

## **Protocol Training**

- Presenter -
- Institution -





## **Trial Overview**

## PediCAP (Paediatric Community Acquired Pneumonia)

Impact of oral step-down to amoxicillin or co-amoxiclav and of duration of antibiotic therapy on effectiveness, safety and selection of antibiotic resistance in severe childhood community-acquired pneumonia (CAP): a randomised controlled trial



### Learning Objectives for PediCAP Protocol Training

- Background
  - Research Question
  - Outcomes
  - > Trial Design
- Participants
  - Sites and participants
  - Inclusion and Exclusion Criteria
- Trial
- Screening and Recruitment
- Consent and Randomisation
- Treatments
- > Trial assessments and substudies
- Early stopping and lost to follow up



## Background



#### In this section:

- Research Question
- Outcomes
- Trial Design

## Research Questions

For hospitalised children with severe CAP, the specific objectives of the PediCAP trial are to answer the following questions:

Is the rate of clinical cure superior with co-amoxiclav 7:1 versus amoxicillin oral step-down therapy?

What is the optimal antibiotic treatment duration that achieves good rates of clinical cure whilst minimising length of hospital stay, toxicity and acquisition of multidrug antimicrobial resistance?

(Co-Primary Objectives)



## Research Questions

For hospitalised children with severe CAP, the specific objectives of the PediCAP trial are to answer the following questions:

- ▶ Does the optimal duration vary by key characteristics, such as age, underlying conditions or risk factors such as HIV exposure, malnutrition or severity, suggesting that antibiotic selection or duration should be personalised to specific subgroups?
- ▶ What plasma exposures of amoxicillin and clavulanate are achieved with standardised allometric-based dosing of co-amoxiclav in 4:1, 7:1 and 14:1 dispersible tablets, and do any have significant advantages in terms of PK or toxicity?

Pedi

## Outcome Measures

### **Primary Outcomes**

For the main trial (PediCAP-A):



► Hospital readmission or death within 28 days of randomisation (all-cause)

For the Phase II PK trial (PediCAP-B):

▶ Plasma exposure to amoxicillin and clavulanate





### **Secondary Outcomes**

#### For the main trial (PediCAP-A), within 28 days of randomisation:

#### Clinical

- > CAP-related readmission or CAP-related mortality
- > Length of stay required during the index hospitalisation, and overall through 28 days
- Mortality (all-cause)
- > Duration of supplemental oxygen during the index hospitalisation
- > Total days of antibiotic exposure through 28 days
- Modification of randomised antibiotics for any reason except early stopping or receipt of subsequent course of antibiotics for any reason
- > Modification of randomised antibiotics for inadequate response or additional courses for CAP relapse





### **Secondary Outcomes**

For the main trial (PediCAP-A), within 28 days of randomisation:

#### Safety

- Serious adverse events
- > Grade 3 or 4 adverse events
- > Adverse events of any grade related to antibiotics
- Key solicited events, specifically diarrhoea, vomiting and gastrointestinal disorders, skin rash, thrush/candida
- Modification of antibiotics for adverse reactions
- > Specific clinical complications, including sepsis, lung abscess, empyema
- > Line complications

#### **Substudies**

- ➤ Antimicrobial resistance (see Substudies below)
- Cost and cost-effectiveness (see Substudies below)





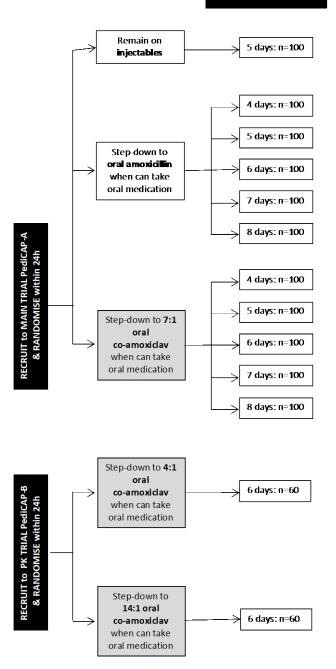
## Trial Design

An open-label, parallel group, 2x5 factorial randomised trial assessing 2 different oral step-down antibiotics (amoxicillin and co-amoxiclav given after intravenous antibiotics for a total of 5 different durations (factorial design) with an additional continued intravenous control group, using a novel design to optimise duration of treatment (main trial, PediCAP-A)

