.3, 1.2.4 and 1.2.5
Microbiological tests	**Microbiological tests** NICE CG191 Recommendation 1.2.7
Timely diagnosis and treatment	**Timely diagnosis and treatment** NICE CG191 Recommendations 1.2.8 (KPI) and 1.2.9
Antibiotic therapy- Low-severity CAP	**Antibiotic therapy- Low-severity CAP** NICE CG191 Recommendations 1.2.10 (KPI), 1.2.11, 1.2.12, 1.2.13 and 1.2.14 (KPI)
Antibiotic therapy- Moderate- and high-severity CAP	**Antibiotic therapy- Moderate- and high-severity CAP** NICE CG191 Recommendations 1.2.15, 1.2.16 and 1.2.17
Monitoring in hospital	**Monitoring in hospital** NICE CG191 Recommendation 1.2.19
Safe discharge from hospital	**Safe discharge from hospital** NICE CG191 Recommendations 1.2.20 and 1.2.21
Patient information	**Patient information** NICE CG191 Recommendations 1.2.22 (KPI) and 1.2.23

Severity assessment in primary care

NICE CG191- Recommendation 1.2.1

When a clinical diagnosis of community-acquired pneumonia is made in primary care, determine whether patients are at low, intermediate or high risk of

death using the CRB65 score (please see Appendix 1).

NICE CG191- Recommendation 1.2.2.

Use clinical judgement in conjunction with the CRB65 score to inform decisions about whether patients need hospital assessment as follows:

- consider home-based care for patients with a CRB65 score of 0
- consider hospital assessment for all other patients, particularly those with a CRB65 score of 2 or more.

Severity assessment in hospital

NICE CG191- Recommendation 1.2.3

When a diagnosis of community-acquired pneumonia is made at presentation to hospital, determine whether patients are at low, intermediate or high risk of death using the CURB65 score (please see Appendix 1).

NICE CG191- Recommendation 1.2.4

Use clinical judgement in conjunction with the CURB65 score to guide the management of community-acquired pneumonia, as follows:

- consider home-based care for patients with a CURB65 score of 0 or 1
- consider hospital-based care for patients with a CURB65 score of 2 or more
- consider intensive care assessment for patients with a CURB65 score of 3 or more.

NICE CG191- Recommendation 1.2.5

Stratify patients presenting with community-acquired pneumonia into those

with low-, moderate- or high-severity disease. The grade of severity will usually correspond to the risk of death.

Microbiological tests

NICE CG191- Recommendation 1.2.7 (key priority for implementation)

For patients with moderate- or high-severity community-acquired pneumonia:

- take blood and sputum cultures **and**
- consider pneumococcal and legionella urinary antigen tests.

Timely diagnosis and treatment

NICE CG191- Recommendation 1.2.8 (key priority for implementation)

Put in place processes to allow diagnosis (including X-rays) and treatment of community-acquired pneumonia within 4 hours of presentation to hospital.

NICE CG191- Recommendation 1.2.9

Offer antibiotic therapy as soon as possible after diagnosis, and certainly within 4 hours to all patients with community-acquired pneumonia who are admitted to hospital.

Antibiotic therapy- Low-severity CAP

NICE CG191- Recommendation 1.2.10 (key priority for implementation)

Offer a 5-day course of a single antibiotic to patients with low-severity community-acquired pneumonia.

NICE CG191- Recommendation 1.2.11

Consider amoxicillin in preference to a macrolide or a tetracycline for patients

with low-severity community-acquired pneumonia. Consider a macrolide or a tetracycline for patients who are allergic to penicillin.

NICE CG191- Recommendation 1.2.12

Consider extending the course of the antibiotic for longer than 5 days as a possible management strategy for patients with low-severity community-acquired pneumonia whose symptoms do not improve as expected after 3 days.

NICE CG191- Recommendation 1.2.13

Explain to patients with low-severity community-acquired pneumonia treated in the community, and when appropriate their families or carers, that they should seek further medical advice if their symptoms do not begin to improve within 3 days of starting the antibiotic, or earlier if their symptoms are worsening**.**

NICE CG191- Recommendation 1.2.14 (key priority for implementation)

Do not routinely offer patients with low-severity community-acquired pneumonia:

- a fluoroquinolone
- dual antibiotic therapy.

Antibiotic therapy- Moderate- and high-severity CAP

NICE CG191- Recommendation 1.2.15

Consider a 7- to 10-day course of antibiotic therapy for patients with moderate or high-severity community-acquired pneumonia.

NICE CG191- Recommendation 1.2.16

Consider dual antibiotic therapy with amoxicillin and a macrolide for patients with moderate-severity community-acquired pneumonia.

NICE CG191- Recommendation 1.2.17

Consider dual antibiotic therapy with a beta-lactamase stable beta-lactam[2] and a macrolide for patients with high-severity community-acquired pneumonia.

Monitoring in hospital

NICE CG191- Recommendation 1.2.19

Consider measuring a baseline C-reactive protein concentration in patients with community-acquired pneumonia on admission to hospital, and repeat the test if clinical progress is uncertain after 48 to 72 hours.

Safe discharge from hospital

NICE CG191- Recommendation 1.2.20

Do not routinely discharge patients with community-acquired pneumonia if in the past 24 hours they have had 2 or more of the following findings:

- temperature higher than 37.5°C
- respiratory rate 24 breaths per minute or more
- heart rate over 100 beats per minute
- systolic blood pressure 90 mmHg or less

[2] Available beta-lactamase stable beta-lactams include: co-amoxiclav, cefotaxime, ceftaroline fosamil, ceftriaxone, cefuroxime and piperacillin with tazobactam.

- oxygen saturation under 90% on room air
- abnormal mental status
- inability to eat without assistance.

NICE CG191- Recommendation 1.2.21

Consider delaying discharge for patients with community-acquired pneumonia if their temperature is higher than 37.5°C.

Patient information

NICE CG191- Recommendation 1.2.22 (key priority for implementation)

Explain to patients with community-acquired pneumonia that after starting treatment their symptoms should steadily improve, although the rate of improvement will vary with the severity of the pneumonia, and most people can expect that by:

- 1 week: fever should have resolved
- 4 weeks: chest pain and sputum production should have substantially reduced
- 6 weeks: cough and breathlessness should have substantially reduced
- 3 months: most symptoms should have resolved but fatigue may still be present
- 6 months: most people will feel back to normal.

NICE CG191- Recommendation 1.2.23

Advise patients with community-acquired pneumonia to consult their healthcare professional if they feel that their condition is deteriorating or not improving as expected.

4.2.3 Current UK practice

Severity assessment in primary care

No published studies on current practice data were highlighted for this suggested area for quality improvement specifically in primary care; this area is based on stakeholder's knowledge and experience.

Severity assessment in hospital

The 2012-13 British Thoracic Society (BTS) adult CAP national audit found that the CURB65 score was recorded as a measure of pneumonia severity in only approximately 46% of hospitalised CAP patients.

Also between 70 – 80% of CAP patients were admitted via Emergency Departments using the CURB65 score. This assessment was reported as variable in these departments[3].

Timely diagnosis and treatment

The 2012-13 BTS 2012-13 adult CAP national audit[4] reported an increase in the proportion of patients who received antibiotics within 4 hours of admission over the 4 audit periods. However, the proportion in whom a chest x-ray was undertaken prior to antibiotics administered has decreased over the same period. These audit results suggest that there may be a move towards giving antibiotics more quickly at the cost of establishing a confirmed diagnosis of CAP radiologically. The audit emphasised that while it is desirable for antibiotics to be given early when indicated, the cost of misdiagnosis and inappropriate use of antibiotics in patients who do not have CAP must not be ignored.

