**Nursing Home Antibiotic Data Entry and Cleaning Guide**

1. Create a Master spreadsheet for each nursing home in which raw data will be combined. Sheet should be set up with the following column headings at a minimum:

a. Resident identifier (unique identifier to determine antibiotic starts)

b. Resident location (in order to evaluate antibiotic use by location)

c. Drug name

d. Sig (1-6)

e. Start date

f. Days of Therapy (DOT) or end date so DOT can be calculated manually

g. Administration route (PO, IV, IM, INH)

h. Quantity dispensed

I. Prescriber’s name

2. If electronic file, copy raw data into “raw data” tab of Master spreadsheet.

3. On “masterlist” tab, remove all prescriptions for topical, ophthalmic or otic agents (or just don’t enter them if you are entering manually from paper files).

4. Remove all prescriptions that state they are for Pyxis or E-box replacement or for floor stock.

5. Remove all non-systemic prescriptions including those with directions to “swish and spit” or to crush and sprinkle on wound.

6. Standardize drug names into the **Drug2** column so that only the name of the drug is entered. For example, if the **Drug** column equals CEFPODOXIME 200 MG TABLET, then **Drug2** would equal CEFPODOXIME.

7. Assign a classification number to each drug in the **Drug Type** column following the scheme below:

|  |  |
| --- | --- |
| Drug Type |  |
| 1 | Antibiotic  |
| 2 | Antiviral |
| 3 | Antifungal |
| 4 | Antiprotozoal/Antiparasitic |
| 5 | Other – prescribed for non-infectious reason\* |

Refer to Table 1 to help classify drugs.

\*Non-infectious indications may include but are not limited to hepatic encephalopathy, Crohn’s disease, irritable bowel syndrome, rheumatoid arthritis, chronic gastroparesis, hyperammonemia, lupus (could be abbreviated SLE), and polymyalgia rheumatic (PMR). If you’re not sure how to classify a drug, use resources including [Up to Date](https://www.urmc.rochester.edu/Libraries/miner/uptodate/login.aspx?ReturnUrl=%2flibraries%2fminer%2fuptodate%2fgoto_UpToDate.asp), the Nursing Drug Handbook, or any reliable medical website.

8. Standardize indication into specified syndromes (see Table 2) in Indication2 column. It may be necessary to find the indication in one of the “Sig” columns. Refer to Table 3 for common abbreviations found in the sig.

9. *[Optional depending on nursing home]:* Verify that the DOT is correct and recalculate when necessary.

* DOT is defined as the cumulative number of days that each antibiotic is received per patient. For example, if a patient is receiving 10 days of ciprofloxacin and 5 days of cephalexin for a UTI, then the DOT for UTI would be 15 days regardless of whether the dates of the prescriptions overlap. Some nursing homes may not calculate this appropriately so there is a need to double check this column. To calculate DOT, use the indication, the quantity dispensed, and the directions for use (i.e., the sig) to determine how many days the patient is receiving therapy for.

 10. Populate the Quarter and Year columns (start month will populate automatically when you enter the date of the prescription).

11. Many of the prescriptions will have an unknown indication; some of which you may be able to populate based on other prescriptions the patient is receiving. Rules for determining whether to complete an unknown indication are as follows: if it’s the same resident, prescribed the same drug for an unknown indication within 4 days of a prescription with a known indication, then we assume it’s for the same indication. For example:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **RX Number** | **Patient Name** | **Rx Date** | **Drug Name** | **Indication2** | **Changes to Indication2** |
| 1 | Smith, John | 12/1/16 | Ciprofloxacin | UTI | None |
| 2 | Smith, John | 12/1/16 | Cefepime | Unknown | None |
| 3 | Smith, John | 12/4/16 | Doxycycline | Unknown | None |
| 4 | Smith, John | 12/4/16 | Ciprofloxacin | Unknown | UTI |

Use SAS code below to population unknown indications based on the previous rule and to combine dispenses into antibiotic starts.