Plus a parallel Phase II pharmacokinetic (PK) trial comparing two additional different ratios for one of the oral step-down options, co-amoxiclav (14:1 and 4:1) (PediCAP-B), to enable the PK of all three ratios to be compared across the main trial (PediCAP-A) and the PK trial (PediCAP-B)

## Trial Schema

Aged 2m-6y
admitted to
participating
centres with
severe
pneumonia,
treated with
WHOrecommended
injectable
regimen for at
least 24 hours



Follow-up to 28 days post randomisation for

#### Primary outcome:

 Hospital readmission or death

#### Secondary outcomes:

- CAP-related readmission /death
- Length of stay
- Mortality
- Duration of supplemental oxygen
- Total antibiotic exposure
- Modification of trial antibiotics
- Serious adverse events
- Grade 3 or 4 adverse events
- Adverse events related to antibiotics
- Diarrhoea/vomiting and gastrointestinal disorders/skin rash/thrush/candida
- Modification of antibiotics for adverse reactions
- Specific dinical complications
- · Line complications
- Antimicrobial resistance
- Costs and costeffectiveness

#### PK substudy primary outcome:

 Plasma exposure to amoxicillin and clavulanate acid



## PediCAP Substudies

#### ► Pharmacokinetics (PK) - this includes PediCAP - B:

What is the PK of amoxicillin and clavulanic acid when administered as step-down in severe childhood CAP in three different ratios (7:1, 4:1 and 14:1)?

- 60 of 500 children randomised to co-amoxiclay 7:1 in PediCAP-A
- 120 children randomised to co-amoxiclay 4:1 vs 14:1 in PediCAP-B

#### Microbial sampling:

Are there any changes in nasopharyngeal and faecal prevalence of antimicrobial resistance in relation to randomisation to amoxicillin/co-amoxiclav, duration of antibiotic exposure and inpatient stay?

- 330 children from across PediCAP-A

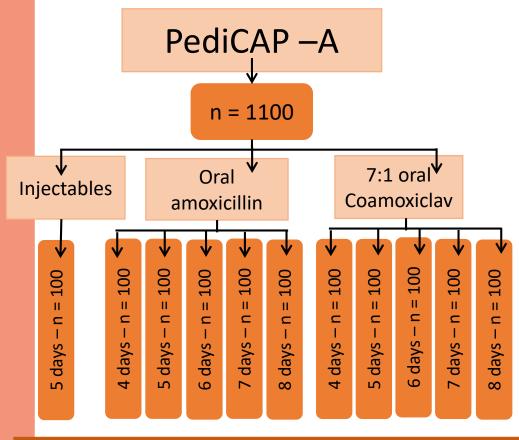
#### ► Health economics and equity:

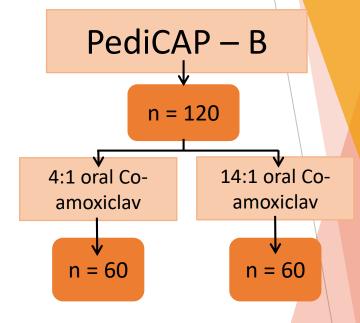
What are the costs and cost-effectiveness of different treatment strategies in the randomised trial as well as their equity impacts at household level?

### **Duration**

Recruitment for 23 months (2 years in total)

## Recruitment





Microbiology Sub-Study

n = 330

PK Sub-Study

n = 180



# PediCAP Protocol Background Summary Questions

What is the primary outcome for the main trial (PediCAP-A)?

What are the three PediCAP substudies?

# PediCAP Protocol Background Summary Questions

What is the primary outcome for the main trial (PediCAP-A)?

Hospital readmission or death within 28 days of randomisation (all-cause)



What are the three PediCAP substudies?