Antibiotic therapy- Low-severity CAP

No published studies on current practice data were highlighted for this suggested area for quality improvement; this area is based on stakeholder's knowledge and experience.

A stakeholder reported that all patients with low-severity CAP should receive single antibiotic therapy as mortality in this group was reported as low as 9% in hospital and antibiotic overuse is a harmful driver of bacterial antibiotic resistance.

[3] C Rodrigo et al.(2015) Admission via the Emergency Department in relation to mortality of adults hospitalised with community-acquired pneumonia
[4] W S Lim & C Rodrigo (2012-13) Adult community acquired pneumonia national audit

Antibiotic therapy- Moderate- and high-severity CAP

Rodrigo et al's (2013) study[5] on single versus combination antibiotic therapy in adults hospitalised with CAP reported an overall 30 day inpatient mortality of 24% of patients. A number of limitations to the study were identified however it concluded that the benefits of combination therapy in relation to pneumonia severity are uncertain. This study concluded that efforts should be made to improve guideline implementation and adherence in clinical practice, especially given the current unsystematic use of combination therapy highlighted by this study.

Monitoring in hospital

Menendez et al's 2004 study[6] aimed to identify factors associated with failure of treatment and to determine the incidence of both early (less than 72 hours) and late treatment failure and their impact on clinical outcome. To achieve these objectives the patients were stratified according to initial risk class including pneumonia. This study concluded that mortality was significantly higher in patients with treatment failure (25% versus 2%). Failure to monitor increased the mortality of CAP 11-fold after adjustment for risk class.

Safe discharge from hospital

Early oxygen assessment has been studied as an indicator of the quality of processes of care in the management of CAP. The 2008 BTS Guideline for Emergency oxygen use in adults reported how oxygen assessment in CAP is associated with improved prognosis.

Patient information

No published studies on current practice data were highlighted for this suggested area for quality improvement; this area is based on stakeholder's knowledge and experience.

[5] C Rodrigo et al (2013) Single versus combination antibiotic therapy in adults hospitalised with community acquired pneumonia
[6] Menendez et al (2004) Risk factors of treatment failure in community acquired pneumonia: implications for disease outcome

4.3 Additional areas

Summary of suggestions

The improvement areas below were suggested as part of the stakeholder engagement exercise. However they were felt to be either unsuitable for development as quality statements, outside the remit of this particular quality standard referral or require further discussion by the Committee to establish potential for statement development.

There will be an opportunity for the QSAC to discuss these areas at the end of the session on June 4 2015.

Additional areas

Home treatments - oxygen use with monitoring

A stakeholder suggested oxygen use treatments could be appropriately undertaken at home to positively reduce hospital length of stay and the potential of hospital acquired infection. It was suggested that oxygen use could be home monitored by a community nurse.

CAP care bundles

A stakeholder highlighted the benefits of implementing care bundles in CAP management as being key quality improvement drivers of acute care. These were reported as already being in place in several UK regional areas.

Adoption of direct referrals from primary care to community rehabilitation services

A stakeholder highlighted the need for a direct referral system from primary care to community rehabilitation services with timely access to appropriate services positively leading to better outcomes.

Minimum competency or core quality indicators for service provision and management

A stakeholder reported marked current variation in service provision. Communication between acute care service and community care service improvements could potentially improve outcome.

Pneumococcal vaccine

Stakeholders raised the need of a targeted pneumococcal vaccination programme as pneumonia is common with a high mortality rate. It was reported that although

pneumonia has an associated vaccination programme, this is poorly understood and does not consider wider community and vulnerable groups (such as those with learning disabilities and mental health issues) and their carers who would benefit from the vaccination.

Another stakeholder highlighted that pneumococcal vaccination should be offered to all new patients over 65 years who have been admitted with a CAP and have not previously received this vaccination

Making Every Contact Count: behaviour change framework

A stakeholder highlighted that by using this framework NHS staff can take every opportunity to help patients and carers make informed choices about their health related behaviours, lifestyle and health service utilisation.

Management in elderly patients

A stakeholder highlighted the importance of management in elderly patients as this population present unique challenges due to their physiological changes, decreased renal function, decreased immunity and the existence of co-morbidities and potential drug interactions which can further complicate the management of their pneumonia. The elderly (over 65 years) constitute the fastest growing population subset and their frequent contact with the health system also increases their risk of developing an antibiotic resistant infection.

Another stakeholder raised that elderly patients with pneumonia should have a chest x-ray six to eight weeks after antibiotic treatment.

Similarly, a stakeholder also highlighted that elderly patients presenting with sudden onset or worsening breathlessness and confusion, particularly with a raised temperature and new or changed lung sounds where pneumonia is considered in the differential diagnosis should be urgently referred for a chest X-ray and assessment.

Another suggestion raised by a stakeholder was that all elderly patients with pneumonia should also have a ‘ceiling’ of treatment discussed within 12hrs of admission involving family and carers as appropriate to ensure that patient wishes are adhered to with appropriate treatment tailored to their general condition and functional status.

Another stakeholder raised the importance of nutritional assessment and supplementation which should be integral to the treatment pathway for all elderly patients admitted to hospital with pneumonia. This was reported as being frequently overlooked as a significant impact on mortality.

Management in obese patients

A stakeholder highlighted the importance of management in obese patients as current pneumonia guidance lacks specifics on treating this population. It was suggested that the impact of obesity on antibiotic dosing and administration, fluid resuscitation and ventilator management needs to be considered to improve treatment outcomes.

Public reporting of hospital antibiotic timing scores

A stakeholder raised concern that public reporting of the antibiotic timing measure (percentage of patients with pneumonia receiving antibiotics within 4 hours) has led to unintended adverse consequences for patients. Importantly it was reported that this has not led to increased pneumonia diagnosis, antibiotic use, or a change in patient prioritisation.

Excess winter deaths and morbidity and the health risks associated with cold homes (NICE clinical guideline NG6, 2015)

A stakeholder highlighted the overlaps with this Quality Standard and NICE clinical guideline NG6 (2015) which recommends that social and health care works together to ensure housing is fit for purpose and provides warmth and shelter.

Ventilator acquired pneumonia in the HAP context

A stakeholder suggested that ventilator acquired pneumonias should be measured as a core quality improvement indicator. It was reported that simple measures such as patient positioning in bed and bed angle can significantly halve ventilator acquired pneumonias in the hospital-acquired pneumonia (HAP) context.

HAP microbiology data

A stakeholder highlighted the limitations of HAP microbiology data to guide antibiotic therapy.

Availability of pulse oximetry

This was raised by a stakeholder as an important potential quality improvement area for pneumonia in primary care.

Smoking cessation advice

This was raised by a stakeholder as an important potential quality improvement area for pneumonia in primary care.

Development of antibiotic alternatives

A stakeholder highlighted the need to develop alternatives to antibiotics to reduce and avoid the excessive use of antibiotics.

Appendix 1a: CRB65 score for mortality risk assessment in primary care

Box 1 CRB65 score for mortality risk assessment in primary care[a]

CRB65 score is calculated by giving 1 point for each of the following prognostic features:

- confusion (abbreviated Mental Test score 8 or less, or new disorientation in person, place or time)[b]
- raised respiratory rate (30 breaths per minute or more)
- low blood pressure (diastolic 60 mmHg or less, or systolic less than 90 mmHg)
- age 65 years or more.

