I looked over the reviewers' remarks again. I think an overall issue is the tension between trying to be scientific in validating these measures, while dealing with a small sample and preliminary work. The reviewers seem to want more technical work than I think you can provide with a small dataset. So it may be helpful to emphasize that the work is conceptually-driven and that the measurement of the concepts is preliminary. The reviewers do seem to want more information about the individual measures. I ran additional analysis that might be helpful (see below). I don't think it's a good idea to use factor scores from such a small sample. Honestly, I'm surprised that the reviewers think you should weight the items based on this small sample, and that they think errors are compounded or redundancy among measures is magnified when a composite is created. I think composite measures tend to balance out problems related to measurement error and correlated error.

---

Reviewer 1. Item 13.
[I appreciate what the reviewer is suggesting -- that there should be a thorough review of measures reported in the literature, and that those measures should be compared with the measures you have used so that anyone can produce your nurse dose composites from their administrative data. I think that suggestion is beyond the scope of this study, but it can be mentioned in the discussion section.]

Reviewer 2. Item 1.
Composite measures generally reduce error by providing more breadth and depth of measurement of a particular concept, and can reduce measurement error through cancelling of random error. So the trend is toward better measurement with a composite, even if it contains a "weak" measure of the concept.

Reviewer 2. Item 2.
In a preliminary analysis with a small sample, weighting based on the results of the factor analysis could "capitalize on chance" -- that is, tailor the measure to this specific dataset. With additional samples from further studies it would be possible to look across datasets for patterns of association or influence, to determine whether weights are needed. In the absence of additional samples, it's more conservative to weight items equally.

Reviewer 2. Item 4.
It is possible to include the individual items in a regression, but if doing so, it makes sense to include the subset of predictors within a particular composite to gain insight about the relative contributions of the items. (Correlations later in the output provide information about associations of individual measures with the outcomes.} With this small sample, rules of thumb suggest a maximum of two predictors. We can stretch that to get results using all three predictors. I ran these -- see below. If you choose to report these results, that may lessen the reviewers' focus on weighting items based on results of the factor analysis. Some of the variables are not significant or only approach significance. The sample is small. You can revisit the way you have constructed the scales in the future (and you should!) when you have more data.]

```
------------------------------------------------------------------------------
Poisson regression                              Number of obs   =         26
                                                LR chi2(3)      =      23.14
                                                Prob > chi2     =     0.0000
Log likelihood = -27.865124                     Pseudo R2       =     0.2934

------------------------------------------------------------------------------
    hairate1 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      rneduc |   .0808875   .3298442     0.25   0.806    -.5655953    .7273703
       exper |  -1.565902   .3871695    -4.04   0.000     -2.32474   -.8070636
       skill |  -.1253747   .2344381    -0.53   0.593    -.5848649    .3341155
       _cons |   2.595479   .9180699     2.83   0.005     .7960955    4.394863
------------------------------------------------------------------------------
```

```
------------------------------------------------------------------------------
Poisson regression                              Number of obs   =         26
                                                LR chi2(3)      =      17.26
                                                Prob > chi2     =     0.0006
Log likelihood = -30.806733                     Pseudo R2       =     0.2188

------------------------------------------------------------------------------
    hairate1 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        amt2 |  -.5390696   .3055614    -1.76   0.078    -1.137959    .0598197
        freq |  -1.039931   .4783595    -2.17   0.030    -1.977499   -.1023641
     intens3 |   .2816333    .501066     0.56   0.574     -.700438    1.263705
       _cons |    2.96338   1.092716     2.71   0.007     .8216953    5.105064
------------------------------------------------------------------------------


------------------------------------------------------------------------------
Poisson regression                              Number of obs   =         26
                                                LR chi2(3)      =      50.92
                                                Prob > chi2     =     0.0000
Log likelihood = -84.528676                     Pseudo R2       =     0.2315

------------------------------------------------------------------------------
   fallrate1 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      rneduc |   -.000724   .1062577    -0.01   0.995    -.2089853    .2075373
       exper |  -.6888115   .1078298    -6.39   0.000     -.900154    -.477469
       skill |  -.1496613    .085357    -1.75   0.080    -.3169579    .0176354
       _cons |   3.633334   .3074081    11.82   0.000     3.030825    4.235843
------------------------------------------------------------------------------


------------------------------------------------------------------------------
Poisson regression                              Number of obs   =         26
                                                LR chi2(3)      =      35.93
                                                Prob > chi2     =     0.0000
Log likelihood = -92.024444                     Pseudo R2       =     0.1633

------------------------------------------------------------------------------
   fallrate1 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        amt2 |  -.4836875   .1132234    -4.27   0.000    -.7056014   -.2617737
        freq |  -.5403023   .1519448    -3.56   0.000    -.8381087   -.2424959
     intens3 |   .2147794   .1673523     1.28   0.199    -.1132251    .5427838
       _cons |   3.975299   .4145535     9.59   0.000     3.162789    4.787809
------------------------------------------------------------------------------
```

Reviewer 3. Item 7.

The two hospitals provide more variance than would be expected from a single hospital, but the sample size limits the type of analysis we can conduct. Conducting the study with more than two hospitals would allow a test of whether "hospital" explained variance in patient outcomes above and beyond the variance explained by active ingredient and intensity. The small number of hospitals and units in this sample is a limitation of the study. In t-tests, the hospitals were found to differ significantly on infection rate, fall rate, active ingredient and intensity. The hospital with lower average MRSA and fall rates had higher average scores on active ingredient and intensity.