- Pharmacokinetics (PK)
- Microbial sampling
- Health economics and equity

## **Participants**



#### In this section:

- Sites and participants
- > Inclusion and Exclusion Criteria

## **PediCAP Sites**

#### Zambia

University Teaching Hospital, Lusaka



#### South Africa

- University of Witwatersrand, Johannesburg
- African Health Research Institute and University of Kwa-Zulu-Natal, Durban



 Mulago National Referral Hospital and Makerere University College of Health Sciences, Kampala



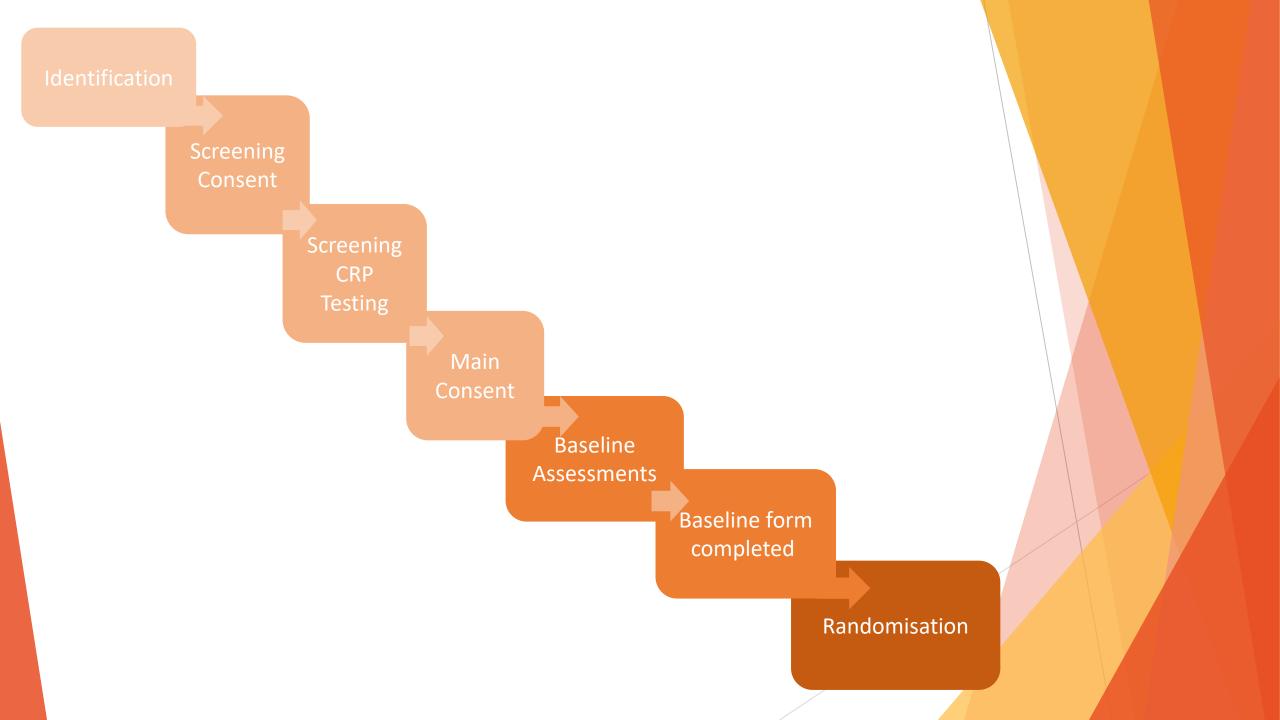
### Zimbabwe

Parirenyatwa and Harare Central Hospitals and the University of Zimbabwe Clinical Research Centre, Harare









## **Participants**

Children aged2 months to 6years inclusive

Weighing >= 3kgand <30kg</li>

 Hospitalised with severe community acquired pneumonia

• Who are about to start or who have started intravenous antibiotics for severe CAP

• With C-reactive protein >10 mg/l on a semi-quantitative point-of-care test at screening



# Inclusion and Exclusion Criteria



## **Inclusion Criteria**



## Aged 2 months to 6 years inclusive

Weighing >= 3kg and <30kg (to align with weightbanded dosing schedule for the oral trial medications)

Admitted to hospital with severe pneumonia judged to require at least 24h of intravenous antibiotics by the treating physician



## **Inclusion Criteria**

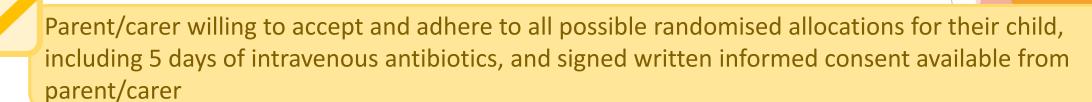


- intravenous benzylpenicillin plus gentamicin,
- ampicillin plus gentamicin,
- benzylpenicillin or ampicillin alone,
- ceftriaxone alone or cefotaxime alone



