SAS Code:

```
%gupi_horiz;
```

```
/* rename variables according to question number for the purposes of
        doing imputations, subtotals, etc. */
```

```
data gupi_hqnums;
        set gupi_h1;
```

```
array vnames(15) Gupi_qspainent Gupi_qspainvag Gupi_qspainure Gupi_qspainpub
        Gupi_qspainurin Gupi_qspainsex Gupi_qspainbladfill    Gupi_qspainvoid
        Gupi_qspainarea Gupi_qspainave Gupi_qssense  Gupi_qsurin2h  Gupi_qssymkind
        Gupi_qssymthink Gupi_qssymfeel;
```

```
array numnames(15) q1a q1b q1c q1d q2a q2b q2c q2d q3 q4 q5 q6 q7 q8 q9;
```

```
do i = 1 to 15;
        numnames(i) = vnames(i);
end;
```

```
drop i;
run;
```

```
data gupi_h2;
        set gupi_hqnums;
```

```
/* Create derived variables for GUPI Questions 1 and 2, based on the
        Sum of the responses for questions 1a-1d and 2a-2d, respectively */
```

```
/* First check to see how many of the raw responses are non-missing */
```

```
  sumnonmiss_q1 = (q1a>.) + (q1b>.) + (q1c>.) + (q1d>.) ;
  sumnonmiss_q2 = (q2a>.) + (q2b>.)+ (q2c>.) + (q2d>.);
```

```
        rawsum_q1 = sum(of q1a q1b q1c q1d);
        rawsum_q2 = sum(of q2a q2b q2c q2d);
```

```
if sumnonmiss_q1 in (0 1) then gupi_q1 = .;
else if sumnonmiss_q1 eq 4 then gupi_q1 = rawsum_q1;
/* For GUPI Q1, if 1 or 2 of the 4 responses are missing (i.e., 2 or 3 are non-missing),
        then check to see if the sum of the non-missing scores is 0 (indicating no pain.) If so,
```

assume that the missing values also represent no pain and impute a total of 0 */

else if sumnonmiss_q1 in (2 3) then do;
        if rawsum_q1 eq 0 then gupi_q1 = 0;
        else gupi_q1 = .;
end;

/* For GUPI Q2, if 1 or 2 of the 4 responses are missing (i.e., 2 or 3 are non-missing),
        then check to see if the sum of the non-missing scores is 0 (indicating no pain.) If so,
        assume that the missing values also represent no pain and impute a total of 0. In
        addition, if the only missing value is for question 2b, which deals with sexual
        intercourse/ejaculation, impute the total score based on the sum of the other 3 */

if sumnonmiss_q2 in (0 1) then gupi_q2 = .;
else if sumnonmiss_q2 eq 4 then gupi_q2 = rawsum_q1;
else if sumnonmiss_q2 in (2 3) and rawsum_q2 eq 0 then gupi_q2 = 0;
else if sumnonmiss_q2 eq 3 and q2b eq . then do;
        raw_gupi_q2 = (sum(of q2a q2c q2d))*4/3;
        gupi_q2 = round(raw_gupi_q2, 0.1);
end;
else gupi_q2 = .;

/*GUPI PAIN SCORE with Imputations */

   sumnonmiss = (q1a>.) + (q1b>.) + (q1c>.) + (q1d>.) + (q2a>.) + (q2b>.)+ (q2c>.) + (q2d>.);
   storesum_q1_q2 = sum (of q1a q1b q1c q1d q2a q2b q2c q2d);

/* If no more than 4 of the 8 combined Q1 and Q2 questions are missing AND if all non-missing
responses to Q1 and Q2 are 0 AND if Q3 is 0, then if Q4 is missing, set Q4 (Gupi_qspainave) to 0. */

        if ((sumnonmiss > 4) and storesum_q1_q2=0 and (q3<=0) and (q4<=0)) then do;
                q4=0;
        end;
/* If the imputed value of Q4 is not missing AND ((Q3 is not missing AND no more than 5 of the 8
combined Q1 & Q2 questions are missing) OR (Q3 is missing AND none of the 8 combined Q1 & Q2
questions are missing)) then:

