Calculating Visit-Arrival Lag (valag)

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This document describes how to find the lag between the time someone visits a facility and: (a) The time that the facility's *first* message for this visit arrives at the CDC, and (b) The time that the facility's first message *with chief complaint or admit reason* arrives at the CDC. Two functions will be discussed: One to return the average lag for all facilities in a location within a specified time frame, and another to return the average lag for one facility within a specified time frame.

To use these functions, you will need to first run the code in the `valag.R` document. (*Note*: For those interesting in editing the code, I discuss it line-by-line in the `valagExplainer.pdf` document).

Preparing to use the `valag` and `valag1` functions

First, you will have to set up a connection using the `odbcConnect` function in the `RODBC` package. Load this package using the `library(RODBC)` command. An example of this code looks like:

```
channel <- odbcConnect("Biosense_Platform", "USERNAME", "********")
```

Second, you will have to install the `dplyr` package before using these functions, since the functions discussed here depend on a function within that package (as well as the `RODBC` package). After you have this set up, you are ready to run the `lag` and `lag1` functions.

The `valag` function

This function has five arguments:
1. channel = the channel you set up through `odbcConnect`.
2. begin = the *visit* date in which you wish to begin the analyses.
3. end = the *visit* date in which you wish to end the analyses.
4. table = the table in which you wish to take the data from. Specify `"PR"` or `"ST"`.
5. location = the location in which you wish to take the data from. Since I created this function for use in Kansas, the argument defaults to `KS`.

Note: The arguments for `begin`, `end`, `table`, and `location` must all be put between quotation marks.

`valag` examples

Let's say I am interested in how quickly Kansas facilities in the ST table were reporting their visits for the month of April. Here is what I would enter, followed by what the function

returns. Since the table it returns is too wide for this document, I will display the first two columns and then the second two columns below it.

```
aprilST <- valag(channel, begin="2017-04-01 00:00:00", end="2017-04-30
23:59:59", table="ST")

aprilST[,1:2]
```

```
##     C_Biosense_Facility_ID                           Facility_Name
## 1                     3783 Neosho Memorial Regional Medical Center
## 2                     3785                       Mercy Hospital Inc.
## 3                     3787             Community Healthcare Systems
## 4                     3789                    Olathe Medical Center
## 5                     3790                       Saint Luke's South
## 6                     3796                   Menorah Medical Center
## 7                     3800     Coffeyville Regional Medical Center
## 8                     3801               Fredonia Regional Hospital
## 9                     3803                 Grisell Memorial Hospital
## 10                    3804               Sabetha Community Hospital
## 11                    3806                   Jewell County Hospital
## 12                    3807             Western Plains Medical Complex
## 13                    3808             Saint Luke's Cushing Hospital
## 14                    3812                 Republic County Hospital
## 15                    3813           Medicine Lodge Memoral Hospital
## 16                    3816                    Lane County Hospital
## 17                    3818                    Ness County Hospital
## 18                    3822     Overland Park Regional Medical Center
## 19                    3825               Ellinwood District Hospital
## 20                    3830           Osborne County Memorial Hospital
## 21                    3831                 Phillips County Hospital
## 22                    3833         Nemaha Valley Community Hospital
## 23                    3834               Miami County Medical Center
## 24                    3835                    Smith County Hospital
## 25                    3837             Great Bend Regional Hospital
## 26                    3839                 Satanta District Hospital
## 27                    3840             Wichita County Health Clinic
## 28                    3846               Minneola District Hospital
## 29                    3854             Ottawa County Health Center
## 30                    3855                   Trego County Hospital
## 31                    3857     Hutchinson Regional Medical Center
## 32                    3859                         Atchison Hospital
## 33                    3862           Kiowa County Memoral Hospital
## 34                    3864               Cheyenne County Hospital
## 35                    3869                   Kansas Medical Center
## 36                    3875                   Wesley Medical Center
## 37                    3875     Wesley Medical Center -Pediatric ED
## 38                    3876               Wesley Woodlawn Hospital
## 39                    3882             Harper Hospital District No. 5
## 40                    3892         Community Memorial Healthcare, Inc
## 41                    3894                   Lincoln County Hospital
```

```
## 42                    3898         Rush County Memorial Hospital
## 43                    3899           Clay County Medical Center
## 44                    3900               Girard Medical Center
## 45                    3910            Stafford District Hospital
```