Received at most 24h of these intravenous antibiotics at the point of randomisation

(that is, first dose of any intravenous antibiotics must have been administered no more than 24h previously at randomisation)





Available for follow-up for the entire study period; specifically, parent/carer willing to return with their child to clinic at 4 weeks, and be contacted at minimum by telephone at weeks 1, 2 and 3



## **Inclusion Criteria**

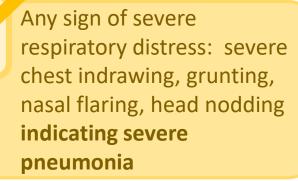


Difficulty breathing (with or without cough reported by parent/carer)



one or more the following occurring at any time from admission up to randomisation:

Central cyanosis or hypoxaemia (room air pulse oximetry <90%) indicating severe pneumonia





#### Signs of pneumonia

- fast breathing (defined as respiratory rate
   ≥50 breaths per minute at age 2-11
   months and ≥40 breaths per minute at age 1 years or older or chest indrawing)
- PLUS a general danger sign indicating severe pneumonia

# Inclusion Criteria Pneumonia with general danger signs

- Tachydyspnoea, i.e. age-adapted fast-breathing or chest-indrawing
- General danger signs (WHO) relevant for PediCAP

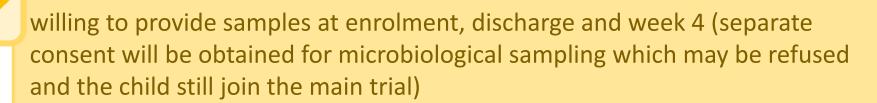


## Substudies - Additional Inclusion Criteria

► If undergoing additional PK sampling:

willing to provide samples and potentially to stay in hospital for up to an additional 12h (separate consent will be obtained for PK sampling which may be refused and the child still join the main trial; specific consent for PK sampling is required for inclusion in the Phase II PK trial)

▶ If undergoing additional microbiological sampling:





## **Exclusion Criteria**





Point-of-care semi-quantitative C-reactive protein (CRP) test < 10mg/l at screening (very unlikely to represent severe pneumonia requiring antibiotics)



Likely nosocomial pneumonia (onset >48h post-admission)



Admitted to hospital overnight in the last 28 days (possibility of nosocomially acquired pneumonia)



Known or anticipated need for invasive ventilation or admission to intensive care



Clinician considers this episode to be predominantly due to reactive airways disease (e.g. asthma)

## **Exclusion Criteria**





Clinician considers this episode to be due to viral bronchiolitis alone in a child under 1 year



Documented allergy to any drug from the penicillin class or contraindications to penicillin/amoxicillin/co-amoxiclav



Anticipated need for systemic treatment with an antibiotic other than trial regimens during hospital admission or in the following 28 days (e.g. for *Pneumocystis jiroveci*)



On long-term antibiotics for prophylaxis or treatment (e.g. for tuberculosis treatment or cotrimoxazole prophylaxis for HIV infection)



Previously enrolled in PediCAP

# PediCAP Protocol Participant Summary Questions

What four African countries are participating in this study?

What is the age range we are recruiting for in this study?

# PediCAP Protocol Participant Summary Questions

What four African countries are participating in this study?

Zambia

South Africa



Uganda

Zimbabwe

What is the age range we are recruiting for in this study?



