

## **Comment on Kaytur and Clancy JAMA 2003**

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### **Recognizing the way correlations between improvements in healthcare and reductions in healthcare disparities tend to turn on the choice of disparities measure**

Sehgal [1] found that during a seven-year (1993-2000) period of dramatic improvements in rates of adequate hemodialysis, the absolute difference between black and white, and between female and male, rates of adequate hemodialysis decreased. In an editorial commentary on the Sehgal study, Aaron and Clancy,[2] officials of the Agency for Healthcare Research and Quality (AHRQ), which is the agency responsible for both the National Healthcare Quality Report and the National Healthcare Disparities Report (NHDR), have discussed the Sehgal study as demonstrating the way that improving healthcare will help to reduce healthcare disparities.

The view of Aaron and Clancy on the implications of the Sehgal study overlooks an important methodological issue. Sehgal measured healthcare disparities in terms of absolute differences between rates. In the NHDR, however, AHRQ measures healthcare disparities in terms of relative differences in adverse outcomes (here, the failure to receive adequate dialysis).[3,4] I have explained in numerous places the tendency whereby as an outcome increases in prevalence, relative differences in experiencing it will tend to decline while relative differences in failing to experiencing it will tend to increase.[3-10]. See also varied references at on the [Measuring Health Disparities](http://jpscanlan.com) page of [jpscanlan.com](http://jpscanlan.com). Not only would substantial increases in adequate hemodialysis rates be expected to result in increasing relative differences in failing to receive adequate dialysis (AHRQ's measure of disparity in the NHDR), but, according to the data in the Sehgal study, the AHRQ approach would find that disparities in fact increased during the period studied. As explained below, this holds for both the racial and gender disparities addressed in the Sehgal study.

#### **A. Racial Differences in Adequate/inadequate Hemodialysis**

Below are the rates of adequate hemodialysis for blacks and whites underlying Sehgal's findings, along with information on absolute differences between rates and relative differences in receiving adequate hemodialysis and failing to receive adequate hemodialysis.

1. Rates of adequate hemodialysis (rates of inadequate hemodialysis):

1993 white rate – 46% (54%)

2000 white rate – 87% (13%)

1993 black rate – 36% (64%)

2000 black rate – 84% (16%)

2. Absolute differences between black and white rates:

1993 – 10 percentage points

2000 – 3 percentage points

Direction of change: decrease

3. Relative risk of adequate hemodialysis (white/black):

1993 – 1.28

2000 – 1.04

Direction of change: decrease

4. Relative risk of inadequate hemodialysis (black/white):

1993 – 1.19

2000 – 1.23

Direction of change: increase

In reference 6, I explained why the decline in absolute difference specifically relied on by Sehgal was more or less to be expected in the circumstances – though there would be reason to expect that for some part of the period (the period until the rate in item 4 exceeded the rate in item 3) the absolute difference would have declined. But in items 3 and 4 we observe the easier to predict patterns: that is, as overall rates of hemodialysis increase, the relative difference in rates of adequate hemodialysis declined while the relative difference in rates of inadequate hemodialysis increased. It is the latter relative difference on which AHRQ would rely in the NHDR to measure changing disparities over time.

The NHDR's actual tracking of hemodialysis disparities involved a period after that covered in the Sehgal study, and the 2006 report [11] (at page 8) found that disparities in rates of adequate hemodialysis increased for the period it examined (by which it meant that the relative difference in failing to receive adequate hemodialysis increased). The conclusion was apparently based on changes between 2002 and 2004 – from Appendix Table 28a in the 2006 report and Appendix Table 19a in the 2004 report [12] – when the white rate increased from 87% to 89% and the black rate increased from 83% percent to 85%. Thus, by AHRQ's method of measurement, the relative risk of inadequate dialysis increased from 1.31 (17/13) to 1.36 (15/11). The relative risk of adequate hemodialysis declined, however, from 1.048 (87/83) to 1.047 (89/85)

It might be noted that, whereas according to the theories set out in references 5, 6, and 10, the absolute difference would be expected to decline in these circumstances, the disparity in fact was unchanged (at 2 percentage points). Possible reasons for this departure from the standard pattern include: (1) that in fact the absolute difference did decline but such decline is obscured by rounding; (2) that all changes were very small and it is difficult to know whether any of them reflect other than random variation; (3) that there in fact occurred a genuine, albeit very slight, worsening of the relative situation of blacks *vis a vis* risk of receiving/failing to receive adequate

hemodialysis; (4) that there are irregularities in the distributions sufficient to outweigh the usual patterns. Nevertheless, the figures are illustrative of what AHRQ usually will find with respect to the effects of improved healthcare on relative differences between experiencing and failing to experience some healthcare outcome.