aprilST[,3:4]

```
##    First_Message CC_or_AR
## 1          30.96    30.96
## 2         123.84   138.23
## 3          19.74    14.24
## 4          39.03    39.03
## 5          11.62    16.29
## 6           6.72     6.72
## 7          31.07    30.11
## 8          67.65    67.65
## 9         198.61   204.43
## 10         56.24    56.24
## 11        145.03   151.69
## 12         37.19    37.19
## 13          9.04    10.21
## 14        165.49   165.49
## 15        149.34   149.34
## 16        177.77   177.77
## 17         55.04    54.39
## 18          7.34     7.36
## 19        115.42   115.42
## 20        243.03   243.03
## 21        165.25   193.59
## 22          6.26    93.97
## 23         35.45    35.45
## 24         83.73    83.75
## 25        133.70   133.90
## 26        117.81   117.81
## 27         64.83    64.83
## 28        112.40   123.35
## 29         92.94    99.68
## 30        130.74   138.55
## 31         59.72       NA
## 32         71.67    73.88
## 33        144.10   160.01
## 34         83.29    87.98
## 35         28.62    28.62
## 36          8.99     8.99
## 37          8.99     8.99
## 38          6.93     6.93
## 39         72.10    74.94
## 40         25.11    20.27
## 41         17.62    17.62
## 42        109.71       NA
```

```
## 43          182.16    184.56
## 44          297.49    293.66
## 45          114.23    135.50
```