Children aged2 months to 6years inclusive

#### The Trial

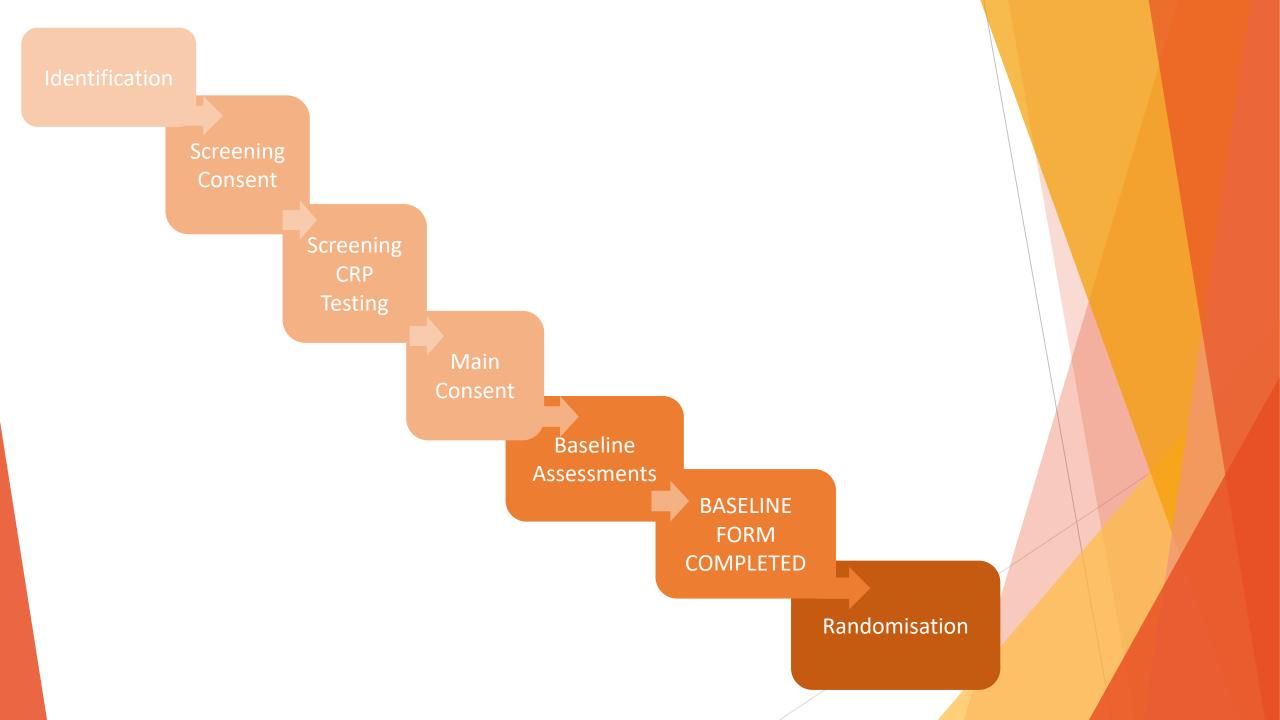


#### In this section:

- Screening and Recruitment
- Consent and Randomisation
- > Treatments
- Trial assessments and substudies
- Early stopping and lost to follow up

## Screening and Recruitment





## **Screening Procedures**

Identification

**Screening Consent** 

**Screening CRP Testing** 

Potentially eligible children will be identified prior to completing 24h of IV antibiotics

Screening
Patient
Information
Sheet
provided to
parents/
carers

Written informed consent for screening procedures obtained

Trial specific point of care CRP testing

Eligible children (requiring CRP > 10mg/l) are potentially eligible

## **Consent Procedure**

Main Consent obtained

For potentially eligible children, an information sheet for the full trial will be provided to parents/carers

Find the time to go through everything with families – fully informed consent



## Randomisation



## Baseline and Randomisation

Baseline Assessments FORM and SCREENING FORM COMPLETED

Randomisation

- Medical and social history
- Weight
- Vital signs
- Clinical characteris tics relevant to the episode

Forms sent directly onto secure web-based trial database

Details of child's treatment allocation generated and provided to study team

### Randomisation

- ► Eligible children should be randomised as soon as possible, prior to completing 24h of IV antibiotics
- Confirmation of eligibility criteria and written informed consent must be obtained before randomisation

MICROBIOLOGY SUBSTUDY: Nasopharyngeal and peri-rectal swabs taken as soon as possible after consent

- ► Randomisation for PediCAP-A will be stratified by site
- Randomisation for PediCAP-B will be stratified by weight band only

### **Treatments**



### Intravenous Antibiotics (All Children)

- At point of randomisation, children should have received no more than 24h of IV antibiotics
- SOC IV treatment should be at least 24 hours for all children (i.e minimum of two IV doses)





- Dose should follow the local standard of care which generally follow WHO recommendations where given (local SOC may differ)
- Choice made by treating physician prior to randomisation
- Those randomised to IV antibiotics will be treated for 5 days in total