Patients are stratified for risk of death as follows:

- 0: low risk (less than 1% mortality risk)
- 1 or 2: intermediate risk (1-10% mortality risk)
- 3 or 4: high risk (more than 10% mortality risk).

[a] Lim WS, van der Eerden MM, Laing R, et al. (2003) Defining community-acquired pneumonia severity on presentation to hospital: an international derivation and validation study. Thorax 58: 377–82

[b] For guidance on delirium, see the NICE guideline on delirium.

Appendix 1b: CRB65 score for mortality risk assessment in hospital

Box 2 CURB65 score for mortality risk assessment in hospital[a]

CURB65 score is calculated by giving 1 point for each of the following prognostic features:

- confusion (abbreviated Mental Test score 8 or less, or new disorientation in person, place or time)[b]
- raised blood urea nitrogen (over 7 mmol/litre)
- raised respiratory rate (30 breaths per minute or more)
- low blood pressure (diastolic 60 mmHg or less, or systolic less than 90 mmHg)
- age 65 years or more.

Patients are stratified for risk of death as follows:

- 0 or 1: low risk (less than 3% mortality risk)
- 2: intermediate risk (3-15% mortality risk)
- 3 to 5: high risk (more than 15% mortality risk).

[a] Lim WS, van der Eerden MM, Laing R, et al. (2003) Defining community-acquired pneumonia severity on presentation to hospital: an international derivation and validation study. Thorax 58: 377–82

[b] For guidance on delirium, see the NICE guideline on delirium.

Appendix 2: Key priorities for implementation (CG191)

Recommendations that are key priorities for implementation in the source guideline and that have been referred to in the main body of this report are highlighted in grey.

Presentation with lower respiratory tract infection

For people presenting with symptoms of lower respiratory tract infection in primary care, consider a point of care C-reactive protein test if after clinical assessment a diagnosis of pneumonia has not been made and it is not clear whether antibiotics should be prescribed. Use the results of the C-reactive protein test to guide antibiotic prescribing in people without a clinical diagnosis of pneumonia as follows:

- Do not routinely offer antibiotic therapy if the C-reactive protein concentration is less than 20 mg/litre.
- Consider a delayed antibiotic prescription (a prescription for use at a later date if symptoms worsen) if the C-reactive protein concentration is between 20 mg/litre and100 mg/litre.
- Offer antibiotic therapy if the C-reactive protein concentration is greater than 100 mg/ litre. [recommendation 1.1.1]

Community-acquired pneumonia

Microbiological tests

For patients with moderate- or high-severity community-acquired pneumonia:

- take blood and sputum cultures **and**
- consider pneumococcal and legionella urinary antigen tests. [recommendation 1.2.7]

Timely diagnosis and treatment

Put in place processes to allow diagnosis (including X-rays) and treatment of

community-acquired pneumonia within 4 hours of presentation to hospital. [recommendation 1.2.8]

Antibiotic therapy

Low-severity CAP

- Offer a 5-day course of a single antibiotic to patients with low-severity community-acquired pneumonia. [recommendation 1.2.10]

- Do not routinely offer patients with low-severity community-acquired pneumonia:

- a fluoroquinolone
- dual antibiotic therapy. [recommendation 1.2.14]

Patient information

- Explain to patients with community-acquired pneumonia that after starting treatment their symptoms should steadily improve, although the rate of improvement will vary with the severity of the pneumonia, and most people can expect that by:
- 1 week: fever should have resolved
- 4 weeks: chest pain and sputum production should have substantially reduced
- 6 weeks: cough and breathlessness should have substantially reduced
- 3 months: most symptoms should have resolved but fatigue may still be present
- 6 months: most people will feel back to normal.[recommendation 1.2.22]

Appendix 3: Glossary

Clinical diagnosis of community-acquired pneumonia Diagnosis based on symptoms and signs of lower respiratory tract infection in a patient who, in the opinion of the GP and in the absence of a chest X-ray, is likely to have community-acquired pneumonia. This might be because of the presence of focal chest signs, illness severity or other features.

Community-acquired pneumonia Pneumonia that is acquired outside hospital. Pneumonia that develops in a nursing home resident is included in this definition. When managed in hospital the diagnosis is usually confirmed by chest X-ray.

Dual antibiotic therapy Treatment with 2 different antibiotics at the same time.

Hospital-acquired pneumonia Pneumonia that develops 48 hours or more after hospital admission and that was not incubating at hospital admission. When managed in hospital the diagnosis is usually confirmed by chest X-ray. For the purpose of this guideline, pneumonia that develops in hospital after intubation (ventilator-associated pneumonia) is excluded from this definition.

Lower respiratory tract infection An acute illness (present for 21 days or less), usually with cough as the main symptom, and with at least 1 other lower respiratory tract symptom (such as fever, sputum production, breathlessness, wheeze or chest discomfort or pain) and no alternative explanation (such as sinusitis or asthma). Pneumonia, acute bronchitis and exacerbation of chronic obstructive airways disease are included in this definition.

Mortality risk The percentage likelihood of death occurring in a patient in the next 30 days.

Severity assessment A judgement by the managing clinician as to the likelihood of adverse outcomes in a patient. This is based on a combination of clinical understanding and knowledge in addition to a mortality risk score. The difference between categories of severity and mortality risk can be important. Typically the mortality risk score will match the severity assessment. However, there may be situations where the mortality score does not accurately predict mortality risk and clinical judgement is needed. An example might be a patient with a low mortality risk score who has an unusually low oxygen level, who would be considered to have a severe illness.

Appendix 4: Suggestions from stakeholder engagement exercise – registered stakeholders

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
1.1 Presentation with lower respiratory tract infection					
001	SCM1	Provide point-of-care CRP measurement in Primary Care for patients with LRTI where the decision to give an antibiotic is uncertain on clinical grounds alone.	There is good evidence that antibiotics do not provide any clinical benefit in self-limiting respiratory tract infections. There is good evidence that overuse of antibiotics is undesirable. The NICE Pneumonia Guideline recommends that use of POC CRP to help guide the decision to prescribe an antibiotic in primary care when faced with a patient with LRTI in whom a clinical diagnosis of pneumonia is not evident.	The use of antibiotics in primary care for self-limiting non-pneumonic LRTI is well-documented. POC CRP is currently unavailable in Primary care in the UK.	
002	SCM2	Early diagnosis of condition severity preferably by the use of the C-Reactive Protein test	So that the most appropriate treatment can be implemented avoiding the possible unnecessary use of antibiotics.	The excessive and frequently unnecessary use of antibiotics is reducing their effectiveness	CG191 recommendations: section 1.1.1 CG69
1.2 Community-acquired pneumonia- severity assessment in primary care					
003	SCM3	All patients with CAP have documented CURB65 score	Illness severity is the key to appropriate management strategies in CAP. There is a recognised tool to assist this, CURB65, which is recommended by NICE CG191		NICE CG 191
004	SCM1	Assess and document pneumonia severity in all	Severity assessment is key in deciding site of care, depth of	The national BTS CAP Audit found that the CURB65 score was	Rodrigo C, et al. Admission via the Emergency Department in relation to