We can compare that to the same time frame for Kansas facilities in production (i.e., specifying the PR table):

```
aprilPR <- valag(channel, begin="2017-04-01 00:00:00", end="2017-04-30
23:59:59", table="PR")

aprilPR[,1:2]
```

```
##     C_Biosense_Facility_ID                      Facility_Name
## 1                     3782          Rooks County Health Center
## 2                     3788                Scott County Hospital
## 3                     3791     Children's Mercy Hospital - South
## 4                     3792             Sheridan County Hospital
## 5                     3793                       Stormont-Vail
## 6                     3794     Sumner County Hospital District - 1
## 7                     3795         Newman Regional Health Center
## 8                     3797                   Mcpherson Hospital
## 9                     3798             Stanton County Hospital
## 10                    3799               Ashland Health Center
## 11                    3802         Greeley County Health Services
## 12                    3803             Grisell Memorial Hospital
## 13                    3804           Sabetha Community Hospital
## 14                    3805       St. Luke Hospital & Living Center
## 15                    3806               Jewell County Hospital
## 16                    3809               Coffey County Hospital
## 17                    3811              Citizens Medical Center
## 18                    3812             Republic County Hospital
## 19                    3813       Medicine Lodge Memoral Hospital
## 20                    3814             Russell Regional Hospital
## 21                    3815             Mitchell County Hospital
## 22                    3816                 Lane County Hospital
## 23                    3817               Kearny County Hospital
## 24                    3819             Southwest Medical Center
## 25                    3820           Cloud County Health Center
## 26                    3821     Pawnee Valley Community Hospital
## 27                    3823               Labette Health Hospital
## 28                    3824       Pratt Regional Medical Center
## 29                    3825           Ellinwood District Hospital
## 30                    3826                 Wamego City Hospital
## 31                    3827     Goodland Regional Medical Center
## 32                    3832                Wilson Medical Center
## 33                    3836       Susan B. Allen Memorial Hospital
## 34                    3838               Via Christi  Manhattan
## 35                    3840           Wichita County Health Clinic
## 36                    3841               Morris County Hospital
## 37                    3843           Morton County Health System
## 38                    3844               Norton County Hospital
```

```
## 39                         3845               Providence Medical Center
## 40                         3846               Minneola District Hospital
## 41                         3848          Hodgeman County Health Center
## 42                         3849                 Via Christi  Pittsburg
## 43                         3851                 Newton Medical Center
## 44                         3852                   Hays Medical Center
## 45                         3853             Holton Community Hospital
## 46                         3854           Ottawa County Health Center
## 47                         3855                 Trego County Hospital
## 48                         3856               Meade District Hospital
## 49                         3858              Hamilton County Hospital
## 50                         3860             Gove County Medical Center
## 51                         3862          Kiowa County Memorial Hospital
## 52                         3863            Washington County Hospital
## 53                         3865        Mhs: Memorial Hospital - Abilene
## 54                         3866          Shawnee Mission Medical Center
## 55                         3867              St. Francis Health Center
## 56                         3868               Stevens County Hospital
## 57                         3870              Anderson County Hospital
## 58                         3871              Ransom Memorial Hospital
## 59                         3872                Via Christi  St. Teresa
## 60                         3873                Via Christi  St. Francis
## 61                         3877                Anthony Medical Center
## 62                         3878            Lawrence Memorial Hospital
## 63                         3879                William Newton Hospital
## 64                         3880              Mercy Hospital Fort Scott
## 65                         3881                 Graham County Hospital
## 66                         3882          Harper Hospital District No. 5
## 67                         3883        South Central Kansas Medical Center
## 68                         3884      Mercy Maude Norton Hospital Columbus
## 69                         3885           Allen County Regional Hospital
## 70                         3886 The University Of Kansas Hospital System
## 71                         3887           Sumner Regional Medical Center
## 72                         3888          Salina Regional Health Center
## 73                         3889                   Rice County Hospital
## 74                         3890                Via Christi  St. Joseph
## 75                         3891            Lindsborg Community Hospital
## 76                         3892      Community Memorial Healthcare, Inc
## 77                         3893               Geary Community Hospital
## 78                         3894               Lincoln County Hospital
## 79                         3895                     St. John's Hospital
## 80                         3910             Stafford District Hospital
## 81                         3911               Comanche County Hospital

aprilPR[,3:4]

##    First_Message CC_or_AR
## 1          22.72    22.72
## 2           9.45     9.45
## 3          27.66    27.66
```

```
## 4              10.04      13.04
## 5              10.23      14.96
## 6              19.17      20.67
## 7              17.11      17.11
## 8              20.55      52.73
## 9              25.71      25.71
## 10             13.63      13.63
## 11             36.07      47.48
## 12             18.09      18.39
## 13             28.36      28.36
## 14             11.87      13.78
## 15             17.71      26.10
## 16             23.44      23.44
## 17             38.39      29.06
## 18             15.40      15.41
## 19             22.09      22.09
## 20             23.09      23.66
## 21             12.64      12.56
## 22             30.40      30.40
## 23             19.41      19.15
## 24             17.92      18.03
## 25              8.13       8.19
## 26             16.98      18.06
## 27             14.51      14.68
## 28             12.99      13.07
## 29             24.33      24.33
## 30             20.59      20.59
## 31             12.72      50.22
## 32              6.75       6.75
## 33              7.88       7.89
## 34              8.50       8.43
## 35             16.47      17.12
## 36             29.39      29.39
## 37             23.06      25.28
## 38             11.14      11.45
## 39             10.18      10.18
## 40             37.07      51.19
## 41             28.29      29.31
## 42              9.10       9.21
## 43             16.99      17.27
## 44             18.10      18.10
## 45             10.26      16.14
## 46             25.64      30.73
## 47             15.88      20.85
## 48             12.83      12.24
## 49             21.69      43.13
## 50             23.28      31.39
## 51             25.28      29.62
## 52             20.65      22.77
## 53             17.22      17.32
```

```
## 54          22.08       22.08
## 55           7.12        7.00
## 56          33.60       33.60
## 57          22.17       21.67
## 58          26.78       27.30
## 59          29.62       29.62
## 60          30.66       30.66
## 61          32.69       32.69
## 62          20.01       20.04
## 63          37.96       37.43
## 64           8.99        9.06
## 65          27.42       34.85
## 66          30.73       27.34
## 67           9.98       10.10
## 68          11.04       11.04
## 69          36.85       36.85
## 70          13.33       13.33
## 71          35.27       35.27
## 72           6.65        6.65
## 73          10.58       11.18
## 74          30.99       30.99
## 75           6.52        6.52
## 76          64.40       56.55
## 77           7.16        7.16
## 78          11.90       13.64
## 79           9.75        9.77
## 80          37.65       68.33
## 81          13.17       13.98
```

The `valag1` function

This function has the same arguments as above, except it adds an additional `facility` argument, where the user has to enter in the facility's C_Biosense_Facility_ID. This should also be entered in between quotation marks. If I wanted to see how many hours it took the Newman Regional Health Center (ID: 3795) to message their reports for visits in the month of April, I would run:

```
valag1(channel, begin="2017-04-01 00:00:00", end="2017-04-30 23:59:59",
table="PR", facility="3795")
```

```
## Newman Regional Health Center
## C_Biosense_Facility_ID: 3795
## Visits between: 2017-04-01 00:00:00 and 2017-04-30 23:59:59 (inclusive)
## The average time between visit and first message arrival: 17.11 hours
## The average time between visit and first message with chief complaint or
admit reason: 17.11 hours
```