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Opinion Article

Importance of Utilizing Standardized Method of Calculating Cost Benefit of Physical Activity Interventions

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Opinion

There are many public health and community organizations that offer physical activity interventions aimed to reduce falls in elderly. Each of these groups are oftentimes competing for the same source of funding. With continued increases in medical care needs and costs, increases in health equity, and limited and sometimes dwindling resources and funding, it is important to compare the various physical activity interventions fairly and efficiently using standardized analytics. In addition to assessing efficacy of these interventions, an additional way to compare competing physical activity interventions is through cost-benefit data, often referred to as the return on investment (ROI). Yet the ROI approach is not well practiced in the public health field.

The two sides of the general formula for calculating ROI are: (1) the "investment" or cost of the intervention; and (2) the "return" or estimated monetary benefits gained from the intervention. See Figure 1 for the general ROI formula.

ROI = "Return" or benefits gained (i.e., reduced cost of falls) / "Investment" or cost of intervention

Example: ROI = $18,720: $11,143 = 1.7: 1 (a 70% savings over the 10-week intervention period)

** Note: an ROI of 1.0 means that there is a break-even point of costs and benefits over the stated time-period. An ROI greater than 1.0 indicates that the benefits are greater than the costs.*

Figure 1: ROI formula.

For the example ROI above, we use data from a cost-benefit analysis of a fall prevention intervention [1]. The cost and benefits of this 10-week intervention, respectively were $11,143 and $18,720, with an ROI of 1.7:1. Keep in mind that this is a 70% return on investment after only 10 weeks. A larger ROI was shown on an annual basis. More details on calculating the return and investment sides of this formula can be viewed in the original article.

The denominator of the ROI formula (the investment), of course can vary greatly based on the specifics of interventions. The numerator of the ROI formula (the return), however, should be based on a standardized approach, including estimates of cost per fall in elderly, so that fair comparisons among various interventions can be made. See Figure 2 for equation to estimate the return side of the ROI formula.

Return = Averted falls [Baseline number of falls X Efficacy of intervention] X Average cost per fall

Example Return = 13 averted falls X $1,440 per fall = $18,720

Figure 2: Return side of ROI formula.

Using the same example as in Figure 1 [1], this intervention observed 13 averted falls, based on the baseline fall rate and efficacy of the intervention. For calculating the average cost per fall, only direct, acute medical costs were used, rather than including long-term costs (i.e., nursing home care, lost wages, etc).

Now, estimating the average cost per fall occurring in the community, can be tricky. Stevens et al. [2], used national data to report the total annual acute cost of falls and the associated number of elderly fall events that seek medical care, and calculated the corresponding cost per fall for this group. Next, an estimate of total number of community falls is needed, as medical care is not sought for all fall events. Bergen et al (2016) used national Behavioral Risk Factor Surveillance System (BRFSS) data to estimate that about 10% of fall events seek medical care (in emergency department and/or hospitals). Hence, Mills et al. [1] based the average cost per fall in the community ($1,440 used in the return formula in Figure 2) on national fall cost data [2], inflation, and proportion of fall events estimated to seek medical care [3]. It was assumed that if they did not seek acute care, they had either no, or negligible, direct health care costs. While

Mills et al. [1] included institutionalized older adults in their study, they found during baseline that these institutionalized elderly did not get referred more frequently for acute care of falls than the elderly living in the community. Hence, the authors utilized the fall-related data for community dwelling older adults.

Accurately calculating the average cost per fall is important in this example, as this rate carries equal weight in the return side of the ROI formula as an intervention's efficacy. For example, if one erroneously calculated three times the average cost per fall, it would have the same effect on the return side of the formula as if one tripled an intervention's efficacy. Inconsistencies in estimating the return side of the formula, or more specifically the average cost per fall, can lead to incorrect ROI formulations and unfair comparisons of physical activity interventions competing for funding.

In one review article that calculated the ROI's of three fall prevention interventions in elderly [4], the authors first estimated the average cost of falls seeking medical care to be $11,502, based on the national data from Stevens et al. [2] combined with inflation. However, to then estimate the average cost of all community falls (including those not seeking medical care), the authors reported a "33.4% likelihood of seeking medical care following a fall". However, when reading the authors reference for this proportion [5], the original article stated that this proportion of 33.4% actually reflected the proportion of people, elderly fallers, who "sought medical care for a fall at some point in a year", rather than proportion of fall events that sought medical care. Hence, Carande-Kulis et al's [4] estimate of average cost per fall was potentially greatly overestimated, as this estimated proportion of falls seeking medical care is three-fold the 10% estimate used by Mills et al. [1] in their return formula. The authors went on to calculate the three interventions ROI's to be 509%, 127%, and 64%, respectively. The higher estimate of cost per fall potentially created three-fold higher ROI's for the three interventions reviewed.

Again, Bergen et al. [3] utilized national BRFSS data to estimate proportion of fall events that sought medical care. Bergen agreed with the above Carande-Kulis et al. [4] article that approximately one-third of people seek medical care at some point during a one-year period but also provided data to show that only approximately 10% of elderly fall events in the community seek acute medical care. This, more accurate, estimate of actual falls seeking medical care would greatly reduce the returns reported in the previously mentioned review article by about one-third, and might result in a different physical activity intervention chosen for funding in a competitive situation.

Including cost-benefit analyses, in addition to assessing efficacy, of physical activity interventions is very important, regardless of which agency is willing to pay for the intervention (i.e., individuals, employers, health insurance companies, grants, or public funding) and/or which agency is receiving the benefits (i.e., individuals, health insurance companies, or public health agencies). However, it is vitally important that a consistent and standard estimate of the cost per fall be used on the return side of the ROI formula, so that the benefits of similar and/or competing interventions can be more accurately compared. In Figure 2 (return formula), it is noted that the average cost per fall portion of the equation carries the same amount of weight, or importance, as an intervention's efficacy.

On a final note, it is also important for authors publishing ROI data to show their work in calculating the ROI, and more specifically, the return side of the formula. As stated above, the average cost per fall can include long-term costs in addition to acute medical care costs. Cost per fall can also vary greatly in community dwelling versus institutionalized older adults. By showing one's work in detail, readers can quickly re-calculate estimates when necessary to compare ROI's among various interventions. In the example used above, a standard, either 33% or 10% of fall events seeking medical care (or somewhere in between) in cost-benefit calculations helps one to fairly compare fall prevention interventions in elderly. Of course, this discussion of the importance of using a standardized (accurate, valid, and consistent) approach to calculating ROI in fall prevention interventions is just an example of its infinite possibilities. This same standardized approach can be used to accurately measure and compare ROIs of a broad spectrum of intervention topics (including oral hygiene, needle exchange, etc).

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