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
		patients with CAP.	investigations and antibiotic choice. The NICE Pneumonia Guideline recommends the use of the CURB65 score together with clinical judgement in the assessment of pneumonia severity.	recorded as a measure of pneumonia severity in only about 45% of patients hospitalised with CAP. Between 70 – 80% of patients with CAP are admitted via Emergency Departments (EDs). Use of the CURB65 score in EDs is variable.	mortality of adults hospitalised with community-acquired pneumonia: an analysis of the British Thoracic Society national Community-Acquired Pneumonia Audit. Emerg Med J. 2015 Jan;32(1):55-9. Lim WS et al. British Thoracic Society adult community acquired pneumonia audit 2009/10. Thorax. 2011 Jun;66(6):548-9.
005	British Thoracic Society	Record Severity of illness, supported by CURB65 score in all patients.	Severity assessment is widely accepted as critical in deciding site of care, depth of investigations and antibiotic choice. The CURB65 score is an internationally validated severity score for CAP. The NICE Pneumonia Guideline recommends the use of the CURB65 score. A similar recommendation is also made in the BTS CAP Guideline.	The National BTS CAP Audit (2012/13) found that the CURB65 score was recorded as being used to determine CAP severity in only 46% of cases. The use of the CURB65 score in Emergency departments is variable.	Please see reports of the BTS National Audit and BTS CAP Care Bundle Project for details. https://www.brit-thoracic.org.uk/audit-and-quality-improvement/bts-audit-programme-reports/ https://www.brit-thoracic.org.uk/audit-and-quality-improvement/bts-care-bundles-for-cap-and-copd/
006	The Royal College of General Practitioners	Primary source: The NICE guidance (2014) Pneumonia: Diagnosis and management of community- and hospital-acquired pneumonia in adults	Has some important potential quality standards for primary care.	These can be based on: 1. Availability of pulse oximetry 2. Use of CRB – 5 severity score 3. Use of amoxicillin as first line antibiotic 4. Length of course of first line antibiotic	[1] Peters CM, Schouwenaars FM, Haagsma E, Evenhuis HM, Echteld MA. Antibiotic prescribing and C-reactive protein testing for pulmonary infections in patients with intellectual disabilities. The British Journal of General Practice. 2013;63(610):e326-e330.

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
				5. Follow-up chest X-ray in appropriate people 6. Smoking cessation advice Consideration should also be given to point of care testing of CRP and presepsin in patients that may be clinically difficult to evaluate such as non-verbal patients such as adults with learning disabilities.	doi:10.3399/bjgp13X667187.
1.3 Community-acquired pneumonia-severity assessment in hospital					
007	British Geriatrics Society	All patients with pneumonia should have a CURB65 score measured on admission	This is easily measure and gives a reliable indication of severity and mortality associated with pneumonia.	This will direct the management pathway, will allow some patient to be managed in the community if appropriate and, in the more severely ill patients will determine where they should be nursed/managed. It will guide antimicrobial sampling and treatment.	
008	SCM4	Diagnosis of cap in patients presenting at hospital	Correct and prompt diagnosis through use of diagnostic tools and tests allows for appropriate treatment to be commenced and also avoids inappropriate treatment in patients without CAP.	NICE CG191 and the BTS pneumonia guideline recommend chest X-ray within 4 hours for patients presenting with CAP. BTS pneumonia audit 12/13 – less than 80% of patients had chest x-ray within 4 hours.	

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
				https://www.brit-thoracic.org.uk/document-library/audit-and-quality-improvement/audit-reports/bts-adult-community-acquired-pneumonia-audit-report-201213/ . A significant number of patients with suspected pneumonia do not have	
1.4 Community-acquired pneumonia-microbiological tests					
009	SCM5	All patients with severe pneumonia should have pneumococcal urine antigen measured	There is evidence that the spectrum of microbials causing pneumonia is different in various age groups. Haemophilus and Moraxella sp. are more common pathogens in the elderly and 'atypical pathogens' are much less likely to cause pneumonia in this age group. The presence of pneumococcal antigen gives an immediate diagnosis.	This will help direct specific antimicrobial treatment. Legionella urinary antigen is also important particularly in patients who have atypical features (eg inappropriate confusion) or who have been abroad. This test is not affected by prior antibiotic treatment. Bacteraemia is not very common in pneumonia but could help management . Sputum gram stain and culture can also be very useful in patient who is producing sputum.	BTS Guidelines (section5)
1.5 Community-acquired pneumonia-timely diagnosis and treatment					
010	SCM3	CXR to be performed within 4 hours of admission	Key to correct diagnosis and antibiotic administration within f	Recommended in NICE Guideline All CXRs are timed so measurement	NICE CG 191

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			hours of admission	is easy	
011	SCM1	Perform a CXR within 4 hours of presentation to hospital in all patients with suspected CAP	A CXR is the gold standard for the diagnosis of pneumonia. An early diagnosis of CAP enables early antibiotic therapy. There is evidence that early antibiotics is associated with better clinical outcomes compared to antibiotics given later. About half of patients presenting to hospital with suspected CAP do not have CXR evidence of pneumonia. Avoiding a misdiagnosis of CAP allows the correct treatment to be given for the alternative diagnosis and avoids inappropriate antibiotic use. There is evidence that overuse of antibiotics is associated with increased harm. The NICE Pneumonia guideline recommends that institutions "Put in place processes to allow diagnosis (including X-rays) and treatment of community-acquired pneumonia within 4 hours of presentation to hospital."	The national British Thoracic Society (BTS) CAP audit programme has data on over 16,000 patients from more than 100 institutions. The national BTS CAP Audit found that a CXR was performed within 4 hours of admission in only 74% of patients with CAP admitted to hospital via Medical Admission Units, compared to 91% of those admitted via Emergency Departments. There is wide variation in the timeliness of formal reports on CXRs performed on medical patients who are acutely ill.	Rodrigo C et al. Admission via the Emergency Department in relation to mortality of adults hospitalised with community-acquired pneumonia: an analysis of the British Thoracic Society national Community-Acquired Pneumonia Audit. Emerg Med J. 2015 Jan;32(1):55-9. Lim WS et al. British Thoracic Society adult community acquired pneumonia audit 2009/10. Thorax. 2011 Jun;66(6):548-9.

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
012	SCM1	Administer antibiotics within 4 hours of presentation to hospital for all patients with CAP	There is evidence that the sooner antibiotics are given in the treatment of CAP, the better the outcome particularly for patients with moderate to high severity CAP. The NICE Pneumonia guideline recommendation is to 'Offer antibiotic therapy as soon as possible after diagnosis, and certainly within 4 hours to all patients with CAP who are admitted to hospital.'	The national BTS audit data found that administration of the first dose of antibiotics occurred with 4 hours of admission in only about 60% of patients with CAP.	Rodrigo C, et al. Admission via the Emergency Department in relation to mortality of adults hospitalised with community-acquired pneumonia: an analysis of the British Thoracic Society national Community-Acquired Pneumonia Audit. Emerg Med J. 2015 Jan;32(1):55-9. Lim WS et al. British Thoracic Society adult community acquired pneumonia audit 2009/10. Thorax. 2011 Jun;66(6):548-9.
013	British Thoracic Society	Perform a CXR within 4 hours of admission in all patients with suspected CAP	A CXR is key to the making of an accurate diagnosis of CAP. An early accurate diagnosis of CAP is necessary to enable early appropriate treatment of CAP which is in turn associated with improved clinical outcomes. Equally, avoiding a misdiagnosis of CAP is critical to avoiding a) inappropriate antibiotic overuse and b) providing appropriate treatment for patients with alternative (non-CAP) diagnoses. A CXR within 4 hours of admission is recommended by the NICE Pneumonia guideline: "Put in place processes to allow diagnosis (including X-rays) and	Data from the national British Thoracic Society (BTS) CAP audit programme over the last 4 years (n= 16, 313 patients) indicate that there is significant variation in the management of CAP across institutions, that adherence to local and national guidelines is poor and that mortality from CAP is high. The national BTS CAP Audit found that only 74% of patients with CAP admitted to hospital via Medical Admission Units or other non-Emergency Department (ED) routes had had a CXR within 4 hours of admission. This proportion was 91% for patients with CAP admitted	Please see reports of the BTS National Audit for community acquired pneumonia in adults (https://www.brit-thoracic.org.uk/audit-and-quality-improvement/bts-audit-programme-reports/)and BTS CAP Care Bundle Project (https://www.brit-thoracic.org.uk/audit-and-quality-improvement/bts-care-bundles-for-cap-and-copd/)for details. Rodrigo C, et al. Admission via the Emergency Department in relation to mortality of adults hospitalised with community-acquired pneumonia: an analysis of the British Thoracic Society national Community-Acquired Pneumonia Audit. Emerg Med J. 2015 Jan;32(1):55-9.

