David Leon Rosenthal <rosenthal.dleon@gmail.com>

Stroke Patient Savings w/Halo

20 messages

David Leon Rosenthal <rosenthal.dleon@gmail.com> Wed, Jul 31, 2013 at 10:00 AM
To: brett@wingeier.com, Lee von Kraus <leevonk@gmail.com>, "Daniel S. Chao" <daniel.s.chao@gmail.com>, Amol Sarva <amol@haloneuro.com>

Hello All,

Here is the latest write-up of savings for stroke patients. Lee and I have been working on refining it to give a clear overview of our calculations:
https://docs.google.com/document/d/18OUbcSVHxB-Zud8nHvSLuK_SagL0-3ZkqV9HTUPdNz8/edit

A few caveats:

1) The effect sizes from Kim et al were not deemed statistically significant, but we decided to keep them in there for now anyway.

2) For converting BI score (Barthel Index = measure of functional ability) improvement into dollars saved, we used a number from Meijer (2005) which correlates BI score to the likelihood of independent living. Unfortunately, what Meijer considers *independent* seems to overlap significantly with our definition of *dependent* (i.e. inpatient living, including nursing and rehab facilities, he considers independent--has to do with differences in Dutch and US systems), which would seem to make them more liberal estimates.

3) The amount of time post-stroke that tDCS was administered varies widely by paper (Lindenberg did it 30-40 mo. after; Nair almost 3 years post stroke; Khedr about 2 weeks after; Kim <2mo). However, our analysis assumes that tDCS is administered in the early stages of post-acute care (beginning about a week after stroke).

All the Best,
David

Lee von Kraus <leevonk@gmail.com> Wed, Jul 31, 2013 at 10:24 AM
To: David Leon Rosenthal <rosenthal.dleon@gmail.com>

Cool, looks good, but for the first couple constants (SD_{IRF} etc) can you put a citation for them?
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Amol Sarva <amol@haloneuro.com> Wed, Jul 31, 2013 at 11:24 AM
To: David Leon Rosenthal <rosenthal.dleon@gmail.com>
Cc: "brett@wingeier.com" <brett@wingeier.com>, Lee von Kraus <leevonk@gmail.com>, "Daniel S. Chao" <daniel.s.chao@gmail.com>

Whats "the answer"? Dont bury it in the link

Amol Sarva Ph.D. // @amol // a.sarva.co // 530-727-8277
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Lee von Kraus <leevonk@gmail.com> Wed, Jul 31, 2013 at 11:56 AM
To: Amol Sarva <amol@haloneuro.com>
Cc: David Leon Rosenthal <rosenthal.dleon@gmail.com>, "brett@wingeier.com" <brett@wingeier.com>, "Daniel S. Chao" <daniel.s.chao@gmail.com>

"Here we present estimates of these savings based on effect sizes reported in 3 recent papers. The average of these estimates is $3,858 per patient (SD = 920). We present the details of our analysis below."
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Lee von Kraus <leevonk@gmail.com> Wed, Jul 31, 2013 at 12:11 PM
To: David Leon Rosenthal <rosenthal.dleon@gmail.com>

also, can you put in a citation for the constant "post-acute care cost per average patient"
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Amol Sarva <amol@haloneuro.com> Wed, Jul 31, 2013 at 3:30 PM
To: Lee von Kraus <leevonk@gmail.com>
Cc: David Leon Rosenthal <rosenthal.dleon@gmail.com>, "brett@wingeier.com" <brett@wingeier.com>, "Daniel S. Chao" <daniel.s.chao@gmail.com>

Boo. Tiny!

Amol Sarva, Ph.D. // @amol // 530-727-8277 // a.sarva.co
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Lee von Kraus <leevonk@gmail.com> Wed, Jul 31, 2013 at 3:41 PM
To: Amol Sarva <amol@haloneuro.com>
Cc: David Leon Rosenthal <rosenthal.dleon@gmail.com>, "brett@wingeier.com" <brett@wingeier.com>, "Daniel S. Chao" <daniel.s.chao@gmail.com>

that value is the savings averaged across all stroke patients, there are ~800,000 strokes per year in the US

800,000 * $3,858 = 3,086,400,000

(> $3 Billion / year)
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Lee von Kraus <leevonk@gmail.com> Wed, Jul 31, 2013 at 3:43 PM
To: David Leon Rosenthal <rosenthal.dleon@gmail.com>

that's right, right? as far as I remember :-P
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Brett Wingeier <brett@wingeier.com> Wed, Jul 31, 2013 at 3:52 PM
To: Amol Sarva <amol@haloneuro.com>
Cc: Lee von Kraus <leevonk@gmail.com>, David Leon Rosenthal <rosenthal.dleon@gmail.com>, "Daniel S. Chao" <daniel.s.chao@gmail.com>

Yeah.