[Milisa -- Table 1 provides descriptives for the two hospitals combined. This reviewer wants the data for each hospital, probably in addition to the data overall. You can also provide statistical tests comparing the two hospitals on the Table 1 measures.]

```
. ttest hairate1, by(country)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
  canada |      14    .0415931    .0178233    .0666886    .0030883    .0800979
      us |      12    2.408692    .1813159    .6280966    2.009618    2.807765
---------+--------------------------------------------------------------------
combined |      26      1.1341    .2499304      1.2744    .6193588    1.648841
---------+--------------------------------------------------------------------
    diff |           -2.367099    .1683926               -2.714644   -2.019553
------------------------------------------------------------------------------
    diff = mean(canada) - mean(us)                                t = -14.0570
Ho: diff = 0                                     degrees of freedom =       24

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000

. ttest fallrate1, by(country)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
  canada |      14    3.976088    .6286546     2.35221    2.617962    5.334213
      us |      12    14.42275    1.538507    5.329545    11.03652    17.80898
---------+--------------------------------------------------------------------
combined |      26    8.797625    1.294686     6.60163    6.131169    11.46408
---------+--------------------------------------------------------------------
    diff |           -10.44666    1.574354               -13.69597   -7.197357
------------------------------------------------------------------------------
    diff = mean(canada) - mean(us)                                t =  -6.6355
Ho: diff = 0                                     degrees of freedom =       24

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000

. ttest edexpsk, by(country)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
  canada |      14    2.261905    .1405491    .5258867    1.958267    2.565543
      us |      12    1.805556    .0866349    .3001122    1.614873    1.996238
---------+--------------------------------------------------------------------
combined |      26    2.051282    .0955279    .4870985    1.854539    2.248025
---------+--------------------------------------------------------------------
    diff |            .4563492    .1719659                .101429    .8112695
------------------------------------------------------------------------------
    diff = mean(canada) - mean(us)                                t =   2.6537
Ho: diff = 0                                     degrees of freedom =       24

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9930         Pr(|T| > |t|) = 0.0139          Pr(T > t) = 0.0070

. ttest intensnew, by(country)

Two-sample t test with equal variances
------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
  canada |      14    3.095238    .0647015     .242091    2.955459    3.235017
      us |      12    2.416667    .1542059    .5341849    2.077262    2.756072
```

```
---------+--------------------------------------------------------------------
combined |      26    2.782051    .1028522    .5244452    2.570223    2.993879
---------+--------------------------------------------------------------------
    diff |            .6785714    .1585999                .3512373    1.005906
------------------------------------------------------------------------------
    diff = mean(canada) - mean(us)                                t =   4.2785
Ho: diff = 0                                     degrees of freedom =       24

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9999         Pr(|T| > |t|) = 0.0003          Pr(T > t) = 0.0001
------------------------------------------------------------------------------
```

Reviewer 3. Item 8.
You can report all of the loadings, and refer to the other paper.

Reviewer 3. Item 9.
if you report the results of the regressions using individual measures, you can use the following argument... The factor analysis was conducted to provide evidence for constructing measures as they were conceptualized (i.e., how to group the individual items in composites). Using equal weighting is a conservative approach given the small sample size. To address the issue of the relative importance of the component measures, we ran regression models using the component variables as predictors. (Due to the small sample size, we ran a model with the three items measuring active ingredient as predictors, and a separate model with the three items measuring intensity.)

Reviewer 3. Item 10.
Using a composite measure constructed from correlated predictors reduces collinearity as compared to using individual, correlated predictors in a regression. Since the average of the items is taken, rather than the sum, inflation seems unlikely. The active ingredient composite includes items that are not highly correlated but are related to the nurse's level of experience and training, so the items are retained as a conceptual set (composite).

here are the correlations. I was surprised to see that the correlations are not all in the same direction, e.g., among the active ingredient items, education and experience are negatively correlated. That is probably because, when constructing the composites, we paid attention to how the individual items correlated with the outcomes, not how they correlated with each other. It is possible for a predictor to be positively correlated with another predictor, even though both predictors are negatively correlated with the dependent variable. We reverse-coded intensity (hppd). You reported that in the paper.

```
             | hairate1 fallra~1   rneduc    exper    skill     amt2     freq
-------------+---------------------------------------------------------------
    hairate1 |   1.0000
             |
             |
   fallrate1 |   0.7757   1.0000
             |   0.0000
             |
      rneduc |  -0.0230  -0.0393   1.0000
             |   0.9114   0.8487
             |
       exper |  -0.7085  -0.5841  -0.0729   1.0000
             |   0.0001   0.0017   0.7235
             |
       skill |  -0.0773  -0.1958   0.2535   0.1094   1.0000
             |   0.7073   0.3376   0.2114   0.5947
             |
        amt2 |  -0.1134  -0.2539   0.2112   0.2363   0.7991   1.0000
             |   0.5812   0.2107   0.3003   0.2451   0.0000
             |
        freq |  -0.6226  -0.3366  -0.0549   0.2212  -0.3892  -0.4009   1.0000
             |   0.0007   0.0927   0.7901   0.2775   0.0494   0.0424
             |
     intens3 |  -0.5169  -0.2308   0.0160   0.2447  -0.3044  -0.3477   0.8559
             |   0.0069   0.2566   0.9382   0.2283   0.1306   0.0817   0.0000
```