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			treatment of community-acquired pneumonia within 4 hours of presentation to hospital." A similar recommendation is also made in the BTS CAP Guideline.	via EDs. There remains wide variation in the provision of services for a CXR within 4 hours of presentation to hospital. Immediate reporting of the CXR by a qualified radiologist is variable; where this is not provided, interpretation of the CXR in relation to a diagnosis of pneumonia is left to the attending clinician, often a junior doctor.	Lim WS et al. British Thoracic Society adult community acquired pneumonia audit 2009/10. Thorax. 2011 Jun;66(6):548-9. Annotated BTS Guideline for the management of CAP in adults 2015: https://www.brit-thoracic.org.uk/guidelines-and-quality-standards/community-acquired-pneumonia-in-adults-guideline/
014	British Thoracic Society	Administer antibiotics within 4 hours of presentation to hospital.	There is good evidence that early antibiotic treatment of CAP is associated with improved outcomes (reduction in mortality). Treatment of CAP within 4 hours of admission is recommended by the NICE Pneumonia guideline:	National BTS audit data found that administration of the first dose of antibiotics occurred with 4 hours of admission in only about 60% of patients with CAP. A small proportion of patients received antibiotics > 12 hours	Please see reports of the BTS National Audit and BTS CAP Care Bundle Project for details. https://www.brit-thoracic.org.uk/audit-and-quality-improvement/bts-audit-programme-reports/

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			"Put in place processes to allow diagnosis (including X-rays) and treatment of community-acquired pneumonia within 4 hours of presentation to hospital." The BTS Guidelines offer clear recommendations relating to the timing and type of empirical antibiotics – single/ combination/ IV/PO stratified according to disease severity.	after admission.	https://www.brit-thoracic.org.uk/audit-and-quality-improvement/bts-care-bundles-for-cap-and-copd/ Rodrigo C, et al. Admission via the Emergency Department in relation to mortality of adults hospitalised with community-acquired pneumonia: an analysis of the British Thoracic Society national Community-Acquired Pneumonia Audit. Emerg Med J. 2015 Jan;32(1):55-9. Lim WS et al. British Thoracic Society adult community acquired pneumonia audit 2009/10. Thorax. 2011 Jun;66(6):548-9.
015	SCM5	All patients admitted to (or in) hospital with a suspicion of a severe pneumonia should have a CXR reviewed within four to six hours of assessment by an appropriately qualified clinician	To confirm a diagnosis of a community acquired pneumonia (CAP) or a hospital acquired pneumonia.	To make an accurate diagnosis and determine the appropriate treatment pathway particularly in a patient with a hospital acquired pneumonia where different antibiotics will be required.	BTS Guidelines
016	British Geriatrics Society	All patient with a CAP should have antibiotics administered within 4hrs of presentation to hospital	Prompt antibiotics significantly reduce mortality in patient >65ys old	There is under recognition of the severity of pneumonia in the elderly. Urgent assessment and treatment is required.	

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
017	SCM6	Early recognition/ diagnosis of pneumonia	Early recognition/ diagnosis of pneumonia	Early and correct timely therapy can reduce morbidity and mortality. Red flags- identify when to worry/ key intervention see how guidelines and algorithms are written- pneumonia guidelines are only accessed if this is considered- otherwise pneumonia is often diagnosed late in some populations so correct guidance not referred to.	See pneumonia guidelines, CKS on management of cough and GP systems such as EMIS which have a framework for care decisions to be documented- they don't necessarily identify pneumonia as a possible cause early enough in initial stages.
018	SCM4	Time to of antibiotics	A delay in the prescribing and administration of antibiotics may be associated with poorer outcomes. The majority of studies reviewed during the development of the pneumonia guideline suggest that administering antibiotic therapy within the first 4 hours of admission is beneficial in reducing mortality.	The BTS pneumonia audit showed that less than 60% of patients received antibiotics within 4 hours of presentation to hospital. NICE CG191 recommended antibiotics within as soon as possible and at least within 4 hours of admission.ICE CG191 recommendeds within tion to hospital. NICE CG191 recommendeds antibiotics within 4 hoursis	'Start Smart then Focus' (Public Health England guideline) recommends that effective antibiotics are started within 1 hour of diagnosis. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/417032/Start_Smart_Then_Focus_FINAL.PDF
1.6 Antibiotic therapy - Low-severity community-acquired pneumonia					
019	SCM3	All patients with low severity CAP to receive single antibiotic therapy.	Mortality is low (9%) in this group in hospital and antibiotic overuse is driver of bacterial antibiotic resistance	BTS audit found 60% received unnecessary dual antibiotic therapy in hospital	NICE CG191 Rodrigo C et al. Single versus combination antibiotic therapy in adults hospitalised with community acquired pneumonia. Thorax 2013;68:493-495 Limitation: NICE says 'consider' rather

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
					than 'offer'
020	SCM1	Administer antibiotics appropriate to pneumonia severity in patients presenting with CAP.	There is good evidence that the use of dual combination antibiotics for patients with moderate to high severity pneumonia is associated with better outcomes. The NICE Pneumonia Guideline recommends a single antibiotic for patients with low severity CAP and dual antibiotics for patients with moderate and high severity CAP.	The national BTS CAP audit found that only about 50% of patients received antibiotics that were appropriate according to pneumonia severity (measured by the CURB65 score).	Rodrigo C, et al. Admission via the Emergency Department in relation to mortality of adults hospitalised with community-acquired pneumonia: an analysis of the British Thoracic Society national Community-Acquired Pneumonia Audit. Emerg Med J. 2015 Jan;32(1):55-9. Lim WS et al. British Thoracic Society adult community acquired pneumonia audit 2009/10. Thorax. 2011 Jun;66(6):548-9.
021	SCM2	Monitoring and control of antibiotics	To limit the use of antibiotics without compromising recovery	To avoid excessive use of antibiotics	
022	British Thoracic Society	Administer antibiotics according to pneumonia severity.	There is good evidence that the use of appropriate antibiotics (dual combination antibiotics) for patients with moderate to high severity pneumonia is associated with improved clinical outcomes (decreased mortality). There is no good evidence that combination broad-spectrum antibiotics for patients with low severity CAP is associated with clinical benefit. There is good evidence that antibiotic overuse promotes drug resistance.	Data from the national BTS CAP audit programme found that only about 50% of patients received antibiotics that were concordant with existing BTS CAP Guidelines – these guidelines make the same antibiotic recommendations as the NICE Pneumonia Guideline. Both under-treatment of patients with moderate to high severity CAP, and over-treatment of patients with low severity CAP was noted.	Please see reports of the BTS National Audit and BTS CAP Care Bundle Project for details. https://www.brit-thoracic.org.uk/audit-and-quality-improvement/bts-audit-programme-reports/ https://www.brit-thoracic.org.uk/audit-and-quality-improvement/bts-care-bundles-for-cap-and-copd/ Rodrigo C, et al. Admission via the Emergency Department in relation to mortality of adults hospitalised with

