Generating antibiograms with the AMR package

AMR package developers

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This is an example R Markdown file to show the use of `antibiogram()` of the AMR package.

For starters, this is what our `example_isolates` data set looks like:

```
example_isolates
```

```
## # A tibble: 2,000 x 46
##    date       patient    age gender ward     mo           PEN   OXA   FLC   AMX
##    <date>     <chr>    <dbl> <chr>  <chr>    <mo>         <sir> <sir> <sir> <sir>
##  1 2002-01-02 A77334      65 F      Clinical B_ESCHR_COLI R     NA    NA    NA
##  2 2002-01-03 A77334      65 F      Clinical B_ESCHR_COLI R     NA    NA    NA
##  3 2002-01-07 067927      45 F      ICU      B_STPHY_EPDR R     NA    R     NA
##  4 2002-01-07 067927      45 F      ICU      B_STPHY_EPDR R     NA    R     NA
##  5 2002-01-13 067927      45 F      ICU      B_STPHY_EPDR R     NA    R     NA
##  6 2002-01-13 067927      45 F      ICU      B_STPHY_EPDR R     NA    R     NA
##  7 2002-01-14 462729      78 M      Clinical B_STPHY_AURS R     NA    S     R
##  8 2002-01-14 462729      78 M      Clinical B_STPHY_AURS R     NA    S     R
##  9 2002-01-16 067927      45 F      ICU      B_STPHY_EPDR R     NA    R     NA
## 10 2002-01-17 858515      79 F      ICU      B_STPHY_EPDR R     NA    S     NA
## # ... with 1,990 more rows, and 36 more variables: AMC <sir>, AMP <sir>,
## #   TZP <sir>, CZO <sir>, FEP <sir>, CXM <sir>, FOX <sir>, CTX <sir>,
## #   CAZ <sir>, CRO <sir>, GEN <sir>, TOB <sir>, AMK <sir>, KAN <sir>,
## #   TMP <sir>, SXT <sir>, NIT <sir>, FOS <sir>, LNZ <sir>, CIP <sir>,
## #   MFX <sir>, VAN <sir>, TEC <sir>, TCY <sir>, TGC <sir>, DOX <sir>,
## #   ERY <sir>, CLI <sir>, AZM <sir>, IPM <sir>, MEM <sir>, MTR <sir>,
## #   CHL <sir>, COL <sir>, MUP <sir>, RIF <sir>
```

Traditional Antibiogram

```
antibiogram(example_isolates,
            antibiotics = c(aminoglycosides(), carbapenems()))
```

Pathogen (N min-max)	AMK	GEN	IPM	KAN	MEM	TOB
CoNS (43-309)	0	86	52	0	52	22
E. coli (0-462)	100	98	100		100	97
E. faecalis (0-39)	0	0	100	0		0
K. pneumoniae (0-58)		90	100		100	90
P. aeruginosa (17-30)		100		0		100
P. mirabilis (0-34)		94	94			94
S. aureus (2-233)		99				98
S. epidermidis (8-163)	0	79		0		51
S. hominis (3-80)		92				85

Pathogen (N min-max)	AMK	GEN	IPM	KAN	MEM	TOB
S. pneumoniae (11-117)	0	0		0		0

Combined Antibiogram

```
antibiogram(example_isolates,
            antibiotics = c("TZP", "TZP+TOB", "TZP+GEN"))
```

Pathogen (N min-max)	TZP	TZP + GEN	TZP + TOB
CoNS (29-274)	30	97	
E. coli (416-461)	94	100	99
K. pneumoniae (53-58)	89	93	93
P. aeruginosa (27-30)		100	100
P. mirabilis (27-34)		100	100
S. aureus (7-231)		100	100
S. epidermidis (5-128)		100	100
S. hominis (0-74)		100	100
S. pneumoniae (112-112)	100	100	100

Syndromic Antibiogram

```
antibiogram(example_isolates,
            antibiotics = c(aminoglycosides(), carbapenems()),
            syndromic_group = "ward")
```

Syndromic Group	Pathogen (N min-max)	AMK	GEN	IPM	KAN	MEM	TOB
Clinical	CoNS (23-205)		89	57		57	26
ICU	CoNS (10-73)		79				
Outpatient	CoNS (3-31)		84				
Clinical	*E. coli* (0-299)	100	98	100		100	98
ICU	*E. coli* (0-137)	100	99	100		100	96
Clinical	*K. pneumoniae* (0-51)		92	100		100	92
Clinical	*P. mirabilis* (0-30)		100				100
Clinical	*S. aureus* (2-150)		99				97
ICU	*S. aureus* (0-66)		100				
Clinical	*S. epidermidis* (4-79)		82				55
ICU	*S. epidermidis* (4-75)		72				41
Clinical	*S. hominis* (1-45)		96				94
Clinical	*S. pneumoniae* (5-78)	0	0		0		0
ICU	*S. pneumoniae* (5-30)	0	0		0		0

Weighted-Incidence Syndromic Combination Antibiogram (WISCA)

```
antibiogram(example_isolates,
            antibiotics = c("AMC", "AMC+CIP", "TZP", "TZP+TOB"),
            mo_transform = "gramstain",
            minimum = 10, # this should be >= 30, but now just as example
            syndromic_group = ifelse(example_isolates$age >= 65 &
                                        example_isolates$gender == "M",
                                     "WISCA Group 1", "WISCA Group 2"))
```

Syndromic Group	Pathogen (N min-max)	AMC	AMC + CIP	TZP	TZP + TOB
WISCA Group 1	Gram-negative (261-285)	76	95	89	99
WISCA Group 2	Gram-negative (380-442)	76	98	88	98
WISCA Group 1	Gram-positive (123-406)	76	89	81	95
WISCA Group 2	Gram-positive (222-732)	76	89	88	95