a.) Calculate the Pain weighted_missing_score (Pain_WMS) as follows:
i. WMS_q1_q2 = number of missing values (0 to 8) for questions 1a-1d & 2a-2d
ii. If Q3 is missing, then WMS_q3 = 5, otherwise WMS_q3 = 0
iii. Pain_WMS = Sum of (WMS_q1_q2, WMS_q3)

b.) pain_calc_score = Sum of responses to questions 1-4, using the imputed value of Q4 as described above

c.) Imputed pain score = pain_calc_score * (23/(23 - Pain_WMS))   */

poss_painscore_gupi=sumnonmiss+(5*(q3>.))+(10*(q4>.));
meas_painscore_gupi=sum(storesum_q1_q2,q3,q4);

/* max total score for gupi-pain = 23 (8 + 5 + 10). Acceptable number
        of missing points is 5 (%complete = 18/23 = 78%) */

if poss_painscore_gupi ge 18 then raw_gupiscore_pain =
meas_painscore_gupi*(23/poss_painscore_gupi);

gupiscore_pain = round(raw_gupiscore_pain, 0.01);

/* Imputation for use calculating the Urinary Severity Score */

        gupi_q56 = sum(q5, q6);
        gupi_miss_q56 = sum(q5=., q6=.);

/* QOL */

/* If Q9 is not missing AND ((Q7 is missing AND Q8 is NOT missing) or (Q7 is not missing AND Q8 is missing)) then impute gupiscoreqol by multiplying the calculated score by 12/9 (1.33) */

poss_qolscore_gupi = sum((q7>.)*3,(q8>.)*3,(q9>.)*6);
meas_qolscore_gupi =sum(q7,q8,q9);

/* max total score for gupi-qol = 12 (3 + 3 + 6). Acceptable number
        of missing points is 3 (%complete = 9/12 = 75%) */

        if poss_qolscore_gupi ge 9 then raw_gupiscore_qol =
meas_qolscore_gupi*(12/poss_qolscore_gupi);
        gupiscore_qol = round(raw_gupiscore_qol, 0.01);
/*GUPI SCORE TOTAL */

/* a.) Calculate the value of weighted_missing_score (Total_WMS) as follows:

        WMS_q1_q2 = number of missing values (0 to 8) for questions 1a-1d & 2a-2d
        If Q3 is missing, then WMS_q3 = 5, otherwise WMS_q3 = 0
        If Q4 is missing, then WMS_q4 = 10, otherwise WMS_q4 = 0
        If Q5 is missing, then WMS_q5 = 5, otherwise WMS_q5 = 0
        If Q6 is missing, then WMS_q6 = 5, otherwise WMS_q6 = 0

If Q7 is missing, then WMS_q7 = 5, otherwise WMS_q7 = 0
If Q8 is missing, then WMS_q8 = 5, otherwise WMS_q8 = 0
If Q9 is missing, then WMS_q9 = 5, otherwise WMS_q6 = 0

b.) Total_WMS = Sum of (WMS_q1_q2, WMS_q3, WMS_q4, WMS_q5, WMS_q6, WMS_q7, WMS_q8, WMS_q9)

c.) Sum_score = Sum of responses to questions 1-9, using the imputed value of Q4 as described above.

d.) If Total_WMS <= 11, then Imputed total score = Sum_score * (45/(45 - Total_WMS))   */

```
poss_q56_score=sum((q5>.)*5,(q6>.)*5);
poss_gupi_total=sum(poss_painscore_gupi,poss_q56_score,poss_qolscore_gupi);
meas_gupi_total=sum(meas_painscore_gupi,meas_qolscore_gupi, q5, q6);
```

/* max total GUPI score is 45. Acceptable number
    of missing points is 11 (%complete = 34/45 = 75.6%) */

```
if poss_gupi_total ge 34 then raw_gupiscoretotal = meas_gupi_total*(45/poss_gupi_total);
gupiscoretotal = round(raw_gupiscoretotal, 0.01);
```

/* GUPI Urin Score: No imputation is used, since there are only two questions involved.
    If either question 5 or question 6 is missing, then the GUPI Urin Score is missing */

```
gupiscoreurin = q5 + q6;

drop q1a q1b q1c q1d q2a q2b q2c q2d q3 q4 q5 q6 q7 q8 q9 raw:;
run;
```