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			The use of antibiotics appropriate to the severity of CAP is recommended by NICE. A similar recommendation is also made in the BTS CAP Guideline.		community-acquired pneumonia: an analysis of the British Thoracic Society national Community-Acquired Pneumonia Audit. Emerg Med J. 2015 Jan;32(1):55-9. Lim WS et al. British Thoracic Society adult community acquired pneumonia audit 2009/10. Thorax. 2011 Jun;66(6):548-9. Rodrigo C et al. Single versus combination antibiotic therapy in adults hospitalised with community acquired pneumonia. Thorax. 2013 May;68(5):493-5.
023	SCM4	Duration/monitoring of antibiotics	Too short a duration may lead to relapse or poorer outcomes while an extended duration longer than necessary can lead to increased risk of C.difficile infection and unnecessary side effects.	Practice in both primary and secondary care has historically offered at least 7 days treatment for non-severe pneumonia. CG191 and Public Health England recommendations indicate 5 days as an initial treatment. It is a key area for improvement as it is difficult to embed in practice.	
1.6 Antibiotic therapy - Moderate- and high-severity community-acquired pneumonia					
024	SCM3	All patients in hospital with moderate or high severity CAP to receive dual antibiotic therapy.	Mortality is high (25% in moderate and 47% in high severity CAP). Appropriate antibiotic therapy is important for limiting mortality and NICE recommendation is for dual	BTS audit found that such therapy was received by only 62% of moderate and 65% of high severity cases in UK hospitals.	NICE CG191 Rodrigo C et al. Single versus combination antibiotic therapy in adults hospitalised with community acquired pneumonia. Thorax 2013;68:493-495

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			therapy		Limitation: NICE says 'consider' rather than 'offer'
1.9 Community-acquired pneumonia- monitoring in hospital					
025	SCM5	Patients with severe pneumonia who fail to improve in hospital after 72hrs should be critically reviewed by an appropriately trained clinician.	Failure to respond may suggest the wrong antibiotic or dosage of antibiotic; an empyema; a cavitating pneumonia; a lung abscess; a pleural effusion. An atypical infection may require a change in antibiotic therapy, further sputum sampling, bronchoscopy and bronchial lavage.	Failure to treat pneumonia will significantly increase length of stay and the morbidity of pneumonia. A repeat X Ray might be needed. The presence of a pleural effusion will raise the possibility on an empyema which will require urgent thoracocentesis	BTS Guidelines (Section 9) Meneddez et al Thorax 2004 59 960-965
1.10 Community-acquired pneumonia- Safe discharge from hospital					
026	British Thoracic Society	Assess oxygen saturation in all patients admitted with CAP and prescribe supplementary oxygen where appropriate	Early oxygen assessment has been studied as an indicator of the quality of processes of care in the management of CAP. There is evidence that oxygen assessment in CAP is associated with improved prognosis. The BTS CAP Guideline and the BTS Guidelines for Emergency Oxygen Use in Adult patients both recommend oxygen assessment and supplementation in patients admitted to hospital with CAP. The assessment of oxygen in the		BTS Guidelines for Emergency oxygen use in adult patients, 2008 https://www.brit-thoracic.org.uk/guidelines-and-quality-standards/emergency-oxygen-use-in-adult-patients-guideline/

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			management of CAP was not included in the scope of the NICE Pneumonia Guideline.		
1.11 Community-acquired pneumonia-Patient information					
027	SCM2	Advise patient of the likely prognosis	To provide reassurance to the patient that of expecting nature of the recovery programme	It is much easier on the patient if they know that their symptoms are normal for their condition and what is the likely prognosis	CG191 Recommendations: Section 1.2.22 CG191 Patient information 'Questions to ask about pneumonia' CG138
1.12 Additional areas					
028	SCM2	The length of time in hospital should be minimised by considering if some treatment could be done at home.	To reduce hospital acquired infection (especially in a respiratory ward)	The taking of medication including the use of oxygen could be done at home with monitoring of condition by community nurse	CG191 Recommendations: section 1.2.20
029	SCM2	Develop alternatives to antibiotics. Are antibiotics the only treatment against bacteria?	To reduce the use of antibiotics	To avoid excessive use of antibiotics	
030	British Thoracic Society	Additional developmental areas of emergent practice Use a CAP Care Bundle for the delivery of key Quality Improvement measures in CAP	There is good evidence that care bundles are an effective method for the delivery of quality improvement measures.	The national BTS CAP Care Bundle project found that making improvements in the management of CAP requires cross-speciality cooperation and a clear focus on a small set of deliverable objectives. There are wide variations in individual quality improvement programmes in the management of	In the BTS CAP Care Bundle project involving 13 institutions, significant improvement in the time to first antibiotic and in mortality was observed in patients where the Care Bundle was applied. Please see the BTS Care Bundle Report for further details.

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
				CAP; the precise elements included in programmes differ and the measured outcomes differ.	https://www.brit-thoracic.org.uk/audit-and-quality-improvement/bts-care-bundles-for-cap-and-copd/
031	Rotherham Doncaster & South Humber NHS Trust	Adoption of direct referrals from Primary Care to Community Rehabilitation Services	Every year between 0.5% and 1% of adults in the UK will have community-acquired pneumonia. It is diagnosed in 5–12% of adults who present to GPs with symptoms of lower respiratory tract infection	Better outcomes through timely access to appropriate service.	NICE CG:191 Direct referral system from primary care in use at RDaSH.
032	Rotherham Doncaster & South Humber NHS Trust	Pneumococcal vaccine	Pneumonia is common and has a high mortality rate	Every year in England and Wales, there are 5,000 to 6,000 serious pneumococcal infections. It is estimated that in England, around 3,400 people over the age of 65 die in hospital every year from pneumococcal infections.	NICE CG 191 NHS Choices: Pneumococcal vaccine http://www.nhs.uk/Conditions/vaccinations/Pages/pneumococcal-vaccination.aspx
033	Rotherham Doncaster & South Humber NHS Trust	Making Every Contact Count: behaviour change framework	Using this framework NHS staff take every opportunity to help patients and visitors make informed choices about their health related behaviours, lifestyle and health service utilisation.	Enables the NHS staff to develop knowledge and skills in addressing the health and wellbeing needs of the local population in the following areas: long term conditions; smoking; falls prevention; alcohol abuse; obesity management; medicines management; physical health; and mental health and emotional wellbeing	Making Every Contact Count http://www.makingeverycontactcount.co.uk/MECC%20In%20Action/The%20Evidence%20and%20Delivering%20MECC/LitReview.html
034	NHS England	Pneumonia care bundles	Already in place in several areas of	Key drivers of acute care quality	https://www.brit-