\* start by importing the excel file of the comparison of previous period to new period (*italicized code should be replaced with local file names*);

**PROC** **IMPORT** OUT=test

 DATAFILE= "*location of antibiotic data*.csv"

 DBMS=csv REPLACE;

**RUN**;

**proc** **sort** data=test out=test;

 by pt\_id drug2 indication2 start\_date; \*input data must be set up using these headers;

**run**;

**proc** **print** data=test;

var pt\_id drug2 indication2 days\_supply start\_date startqt;

**run**;

**data** collapse(drop=days\_supply /\*start\_month startqt quantity indication1 totcnt drug\_type year\*/ save\_ind enddate savestart tempsave tempind tempqtr drug\_type outflag);

 set test;

 by pt\_id drug2 indication2 start\_date;

\*put pt\_id first.pt\_id drug2 first.drug2 last.drug2 outflag;

 if first.pt\_id and last.pt\_id then do;

 antibiotic\_start=**1**;

 therapy\_days=days\_supply;

 output;

 end;

 else do;

 outflag=**0**;

 if first.drug2 and last.drug2 then do;

 antibiotic\_start=**1**;

 therapy\_days=days\_supply;

 outflag=**1**;

 output;

 end;

 else do;

 if first.drug2 then do;

 save\_ind=indication2;

 antibiotic\_start=**1**;

 therapy\_days=days\_supply;

 enddate=(start\_date+days\_supply)-**1**;

 savestart=start\_date;

 saveqtr=startqt;

 end;

 else do;

 if indication2=save\_ind then do;

 if (start\_date > enddate+**4**) then do;

\* save the startdate and quarter from this record temporarily;

 tempsave=start\_date;

 tempqtr=startqt;

\* now put the correct data back in for start date and startqt;

 start\_date=savestart;

 startqt=saveqtr;

 outflag=**1**;

 output;

\* first check to see if this is the last.drug - that would mean that there are no more to compare to and this record can be output;

\* put the startdate and quarter back into this record and now set up new enddate, new therapy days;

 start\_date=tempsave;

 startqt=tempqtr;

 therapy\_days=days\_supply;

 if last.drug2 then do;

 outflag=**1**;

 output;

 end;

 else do;

 enddate=(start\_date+days\_supply)-**1**;

 savestart=start\_date;

 saveqtr=startqt;

 outflag=**0**;

 end;

 end;

 else do;

\* add the supply\_days to therapy\_days and set a new enddate;

 therapy\_days = therapy\_days + days\_supply;

\* added logic below on 5/18/17;

\* I need to check to see if the start\_date is less than the original end date that I had. If it is then I want to keep the original end date

and add the days supply to that to extend the end date. For example if someone started a prescription on 4/10 for 6 days and then started another one on 4/11 for 1 day,

The original end date would be 4/16. 4/11 is less than 4/16 so I would want to keep the end date of 4/16 and add 1 day instead of making it 4/11 + 1 day.;

 if start\_date<enddate then enddate=(enddate+days\_supply)-**1**;

 else enddate=(start\_date+days\_supply)-**1**;

 if last.drug2 then do;

\* put the correct startdate and start quarter back on the record;

 start\_date=savestart;

 startqt=saveqtr;

 outflag=**1**;

 output;

 end;

 end;

 end;

\* this is when it is the same patient, same drug but different indication - start all over again;

\* put the saved start date in for the output record, and the saved indication in for the output record;

 else do;

\* hold the start\_date and indication for this record until I output the record;

 tempsave=start\_date;

 tempind=indication2;

 tempqtr=startqt;

\* put the original start\_date and indication back in and then output the record;

 start\_date=savestart;

 indication2=save\_ind;

 startqt=saveqtr;

 outflag=**1**;

 output;

\* Now set up the new enddate, new therapy days, new start date and new indication again;

 start\_date=tempsave;

 indication2=tempind;

 therapy\_days=days\_supply;

 startqt=tempqtr;

 if last.drug2 then do;

 output;

 outflag=**1**;

 end;

 else do;

 save\_ind=indication2;

 savestart=start\_date;

 saveqtr=startqt;

 enddate=(start\_date+days\_supply)-**1**;

 therapy\_days=days\_supply;

 end;

\* go get another record;

 end;

 end;

 end;

 if last.pt\_id then do;

 start\_date=savestart;

 if outflag=**0** then output;

 end;

 end;

 retain enddate save\_ind savestart antibiotic\_start therapy\_days outflag saveqtr ;

**run**;

\* This will create a comma delimited file that can be opened in excel;

ods csv file='*output1*.csv';

**proc** **print** noobs data=collapse;

var pt\_id indication2 drug2 start\_date therapy\_days startqt;

**run**;

ods csv close;

\* Summarize the antibiotics starts by patient, drug name and indication2;

**proc** **summary** data=collapse nway;

var antibiotic\_start therapy\_days;

class pt\_id drug2 indication2 startqt;

output out=startsumm1 sum(antibiotic\_start)=total\_starts sum(therapy\_days)=total\_ther\_days;

**run**;

ods csv file="*output2*.csv";

**proc** **print** data=startsumm1 noobs;

\*where indication2='UTI';

**run**;

ods csv close;