### **B. Gender Differences in Adequate/inadequate Hemodialysis**

The gender disparity discussed in the Sehgal article involved a difference adverse to men. The figures underlying Sehgal's findings of a declining absolute difference between female and male rates of adequate hemodialysis are shown below:

1. Rates of adequate hemodialysis (rate of inadequate hemodialysis):

1993 female rate – 54% (46%)

2000 female rate – 91% (9%)

1993 male rate – 31% (69%)

2000 male rate – 82% (18%)

2. Absolute difference between male and female rates:

1993 – 23 percentage points

2000 – 9 percentage points

Direction of change: decrease

3. Relative risk of adequate hemodialysis (female/male)

1993 – 1.74 (54/31)

2000 – 1.11 (91/82)

Direction of change: decrease

4. Relative risk of inadequate hemodialysis (male/female)

1993- 1.50 (69/46)

2000 – 2.00 (18/9)

Direction of change: increase

While the decline in the absolute gender difference was not discussed in reference 6, the discussion therein of the decline in the absolute racial difference is pertinent to the gender difference as well – i.e., the decline is more or less to be expected in the circumstances. In the case of the relative differences, the patterns are just as expected – i.e., the overall increase was attended by a decline in the relative difference in rates of adequate hemodialysis and an increase in the relative in difference in rates of inadequate hemodialysis. As noted, it is the latter on which the NHDR would rely.

The NHDR does not give the same attention to gender differences in healthcare that it gives to racial, ethnic, and socioeconomic differences. Further, as noted, with respect to hemodialysis women are the advantaged group. Nevertheless, it is worth noting that data in the 2006 NHDR show that between 2002 and 2004 the female rate increased from 91% to 93% and the male rate increased from 81% to 83%. Thus, as with the racial difference, the gender difference in receipt of adequate hemodialysis declined (relative risk decreased from 1.123 (91/81) to 1.120 (93/83)) while the relative difference in rates of inadequate hemodialysis increased (relative risk increased from 2.11 (19/9) to 2.43 (17/7)).

**C. Illustration with the NHDR Hemodialysis Data of the General Pattern Whereby the More Common an Outcome the Smaller Tend to be Relative Differences in Experiencing it and the Larger Tend to be Relative Differences in Avoiding it.**

Sehgal did not present data broken down by race and gender. Such information, however, may be found in the NHDRs for the periods they analyze. Such data in Table 28a of the 2006 NHDR illustrate other aspects of the tendency for relative differences in experiencing and failing to experience an outcome to vary in opposite directions in different settings.

The rates of adequate hemodialysis in Table 28a by race and gender are set out below (with rates of inadequate dialysis in parentheses):

White women – 94% (6%)  
White men – 84% (16%)  
Black women – 90% (10%)  
Black men – 80% (20%)

In a number of places, I have noted that within an advantaged population relative differences between favorable outcome rates of advantaged and disadvantaged groups within such populations will tend to be smaller (though relative differences between adverse outcome rates will tend to be smaller) than within less advantaged population.[6,8-10] In this instance, one can regard (1) whites as the advantaged population and blacks as the disadvantaged population (and women and men as the advantaged and disadvantaged groups within the populations) or (2) women as the advantaged population and men as the disadvantaged population (and whites and blacks as the advantaged and disadvantaged groups within the populations). And one will observe, based on the figures just set, that within the white population the gender difference in the favorable outcome is smaller, and the gender differences in adverse outcome is larger, than within the black population. Similarly, among women the racial difference in the favorable outcome is smaller, and the racial difference in the adverse outcome is larger, than among men.

One can probably find such patterns in most of the tables in the NHDR. But these are just other illustration of the pattern whereby in a setting where favorable outcome rates are more common

relative differences in such outcome rates will tend to be smaller, and relative differences in the adverse outcome rates will tend to be larger, than in settings where the favorable outcome rate is less common. And this holds whether the different settings within which disparities are examined involve different populations or different points in time.

Finally, it may warrant note that the Sehgal article and the Aaron-Clancy editorial were published in early 2003, which was before issuance of the first NHDR and may have been prior to a final decision on just how AHRQ would measure health disparities over time in the report. To my knowledge, the first National Center for Health Statistics document recommending that all disparities be measured in terms of relative differences in adverse outcomes was not issued until 2004,[13] with further articulation of the same position in 2005.[14] Thus, it may not be fair to fault Aaron-Clancy for the 2003 reliance on Sehgal in support or perceived correlation between improved quality and diminishing disparities. However, AHRQ officials responsible for the NHDR continued to cite Sehgal to the same effect in an article specifically about the National Healthcare Disparities Report in 2005.[15]

The important issue, however, is not the misperception of the implications of the Sehgal study, but the failure of AHRQ to appreciate that each measure of difference will tend to change solely as a result of changes in prevalence of an outcome and that, according to the measure it has chosen, improvements in healthcare will create a perception that healthcare disparities are increasing regardless of whether there has occurred any meaningful change in the relative well-being of advantaged and disadvantaged groups.

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