### Intravenous Antibiotics (All Children)

Drug	SCHEDULE
Ampicillin	IV/IM: 50 mg/kg every 6 hours
Benzylpenicillin (penicillin G)	IV: 50'000-100'000 U/kg every 6 hours
Cefotaxime	IV: 50 mg/kg every 6 hours or 33.3 mg/kg every 8
	hours
Ceftriaxone	IV: 80 mg/kg/d as a single dose once daily
	OR
	IV/IM: 50 mg/kg every 12 hours (max single dose 4g)
	OR
	IV/IM: 100mg/kg as a single dose once daily
Gentamicin	IV/IM: 5-7.5 mg/kg as a single dose once a daily
Procain benzylpenicillin (penicillin G for IM	IM: 50'000 U/kg once a day
administration)	

Dosing of standard intravenous antibiotics

### Oral Step-Down Procedures

Children who have received at most 24h of intravenous antibiotics will be randomised to stepdown from intravenous antibiotics when they are clinically stable and able to take oral medication



- Child should have improved clinically, be currently clinically stable or continuing to improve
- ► To be well enough to take medication by mouth i.e. can ingest or keep down the dispersible tablets when made up in a small amount of liquid
- May move to oral medication whilst inpatients e.g. if they are still receiving supplemental oxygen

### PediCAP-A

# Oral amoxicillin or oral co-amoxiclav (7:1 amoxicillin:clauvulanate) or IV antibiotics

- Children randomised to oral amoxicillin or co-amoxiclav will stepdown from intravenous antibiotics when they are clinically stable and able to take oral medication to:
  - ▶ either oral amoxicillin or oral co-amoxiclav (7:1) (1:1), both as dispersible tablets
  - ▶ for a total duration of 4, 5, 6, 7 or 8 days antibiotics (1:1:1:1:1) (from start of intravenous antibiotics);
- Children randomised to the iv arm will remain on intravenous antibiotics for a total of 5 days following current WHO recommendation

# PediCAP-A Oral amoxicillin or oral co-amoxiclav (7:1 amoxicillin:clauvulanate)

FORMULATION	WEIGHT BAND	# TABLETS AM	# TABLETS PM	# TABLETS DAILY	DAILY DOSE (MG)		
Amoxicillin (250mg tablets)	3 - <6kg	1	1	2	500		
	6 - <10kg	2	1	3	750		
	10 - <14kg	2	2	4	1000		
	14 - <20kg	3	3	6	1500		
	20 - <25kg	4	4	8	2100		
	25 - <35kg	5	5	10	2500		
Co-amoxiclav 7:1 (200/28.5mg tablets)	3 - <6kg	1	1	2	400/57		
	6 - <10kg	2	2	4	800/114		
	10 - <14kg	3	2	5	1000/142.5		
	14 - <20kg	4	4	8	1600/228		
	20 - <25kg	5	5	10	2000/285		
	25 - <35kg	6	6	12	2400/342		

Dosing for oral amoxicillin and co-amoxiclav

### PediCAP-B Oral co-amoxiclav (4:1 or 14:1)

- In the parallel Phase II PK trial (PediCAP-B), children who have received at most 24h of intravenous antibiotics will be randomised to step-down from intravenous antibiotics when they are clinically stable and able to take oral medication to
  - ▶ either oral co-amoxiclav 4:1 or 14:1 (1:1) for a total duration of 6 days antibiotics (from start of intravenous antibiotics)
- ▶ All children will receive at least 24h of intravenous antibiotics before stepping down to oral medication.

### PediCAP-B Oral co-amoxiclav (4:1 or 14:1)

FORMULATION	WEIGHT BAND	# TABLETS AM	# TABLETS PM	# TABLETS DAILY	DAILY DOSE (MG)		
Co-amoxiclav 4:1 (250/62.5mg)	3 - <6kg	1	1	2	500/125		
	6 - <10kg	2	1	3	750/187.5		
	10 - <14kg	2	2	4	1000/250		
	14 - <20kg	3	3	6	1500/375		
	20 - <25kg	4	4	8	2000/500		
	25 - <35kg	5	5	10	2500/625		
Co-amoxiclav 14:1 (150/10.725mg)	3 - <6kg	2	1	3	450/32.175		
	6 - <10kg	3	2	5	750/53.625		
	10 - <14kg	4	3	7	1050/75.075		
	14 - <20kg	5	5	10	1500/107.25		
	20 - <25kg	6	7	13	1959/139.425		
	25 - <35kg	8	8	16	2400/171.6		