**proc** **summary** data=collapse nway;

var antibiotic\_start therapy\_days;

class pt\_id drug2 indication2;

output out=startsumm2 sum(antibiotic\_start)=total\_starts sum(therapy\_days)=total\_ther\_days;

**run**;

ods csv file="*output3*.csv";

**proc** **print** data=startsumm2 noobs;

**run**;

ods csv close;

**Table 1. Common Drug Names and Classifications**

|  |  |  |  |
| --- | --- | --- | --- |
| **Generic**  | **Trade** | **Classification** | **Drug Type** |
| Amikacin | Amiken | Antibiotic | 1 |
| Amoxacillin/Clavulanate | Augmentin | Antibiotic | 1 |
| Amoxacillin | Amoxil, Polymox | Antibiotic | 1 |
| Ampicillin/Sublactam | Unasyn | Antibiotic | 1 |
| Ampicillin | Omnipen, Polycillin, Principen | Antibiotic | 1 |
| Azithromycin | Zithromax, Z-Pak | Antibiotic | 1 |
| Aztreonam | Azactam | Antibiotic | 1 |
| Cefaclor | Ceclor | Antibiotic | 1 |
| Cefadroxil | Duricef, Ultracef | Antibiotic | 1 |
| Cefazolin | Ancef, Kefzol, Zolicef | Antibiotic | 1 |
| Cefdinir | Omnicef | Antibiotic | 1 |
| Cefepime | Maxipime | Antibiotic | 1 |
| Cefixime | Suprax | Antibiotic | 1 |
| Cefmetazole |   | Antibiotic | 1 |
| Cefoperazone | Cefobid | Antibiotic | 1 |
| Cefotaxime | Claforan | Antibiotic | 1 |
| Cefotetan | Cefotan | Antibiotic | 1 |
| Cefoxitin | Mefoxin | Antibiotic | 1 |
| Cefpodoxime proxetil | Vantin | Antibiotic | 1 |
| Cefprozil | Cefzil | Antibiotic | 1 |
| Ceftazidime | Fortaz, Tazicef, Tazidime | Antibiotic | 1 |
| Ceftibuten | Cedax | Antibiotic | 1 |
| Ceftizoxime | Cefizox | Antibiotic | 1 |
| Ceftriaxone | Rocephin | Antibiotic | 1 |
| Cefuroxime | Ceftin | Antibiotic | 1 |
| Cephalexin | Keflex | Antibiotic | 1 |
| Cephalothin |   | Antibiotic | 1 |
| Ciprofloxacin | Cipro, Ciloxan | Antibiotic | 1 |
| Chloramphenicol | * Chloromycetin, Chloromycetin Succinate, Diochloram, Pentamycetin
 | Antibiotic | 1 |
| Clarithromycin | Biaxin | Antibiotic | 1 |
| Clindamycin | Cleocin | Antibiotic | 1 |
| Cloxacillin | Tegopen | Antibiotic | 1 |
| Dapsone | 4,4’-diaminodiphenyl sulfone (DDS) | Antibiotic | 1 |
| Daptomycin | Cubicin | Antibiotic | 1 |
| Dicloxacillin | Dycill, Dynapen, Pathocil | Antibiotic | 1 |
| Fidoxamicin | Diffacid | Antibiotic | 1 |
| Doxycycline | Vibramycin | Antibiotic | 1 |
| Enoxacin | Penetrex | Antibiotic | 1 |
| Ertapenem | Invanz | Antibiotic | 1 |
| Erythromycin | E-mycin, Erythrocin, Ilosone, EryPed, Pediazole, EES, EryTab | Antibiotic | 1/5\* |
| Gentamicin | Garamycin, Genopic | Antibiotic | 1 |
| Grepafloxacin |  | Antibiotic | 1 |
