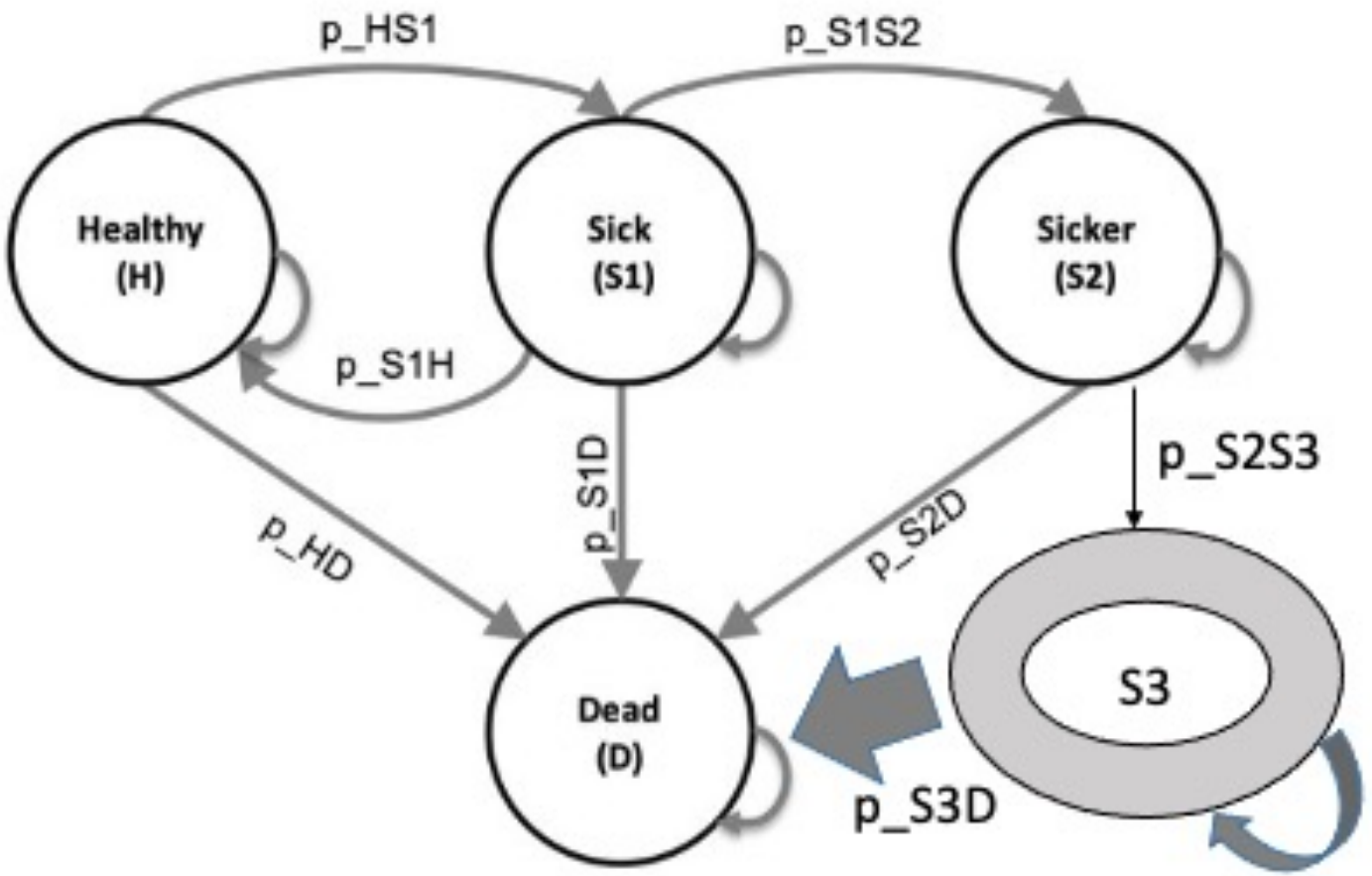
FINAL EXERCISE RESULTS

R for Health Technology Assessment



#1

```r
v_names_states <- c("H",  # the 4 health states of the model:
                    "S1", # Healthy (H), Sick (S1), Sicker (S2), Dead (D)
                    "S2",
                    "S3",
                    "D")

n_states <- length(v_names_states)     # number of health states
```