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			the country	improvement	thoracic.org.uk/document-library/audit-and-quality-improvement/care-bundles-project/bts-pilot-care-bundle-project-report-2014/
035	Pfizer Ltd	Management of pneumonia in elderly patients	Elderly patients present unique challenges because of their physiological changes, decreased renal function, decreased immunity and the existence of co-morbidities and potential drug interactions which can further complicate the management of their pneumonia. The management of elderly patients has not been adequately addressed within the key development sources quoted in section 3.2 of the quality standard topic overview.	The elderly (age >65 years) constitute the fastest growing segment of the population and their unique requirements should be distinguished from the general adult population. Their frequent contact with the health system also increases their risk of harbouring an antibiotic resistant infection. Selection of an appropriate antibiotic that minimises the risk of C difficile infection and is easy to adhere to and administer (for example oral treatments instead of IV) should help to reduce the length of hospital stay while improving patient outcomes. The principles of antibiotic stewardship should also be followed.	Review article: Petrosillo N et al (2015) Treatment options for community-acquired pneumonia in the elderly people. Expert Rev. Anti Infect. Ther. 13 (4): 473 – 485 Antimicrobial stewardship: Nov 2011, Dept of Health, Antimicrobial Stewardship "Start Smart – Then Focus" https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/146981/dh_131181.pdf.pdf
036	Pfizer Ltd	Management of pneumonia in obese patients	Existing pneumonia guidelines lack specific guidance on treating obese patients. The impact of obesity on antibiotic	Obesity is a major public health issue. The prevalence of obesity among adults in England rose from 14.9% to 24.9% between 1993 and 2013.	Obesity statistics: https://www.noo.org.uk/NOO_about_obesity/adult_obesity/UK_prevalence_and_trends

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			dosing and administration, fluid resuscitation and ventilator management needs to be considered to improve treatment outcomes.	Treatment failure is likely if obese patients with pneumonia are incorrectly dosed due to their altered pharmacokinetics and pharmacodynamics. The presence of co-morbidities such as diabetes further complicates their management. For example, obese patients with increased kidney mass and increased glomerular filtration will have increased antibiotic clearance; however obese patients with chronic hypertension or diabetic nephropathy may have a decreased antibiotic clearance. The usual methods of estimating kidney function may also be less accurate for obese patients compared to non-obese patients.	Review Article: Al-Dorzi et al (2014) Antibiotic therapy of pneumonia in the obese patient: dosing and delivery. Current Opinion in Infectious Diseases 27(2):165-73 Systematic review: Trivedi V et al (2015) Impact of obesity on sepsis mortality: A systematic review. Article in Press Journal of Critical Care http://dx.doi.org/10.1016/j.jcrc.2014.12.007
037	British Society for Antimicrobial Chemotherapy	Use of a Care Bundles-Based Approach	Improvement in Standards of Care in Community Acquired Pneumonia (CAP)	A review of patient level data showed that use of a care bundle was associated with a reduction in 30 day in-patient mortality from CAP from 13.6% to 8.8%.	BRITISH THORACIC SOCIETY REPORTS VOL. 6 NO. 4 2014
038	British Society for Antimicrobial	Update on SAPG care bundle approach to optimise the management of patients	Improvement in Standards of Care in Community Acquired Pneumonia (CAP)	SAPG provides leadership and support for NHS Boards in quality improvement in antimicrobial	Community Acquired Pneumonia

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
	Chemotherapy	presenting with community acquired pneumonia		stewardship and infection management with the aim of 'no avoidable injury or harm to people from the healthcare they receive' and 'the most appropriate treatments, interventions, support and services'.	
039	British Society for Antimicrobial Chemotherapy	Improvement on public reporting of hospital antibiotic timing scores	There has been concern that public reporting of the antibiotic timing measure (percentage of patients with pneumonia receiving antibiotics within 4 hours) has led to unintended adverse consequences for patients.	This has not led to increased pneumonia diagnosis, antibiotic use, or a change in patient prioritization.	Friedberg et al. Reporting hospitals' antibiotic timing in pneumonia: adverse consequences for patients? Am J Manag Care. 2009 February: 15(2): 137–144.
040	SCM5	All elderly patients with a pneumonia should have a CXR six to eight weeks after antibiotic treatment	There is evidence that in elderly patients resolution of pneumonic changes is slower than in younger subjects and they are at higher risk of underlying malignancy.	Persistent changes and non resolution of changes need further investigation and assessment. BTS recommend 6 weeks but allowing for slower resolution in the elderly this could be delayed a little. Malignancy rates are higher in patient with pneumonia, slow resolution may imply a bronchial neoplasm. A persistent effusion may need thoracentesis and investigation. The CXR will give an opportunity for a patient to be reviewed.	BTS Guidelines Consensus statement (Evidence base D) There is no absolute and uncontroversial evidence on which to base this statement but there is compelling evidence that increasing comorbidities and malignancy are associated with pneumonia

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041	SCM5	Pneumococcal Vaccination should be offered to all patients over 65 who have not previously received pneumococcal vaccination who have been admitted with a CAP.	Immunisation will prevent infection from some strains of pneumococcus.	This is often overlooked and should be considered in all patients with pneumonia even if pneumococcal. This could be done or suggested at follow up.	BTS Guidelines NICE Pneumococcal Immunisation Guideline
042	British Geriatrics Society	Elderly patients (presenting with sudden onset or worsening breathlessness and confusion, particularly with a raised temperature and new or changed lung sounds) where pneumonia is considered in the differential diagnosis should be urgently referred for a chest X-ray and assessment.	The incidence of pneumonia is significantly higher in the elderly. They may have a different clinical presentation to younger patients. Absence of fever in this age group is well recognised. Tachypnoea and tachycardia may be more relevant. The morbidity and mortality is higher, the risk is increased with other medical co-morbidities and missing the diagnosis and not giving appropriate treatment will significantly increase the mortality. The risk of pneumonia in nursing home residents is independently associated with a high mortality.	To reduce the risk of missing the diagnosis and therefore not assessing, managing and treating the condition appropriately.	
043	British Geriatrics Society	All (elderly) patients with pneumonia should have a ceiling of treatment discussed within 12hrs of admission involving family and carers as appropriate	Pneumonia has a high mortality in this group. Aceiling of care needs to be discussed to ensure a patients wishes are adhered to and that treatment is appropriate dor there general condition and functional	This area of care is frequently overlooked leaving complex and sometimes difficult decisions to be made by medical staff who may be inexperienced and unfamiliar with a particular patient.	

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			status		
044	British Geriatrics Society	Nutritional assessment and supplementation should be an integral part of the treatment pathway for all elderly patients admitted to hospital with pneumonia.	Malnourishment is a significant risk for developing a pneumonia, is common in the elderly and adversely affects mortality.	This is frequently overlooked had a significant impact on mortality.	Pneumonia in elderly . Marrie et al Am Rev Crit care med 1997;156 1980-14. BTS Guidelines
045	MRSA Action UK	Strengthen point 2.4 Hospital-acquired pneumonia CG91 Can rapid microbiological diagnosis of hospital-acquired pneumonia reduce the use of extended-spectrum antibiotic therapy, without adversely affecting outcomes?	Data are limited on the microbiology of hospital-acquired pneumonia to guide antibiotic therapy. Hospital-acquired infections can be caused by highly resistant pathogens that need treatment with extended-spectrum antibiotics (for example, extended-spectrum penicillins, third-generation cephalosporins, aminoglycosides, carbapenems, linezolid, vancomycin, or teicoplanin), as recommended by British Society of Antimicrobial Chemotherapy guidance. Because routine microbial tests lack sensitivity and take 24–48 hours to identify a causative pathogen, patient characteristics are used to guide antibiotic choice. However, this may lead to unnecessary use of extended-spectrum antibiotics in patients infected with non-resistant	Point 2.4 of the CG191 guideline makes reference to rapid testing and limited data on the microbiology of pneumonia. To assist surveillance it would be appropriate to record the causative organism in patients notes and is worthy of being included in voluntary surveillance. National mandatory surveillance may not be appropriate due to local variations. The Chief Medical Officer has issued instructions on the recording of causative organisms on death certificates and we would like to see this included in the quality guide, as this also gives a more accurate picture of mortality caused by multi-drug resistant pathogens and improve	CMO Update Summer 2005 http://webarchive.nationalarchives.gov.uk/20130107105354/http:/www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4115664.pdf