| Imipenem | Primaxin | Antibiotic | 1 |
| Levofloxacin | Levaquin, Quixin | Antibiotic | 1 |
| Linezolid | Zyvox | Antibiotic | 1 |
| Meropenem | Merrem IV | Antibiotic | 1 |
| Methicillin | Staphcillin | Antibiotic | 1 |
| Metronidazole | Flagyl | Antibiotic | 1 |
| Mezlocillin |   | Antibiotic | 1 |
| Minocycline | Minocin, Dynacin | Antibiotic | 1 |
| Moxifloxacin | Avelox, Vigamox | Antibiotic | 1 |
| Nafcillin | Unipen | Antibiotic | 1 |
| Neomycin | Mycifradin | Antibiotic | 1/5\* |
| Nitrofurantoin | Furadantin, Microdantin, Macrobid | Antibiotic | 1 |
| Norfloxacin | Noroxin | Antibiotic | 1 |
| Ofloxacin |  | Antibiotic | 1 |
| Oxacillin |  | Antibiotic | 1 |
| Piperacillin/Tazobactam | Zosyn | Antibiotic | 1 |
| Piperacillin | Pipracil | Antibiotic | 1 |
| Quinupristin/Dalfopristin | Synercid | Antibiotic | 1 |
| Rifaxamin | Xifaxan | Antibiotic | 1/5 |
| Telithromycin | Ketek | Antibiotic | 1 |
| Tetracycline | Achromycin V, Tetracyn, Tetrex | Antibiotic | 1 |
| Ticarcillin/Clavulanate | Timentin | Antibiotic | 1 |
| Ticarcillin | Ticar | Antibiotic | 1 |
| Tigeocycline | Tygacil | Antibiotic | 1 |
| Trimethoprim/Sulfamethoxazole | Bactrim, Septra, TMP/SMX | Antibiotic | 1 |
| Tobramycin | Nebcin, Tobrex | Antibiotic | 1 |
| Trovofloxacin |   | Antibiotic | 1 |
| Vancomycin | Vancocin | Antibiotic | 1 |
| **Antivirals** |
| Didanosine | Videx | Antiviral | 2 |
| Ritonoavir | Norvir | Antiviral | 2 |
| Atazanavir | Reyataz | Antiviral | 2 |
| Efavironez | Sustiva | Antiviral | 2 |
| Emtricitabine/Tenofovir | Truvada | Antiviral | 2 |
| Tenofovir | Viread | Antiviral | 2 |
| Zidovudine | AZT | Antiviral | 2 |
| Lamivudine | Epivir | Antiviral | 2 |
| Rilpivirine | Edurant | Antiviral | 2 |
| Raltegravir | Isentress | Antiviral | 2 |
| Abacavir-lamivudine | Epzicom | Antiviral | 2 |
| Darunavir | Prezista | Antiviral | 2 |
| Nelfinavir | Viracept | Antiviral | 2 |
| **Antifungals/Antiprotozoals** |  |  |  |
| Lamisil, Terbinex | Terbinafine | Antifungal | 3 |
| Voriconazole | Vfend | Antifungal | 3 |
| Amphotericin | Amphotec | Antifungal | 3 |
| Fluconazole | Diflucan | Antifungal | 3 |
| Itraconazole | Onmel, Sporanox, Sporanox Pulsepak | Antifungal | 3 |
| Ketoconazole | Nizoral | Antifungal | 3 |
| Nystatin | Mycostatin, Nilstat, Nystop | Antifungal | 3 |
| Pentamidine | Pentam, Nebupent | Antifungal/ Antiprotozoal | 3/4 |
| Primaquine |  | Antiprotozoal/ Antiparasitic | 4 |
| Atovaquone | Mepron | Antiprotozoal/ Antiparasitic | 4 |
| Ivermectin | Stromectol | Antiprotozoal/ Antiparasitic | 4 |