Dosing for oral co-amoxiclav

### Total Duration of Antibiotics for PediCAP







Begin SOC IV Antibiotics for 24 hours

#### **RANDOMISE**

IV antibiotics

5 days total 4 days

24 hours

Continue IV antibiotics

7:1 Oral Coamoxiclav for 6 days

Continue IV



Oral Amoxicillin
for 4 days

Ready for oral step down immediately after 24 hours iv

### **Trial Assessments**



### Face to Face Assessments

A physical examination must be performed at each face-to-face assessment, including acute events if the child returns to the randomising site.

The following will be recorded for all face-to-face assessments:



Vital signs
 (respiratory and
 heart rate,
 oxygen
 saturation) and
 temperature
 (during
 hospitalisation
 only)



Symptoms and clinical signs, specific solicited side-effects and adverse events



Concomitant care/healthcare utilisation



Results of any haematology/biochemistry/microbiological investigations/chest X-rays undertaken as part of the usual standard of care, but not required by the trial



Children will be weighed on the day of stepdown to oral antibiotics to ensure correct dosing and at the week 4 face to face visit.

### Telephone\Contacts

A review of clinical signs and symptoms must be performed at each telephone contact during follow-up. At a minimum, the following will be recorded:



- Standardised symptom checklist including review of cough, presence of rapid breathing, fever, general state and common known side effects of amoxicillin or co-amoxiclay.
- Solicited clinical adverse events since last protocol contact, including rashes, diarrhoea, vomiting, gastrointestinal events, and thrush/candida.
- Any acute illnesses requiring assessment by a healthcare provider (including traditional healers) since last protocol contact, including whether any antibiotic prescriptions were issued.
- Systemic antibiotic treatment since last protocol contact, including, as appropriate, adherence to PediCAP treatment and whether any additional/new antibiotic prescriptions were issued.
- Adherence and tolerability of PediCAP treatment, including any medication errors (week 1 only).
- Concomitant care/healthcare utilisation (including traditional healers).

## Substudies

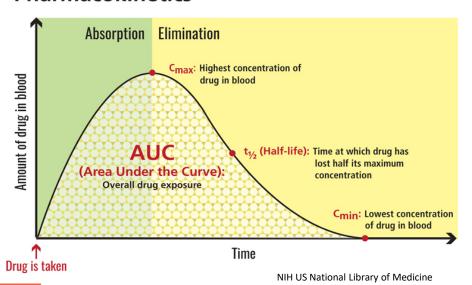


### PK Sampling Substudy

- Additional written informed consent will be obtained to take part in the PK substudy
- PK sampling will occur immediately before and then after the first morning dose



#### **Pharmacokinetics**



- Will consist of 5 samples per child weighing 6kg or more
  - before observed dosing (5-10 min pre-dose),
  - during early absorption (0.25-1h post dose),
  - around the expected Cmax (1-2h),
  - during early disposition (2-6h),
  - and in the terminal phase (6-12h).

# Early Stopping & Lost to Follow up



# Early Stopping of Follow Up

- The parent/carers wishes regarding trial treatment and trial follow-up should be respected at all times.
- If a parent/carer who chooses to discontinue trial treatment for their child remains happy to follow the other trial procedures and follow-up schedule, their child may remain in the trial "on-study, off-study-treatment".
- If they do not wish to remain on trial follow-up, their decision must be respected and the child will be withdrawn from trial follow-up.
- If follow-up is stopped early, the anonymised medical data collected during their participation in the trial will be kept and used in the analysis
- Consent may be withdrawn at the discretion of the parent/carer for the future use of any stored samples.
- Children who stop trial follow-up early will not be replaced.



### Lost to Follow Up

- Follow up is for 28 days
- ► Telephone contact after 1, 2- and 3-weeks post randomisation to ensure that contact is maintained before the face to face follow up at week 4.
- A child will be classified as "lost-to-follow-up" (meaning no further attempts at contact are made) only when three unsuccessful attempts have been made to contact the parent/carer following non-attendance at the face-to-face follow-up in week 4.

# PediCAP Protocol Trial Summary Questions

When should randomisation take place for all eligible children?

What six things should be recorded at face to face assessments?