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			organisms, and inappropriate use of first-line antibiotics (such as beta-lactam stable penicillins, macrolides or doxycycline) in patients infected with resistant organisms. Rapid diagnostic tests to identify causative bacterial pathogens and determine whether they are resistant to antibiotics may have a role in guiding antibiotic choice for postoperative hospital-acquired pneumonia. To limit population variability and include high-risk patients spending time in intensive care, studies should include postoperative patients from different surgical specialties.	surveillance. Wording on the recording of causative pathogens to assist surveillance should therefore be included.	
047	SCM4	Choice of antibiotic (both by individual clinician and in local guidelines)	Inappropriate use of broad spectrum antibiotics, or dual therapy where it is not indicated, may contribute antibiotic resistance and patient may experience increased or unnecessary side effects. 'Under treating' may also lead to increased morbidity or mortality.	BTS audit showed more than 40% of patients were prescribed antibiotics that were not in line with local guidelines. Experience in our hospital shows that clinicians tend to 'over treat' with broader spectrum antibiotics than indicated or with dual antibiotic therapy when single antibiotic therapy is	'Start Smart the Focus' recommends starting smart as in line with local guidelines.

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				indicated.	
048	SCM6	Keep people warm- social and health care working together to ensure housing is fit for purpose and provides warmth and shelter.	Keep people warm- social and health care working together to ensure housing is fit for purpose and provides warmth and shelter.	England has some of the poorest housing in terms of warmth and well being in Europe- warmth is essential for well being and health status... especially for those with respiratory conditions and vulnerable groups.	NICE recent guidance of keeping warm- everyone's business, Age UK policy and frameworks- social and health care frameworks.
049	SCM6	Minimum competency/ core quality indicators for service provision in respect to pneumonia and its management.	Minimum competency/ core quality indicators for service provision in respect to pneumonia and its management.	Variation in service provision is huge, red flags, core competency descriptors in relationship to service provision and pneumonia- communication between acute care service and community care service improvements would improve outcome.	Minimum competencies, core recorded information such as that required by QoF for other diseases/ conditions whilst it does not answer all points does allow some recorded and assessment of care provision. Linking this with competency and red flags clearly sign posted would improve pneumonia service provision and transition in care delivery settings.
050	SCM6	Reduce hospital acquired pneumonias (HAP)- e.g. ventilator acquired pneumonias as a core QI indicator.	Reduce hospital acquired pneumonias (HAP)- e.g. ventilator acquired pneumonias as a core QI indicator.	HAPs often occur secondary to admission for other respiratory conditions e.g. exacerbation of COPD requiring acute management but possibly not hospital admission but none the less this occurs. HAP significantly affects quality of life for people, delays access to other services that they might require such as Pulmonary rehab if COPD.	Simple measures such as position in bed and angle of bed can ½ ventilator acquired pneumonias- in HAP context. Evidence from midlands hospital trust and internal audit data.
051	SCM6	Vaccination for all vulnerable	Vaccination for all vulnerable age	We know that vaccinations and	We know from audit information (see

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		age groups- including other risk factors to identify vulnerable people- such as those with learning disabilities, mental health issues, carers of vulnerable groups.	groups- including other risk factors to identify vulnerable people- such as those with learning disabilities, mental health issues, carers of vulnerable groups.	targeted programmes are successful- see the meningococcal vaccination programme- and significantly reduce disease occurrence. Although pneumonia has an associated vaccination programme, this is poorly understood and does not consider wider community and vulnerable groups who would benefit from the vaccination.	COPD audit, diabetes, sepsis and care bundles for these diseases) that targeting vaccination is useful- we also know that significant variation in provision, health care professional knowledge and understanding of risk is variable- NRAD (2014) identified risk factors for death in asthma- which linked to Mental health conditions, learning disabilities, poor education and carers who did not prioritise their own health- even though some of these are indicators for anti-pneumonia vaccination these people are not always targeted for vaccination.
052	SCM6	Additional developmental areas of emergent practice	Vaccination schedules – dissemination of and consideration of pneumonia prevention –pathogen causal agents and education of public/ carers/parents etc.	Uptake for anti- pneumonia vaccinations is sporadically spread and subject to significant regional variation- newer vaccinations schedules are poorly understood by public and health care professionals- promotion and justification for vaccination is variable.	See CCG commissioning data and PHEngland data sources. E.g. influenza vaccine uptake the cross relationship between contracting influenza and susceptible people developing pneumonia.

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1.13 General comments					
053	SCM6	Adherence to CAP guidelines (NICE or local based on NICE)	NICE Guidelines provide best evidence base for clinical practice	In BTS audit only 50-80% (depending in illness severity) of patients were managed according to local CAP guidelines	NICE CG 191 Lim WS, Woodhead M on behalf of the British Thoracic Society. British Thoracic Society adult community acquired pneumonia audit 2009/10 Thorax 2011;66:548-549
054	SCM3	Additional evidence sources for consideration	Surviving Sepsis Campaign. International Guidelines for Management of Severe Sepsis and Septic Shock. 2012. Available at: http://www.sccm.org/Documents/SSC-Guidelines.pdf (last accessed 23 January 2015) https://www.brit-thoracic.org.uk/document-library/audit-and-quality-improvement/care-bundles-project/bts-pilot-care-bundle-project-report-2014/		
055	SCM2	Additional developmental areas of emergent practice	Not familiar with any emergent practice to comment except to request that any new treatment that improves diagnosis and treatment is universally adopted without unnecessary delay.		
056	British Lung Foundation	The British Lung Foundation was not able to submit its own response on the development of QS for Pneumonia on this occasion, but we have been in touch with the British Thoracic Society during the development of their response. We would therefore like to support and endorse their response to this consultation			
057	Royal College of Physicians	Just to confirm that the RCP is very happy to endorse the response submitted by the BTS.			
058	SCM5	Additional evidence sources for consideration	American Thoracic Society and Infectious Diseases Society of America CAP Guidelines Clin Inf Dis 2007;44 Suppl 2 S27-72		
059	British Geriatrics Society	Additional evidence sources for consideration	Guidelines for management of adult lower respiratory tract infections . Clin Microbiology and Infection Volume 17, Supplement 6 November 2011		
060	SCM6	Additional evidence sources for consideration	Outside the UK- in developing world the PERCH study is reviewing the aetiological causes of pneumonia in children- which leads in poorer countries with areas of high poverty to high child death related to pneumonia. Interesting to identify the causal agents, as current thinking relates pneumonia in children causal agents in the main to be		

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			Streptococcus pneumoniae and Haemophilus influenzae type b (Hib). See Levine et al., (2015) The pneumonia etiology research for child health project: a 21st century childhood pneumonia etiology study. Clinical Infectious Diseases 54 (suppl 2) pS93-S101. We should be prepared for newer epidemics aetiological causes of pneumonia- from across the world, see ebola, SARS etc., which caused more than significant concern- sources of pneumonia should be considered from a world wide perspective.		