\*Drug Type code depends on indication. If given for non-infectious reason (i.e., gastroparesis, hepatic encephalopathy, rheumatoid arthritis, irritable bowel syndrome, crohn’s disease etc.) then drug type=5

**Table 2. Therapeutic site indications for antimicrobial use**

|  |  |
| --- | --- |
| Empiric | Antimicrobial therapy (typically broad-spectrum) commenced before the identification of the causative microbial agent is available. Therapy is prescribed based on suspected infection (i.e., suspected UTI based on presence of urinary frequency, fever, and white blood cell count >11,000 cells/L but antimicrobials are prescribed prior to urinalysis/urine culture results are obtained) and often narrowed once the microbial agent is identified. It does NOT apply to antimicrobial therapy administered for suspected infection of undetermined site (and this is documented in the medical record).  |
| Bloodstream Infection (BSI) | Bloodstream infections, excluding endocarditis and septic thrombophlebitis. Examples: bacteremia, fungemia, candidemia, catheter-related bloodstream infection. Note that “sepsis” of unclear source without positive blood cultures should NOT be categorized as BSI, but rather as Undetermined. “Sepsis” with positive blood cultures should be categorized as BSI (unless the patient has endocarditis or septic thrombophlebitis, in which case the infection should be categorized as CVI). |
| Bone/Joint Infection | Bone and joint infections including but not limited to osteomyelitis and infectious (septic) arthritis. Examples: infection in a prosthetic hip, knee, or shoulder joint. |
| Cardiovascular System Infection | Infections of the cardiovascular system, other than BSI, including but not limited to vasculitis, endocarditis, myocarditis, pericarditis or mediastinitis, and septic thromnophlebitis. |
| CNS Infection | Infections of the central nervous system including (but not limited to) meningitis, cerebritis, and spinal abscess. Examples: encephalitis, cerebrospinal fluid shunt infections, brain abscess, subdural empyema. |
| Disseminated Infection | Disseminated infection. Examples: disseminated viral infections (herpes zoster virus, cytomegalovirus). |
| HEENT Infection | Infection of the eye, ear, nose, throat or mouth including but not limited to upper respiratory infections, conjunctivitis, mastoiditis, sinusitis, pharyngitis, laryngitis, and epiglottitis. Examples: otitis externa, otitis media, thrush or oral candidiasis, infectious keratitis, endophthalmitis.  |
| *C. difficile* Infection | A positive result for a laboratory assay for *C. difficile* toxin A and/or B, or a toxin-producing *C. difficile* organism detected in the stool sample by culture or other means. |
| *C. difficile* Prophylaxis | Treatment with PO Vancomycin or Metronidazole (Flagyl) for prevention of recurrence of *C. difficile* infection (does not include treatment of current *C. difficile* infection) |
| Other GI Infection | Infections of the gastrointestinal tract (specifically, the esophagus, stomach, small and large intestine, and rectum) including but not limited to *Candida* or herpes esophagitis (NOT non-infectious esophageal irritation), gastritis, gastroenteritis, non-*C. difficile* colitis, appendicitis, diverticulitis, and typhlitis (neutropenic entercolitis). |
| Hepatobiliary System Infection | Infections of the hepatobiliary system: i.e., the liver and/or biliary system (including the pancreas). Examples: liver abscess, pancreatitis with infected pseudocyst, ascending cholangitis. |
| Other Intraabdominal Infection | Other intraabdominal infections, including infections of the spleen, not included under Other GI Infection or Hepatobiliary System Infection. Examples: peritonitis (including peritoneal dialysis catheter-related peritonitis), intraperitoneal abscesses including those related to penetrating trauma or procedures, splenic abscess, perirectal abscess. |
| Lower Respiratory Tract Infection | Infections of the lower respiratory tract and pleura including but not limited to pneumonia. Examples: infected pleural effusion, and empyema, lung abscess, pneumonia and infectious pneumonitis (including influenza-related pneumonia). Note that influenza involving only the upper respiratory tract should be categorized as HEENT Infection. Bronchitis should not be captured by this category, but rather as “Other”. |
| Reproductive Tract Infection | Infections of the reproductive tract including but not limited to vaginitis, endometritis, or cervicitis. Examples: pelvic inflammatory disease, tubo-ovarian abscess, bacterial vaginosis, epididymitis. |
| Skin/Soft Tissue Infection | Skin and soft tissue infections including but not limited to decubitus ulcer infection, cellulitis, abscess, mastitis, myositis, necrotizing fasciitis, infant pustulosis, burn infection, herpes simplex or zoster outbreaks on the skin affecting a limited number of dermatomes (i.e., not disseminated). |
| Urinary Tract Infection | Infections of the urinary tract including but not limited to urethritis, cystitis, prostatitis, and pyelonephritis. |
| Undetermined | Antimicrobial therapy administered for suspected infection of undetermined site (and this is documented in the medical record). This category applies to specific circumstance, such as antimicrobial therapy for treatment of febrile neutropenia (where the source of the fever is undetermined), and for treatment of suspected sepsis of unknown origin. It does NOT apply to circumstances where the site of the infection is suspected and documented in the chart (for example, antibiotics given to a patient for treatment of pneumonia when the patient has a fever and new infiltrate on a chest radiograph, or antibiotics given to a patient with dysuria and 100 white blood cells per low power field in an urinalysis). |
| Unknown | There is no therapeutic site documented in the medical record, and the antimicrobial use does meet the definition of “Undetermined”. The “Unknown” option should only be used when there is insufficient documentation in the medical record to make a determination about the therapeutic site(s). |
| Other | Other therapeutic site not reflected in above descriptions. Data collector should specify in space provided. |

**Table 3. Common Antibiotic Indication Abbreviations**

|  |  |
| --- | --- |
| **Abbreviation** | **Definition** |
| UTI | Urinary tract infection |
| PNA | Pneumonia |
| CAP | Community-acquired pneumonia |
| ASP PNA | Aspiration pneumonia |
| B/JI | Bone/Joint infection |
| BSI | Bloodstream infection |
| SSTI | Skin/soft tissue infection |
| COPD | Chronic obstructive pulmonary disease |
| LRTI | Lower respiratory tract infection |
| URI | Upper respiratory tract infection |