#2

```r
#### Costs ----
c_H     <- 2000  # annual cost of being Healthy
c_S1    <- 4000  # annual cost of being Sick
c_S2    <- 15000 # annual cost of being Sicker
c_S3    <- 20000 # annual cost of being Sickest
c_D     <- 0     # annual cost of being dead
c_trtA  <- 12000 # annual cost of receiving treatment A
c_trtB  <- 13000 # annual cost of receiving treatment B
#### Utilities ----
u_H     <- 1     # annual utility of being Healthy
u_S1    <- 0.75  # annual utility of being Sick
u_S2    <- 0.5   # annual utility of being Sicker
u_S3    <- 0.4   # annual utility of being Sickest
u_D     <- 0     # annual utility of being dead
u_trtA  <- 0.95  # annual utility when receiving treatment A
```

#3

```
153  ##New transitions probabilities (S3)
154  #From S2 to S3
155  p_S2S3<- 0.05
156  #From S3 to Death
157  p_S3D<- 0.03
```

#4

```
159  # Construct state-transition models ----
160  ## Initial state vector ----
161  #* All starting healthy
162  v_m_init <- c(H = 1, S1 = 0, S2 = 0, S3=0, D = 0) # initial state vector
163  v_m_init
```

#5

```
196  #* From S2
197  m_P["S2", "S2"] <- 1 - (p_S2D + p_S2S3)
198  m_P["S2", "S3"] <- p_S2S3
199  m_P["S2", "D"]  <- p_S2D
200  #From S3
201  m_P["S3", "S3"] <- 1- p_S3D
202  m_P["S3", "D"]  <- p_S3D
203  #* From D
204  m_P["D", "D"]   <- 1
205
```

#6

```
220 ### Check that transition probabilities are [0, 1] ----
221 check_transition_probability(m_P,      verbose = TRUE)  # m_P >= 0 && m_P <= 1
222 check_transition_probability(m_P_strA, verbose = TRUE)  # m_P_strA >= 0 && m_P_strA <= 1
223 check_transition_probability(m_P_strB, verbose = TRUE)  # m_P_strB >= 0 && m_P_strB <= 1
224 check_transition_probability(m_P_strAB, verbose = TRUE) # m_P_strAB >= 0 && m_P_strAB <= 1
225 ### Check that all rows sum to 1 ----
226 check_sum_of_transition_array(m_P,      n_states = n_states, n_cycles = n_cycles, verbose = TRUE)  # rowSums(m_P) == 1
227 check_sum_of_transition_array(m_P_strA, n_states = n_states, n_cycles = n_cycles, verbose = TRUE)  # rowSums(m_P_strA) == 1
228 check_sum_of_transition_array(m_P_strB, n_states = n_states, n_cycles = n_cycles, verbose = TRUE)  # rowSums(m_P_strB) == 1
229 check_sum_of_transition_array(m_P_strAB, n_states = n_states, n_cycles = n_cycles, verbose = TRUE) # rowSums(m_P_strAB) == 1
230
```

#7

```r
# State Rewards ----
## Scale by the cycle length ----
#* Vector of state utilities under strategy SoC
v_u_SoC    <- c(H  = u_H,
                S1 = u_S1,
                S2 = u_S2,
                S3 = u_S3,
                D  = u_D) * cycle_length
#* Vector of state costs under strategy SoC
v_c_SoC    <- c(H  = c_H,
                S1 = c_S1,
                S2 = c_S2,
                S3 = c_S3,
                D  = c_D) * cycle_length
#* Vector of state utilities under strategy A
v_u_strA   <- c(H  = u_H,
                S1 = u_trtA,
                S2 = u_S2,
                S3 = u_S3,
                D  = u_D) * cycle_length
#* Vector of state costs under strategy A
v_c_strA   <- c(H  = c_H,
                S1 = c_S1 + c_trtA,
                S2 = c_S2 + c_trtA,
                S3 = c_S3,
                D  = c_D)
#* Vector of state utilities under strategy B
v_u_strB   <- c(H  = u_H,
                S1 = u_S1,
                S2 = u_S2,
```

#8

```
> table_cea
                      Strategy Costs ($) QALYs Incremental Costs ($)
Standard of care Standard of care   159,261 20.20                 <NA>
Strategy B             Strategy B   233,603 21.82               74,342
Strategy AB           Strategy AB   324,637 22.77               91,034
Strategy A             Strategy A   252,638 20.99                 <NA>
                 Incremental QALYs ICER ($/QALY) Status
Standard of care                NA          <NA>     ND
Strategy B                    1.62        45,964     ND
Strategy AB                   0.95        95,586     ND
Strategy A                      NA          <NA>      D
>
```

THANKS