# PediCAP Protocol Participant Summary Questions

### When should randomisation take place for all eligible children?

As soon as possible, prior to completing 24h of IV antibiotics

#### What six things should be recorded at face to face assessments?



Vital signs



Symptoms and clinical signs,



Concomitant care/ healthcare utilisation



•

Results of any We haematology/biochemistry/microbiologicalinvestigations/chest X-rays



Weight

And Physical Examination

# Questions?



## Thank you for listening





### Training Workshop PediCAP Protocol Assessment

Please complete the following Assessment to test your learning and progress on the Pneumonia in Children workshop, covering pneumonia background, general aspects and clinical topics covered in this e-learning. There are 10 multiple choice questions (MCQs) to answer. To pass, you will need to achieve 80%.

Start the Assessment →





Question 1. Select the option that is <u>NOT</u> a trial arm that eligible children can be randomised to.

a. Oral Amoxicillin for 5 days

b. Oral 14:1 Co-amoxicillin for 6 days

c. Oral 7:1 Co-amoxicillin for 7 days

d. Oral 4:1 Co-amoxicillin for 3 days

That is the correct answer!

I am afraid that is incorrect......

← Try Again

Question 2. A 6 month old child weighing 8kg has been admitted with difficulty breathing and SpO2 of 89%, and is about to start on IV ampicillin plus gentamicin.

Can you approach this child and their parents to participate into the PediCAP study?



That is the correct answer!

I am afraid that is incorrect......

← Try Again

Question 3. A 5 year old child weighing 17kg was admitted 3 days ago and is presenting with difficulty breathing and signs of respiratory distress and is about to start on IV benzylpenicillin plus gentamicin.

Can you approach this child and their parents to participate into the PediCAP study?



That is the correct answer!

I am afraid that is incorrect......

← Try Again

Question 4. A 3 month old child is admitted and presenting with a cough, fast breathing and lethargy, and is has started IV ceftriaxone alone. Their parents have signed screening consent and their screening CRP results are 8mg/l.

Is this child eligible to participate into the PediCAP study?



That is the correct answer!

I am afraid that is incorrect......

← Try Again

Question 5. A 4 year old child is admitted with pneumonia. Their parents have signed screening consent and their screening CRP results are 11mg/l. They have been on IV cefotaxime alone for two days.

Is this child eligible to participate into the PediCAP study?



That is the correct answer!

I am afraid that is incorrect......

← Try Again

Question 6. A child is randomised onto the PediCAP study into the Oral amoxicillin arm for 8 days. They are ready to step down after 3 days of IV antibiotics.

What is the total duration that this child will receive antibiotics?

a. 12 days

b. 13 days

c. 14 days

d. 15 days

That is the correct answer!

I am afraid that is incorrect......

← Try Again

Question 7. A child is randomised onto the PediCAP study into the Oral 14:1 coamoxicillin arm for 6 days. They are ready to step down after 5 days of IV antibiotics.

What is the total duration that this child will receive antibiotics?

a. 10 days

b. 11 days

c. 12 days

d. 13 days

That is the correct answer!

I am afraid that is incorrect......

← Try Again

Question 8. When should a child NOT step down to oral antibiotics?

- a. They are still an inpatient and on Oxygen
- b. They are able to keep down dispersible tablets
- c. They are unable to keep down dispersible tablets
  - d. They are clinically stable

That is the correct answer!

I am afraid that is incorrect......

← Try Again

Question 9. Which of the following statements is correct in regard to Early stopping and lost to follow up

- a. Patients should be contacted unsuccessfully at least three times before deemed lost to follow up
- b. Parents should be persuaded to stay on to the trial if they decide to withdraw
- c. If Parents decide to discontinue treatment, they must withdraw from all study procedures
  - d. Children who have discontinued early must be replaced

That is the correct answer!

I am afraid that is incorrect......

← Try Again

Question 10. A child has been recruited for the microbiology substudy, when are the samples for the <u>NOT</u> collected during the study?

a. Trial Entry

b. First Dose of Step Down Antibiotics

c. Day of Discharge

d. Week 4 Follow up visit

That is the correct answer!

Continue →

I am afraid that is incorrect......

← Try Again

Continue →



Congratulations for completing the assessment.

Your score is XX%.

Complete the Assessment Again →