I haven't reviewed the doc in detail yet but I'm honestly not surprised that the savings might be only 3-4K in terms of saving rehab time and getting you to the same endpoint quicker. That's not chump change, of course, and there's a business in there given the high incidence of stroke - but I think somewhere along the line we'll have to make a case based on actual increased function. Patients do a finite amount of rehab and hopefully if it is accompanied by DC they emerge with higher function for that given amount of rehab.

The major Euro payers all have a pay line expressed in terms of $ per quality-adjusted life year, and while US reimbursement methods are not quite so explicit the concepts are the same; a treatment is a win (and folks will pay for it) if the additional QALYs are cheap enough (where cheap enough is on the order of $40-50K per QALY). Seems that the next level of analysis should link effect size to QALY or a similar utility measure since the benefits will compound nicely over a few years of decreased disability, yes?

- B

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Brett Wingeier, Ph.D.
Principal Biomedical Engineer
Neurotech / Biosignals / Medical Device Development
US Registered Patent Agent, reg. no. 69895
505.463.4119 (cell)
brett@wingeier.com

David Rosenthal <rosenthal.dleon@gmail.com> Wed, Jul 31, 2013 at 4:20 PM
To: Lee von Kraus <leevonk@gmail.com>

Correct
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David Rosenthal <rosenthal.dleon@gmail.com> Wed, Jul 31, 2013 at 4:25 PM
To: Amol Sarva <amol@haloneuro.com>

Think of it as having 10,000-dollar error bars.
-David
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Amol Sarva <amol@haloneuro.com> Wed, Jul 31, 2013 at 4:28 PM
To: Brett Wingeier <brett@wingeier.com>
Cc: Lee von Kraus <leevonk@gmail.com>, David Leon Rosenthal <rosenthal.dleon@gmail.com>, "Daniel S. Chao" <daniel.s.chao@gmail.com>

Sure I want quality. But here is what I want to find on dollars:
- for a given class of patients xyz
- size r
- their rehab is time t
- cost of s per week
- total expense of U
- if we save V %
- then we save q dollars

Oh, and the q is way higher than the price we want to charge which is like $2-5k

Perhaps if we are averaging across all 800k stroke patients we can defines a narrower xyz above? With higher t and s?

Amol Sarva, Ph.D. // @amol // 530-727-8277 // a.sarva.co
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Lee von Kraus <leevonk@gmail.com> Wed, Jul 31, 2013 at 4:38 PM
To: Amol Sarva <amol@haloneuro.com>
Cc: Brett Wingeier <brett@wingeier.com>, David Leon Rosenthal <rosenthal.dleon@gmail.com>, "Daniel S. Chao" <daniel.s.chao@gmail.com>

"Perhaps if we are averaging across all 800k stroke patients we can defines a narrower xyz above? With higher t and s?"

yeah, tDCS can only treat a % of stroke patients so the savings per patient that would get tDCS is higher (we'll get on calculating that).
The ~4k savings we presented is the savings for only 30% of patients but averaged across all 100% of patients.

(The tDCS-savings are for only 30% of stroke patients because only 63% of stroke patients have intact corticospinal tracts and only 48% of patients are discharged to inpatient post-acute care after acute hospitalization)

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David Rosenthal <rosenthal.dleon@gmail.com> Wed, Jul 31, 2013 at 4:39 PM
To: Amol Sarva <amol@haloneuro.com>

The highest estimate (not included) is about 11k.
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Lee von Kraus <leevonk@gmail.com> Wed, Jul 31, 2013 at 4:57 PM
To: Amol Sarva <amol@haloneuro.com>
Cc: Brett Wingeier <brett@wingeier.com>, David Leon Rosenthal <rosenthal.dleon@gmail.com>, "Daniel S. Chao" <daniel.s.chao@gmail.com>

I guess that would make it around 13k savings / patient for the 30% of patients (~240,000) that have an intact CST and have been discharged to inpatient post-acute care. Anyway, we'll work on addressing that and Amol's other suggestions more thoroughly.

Brett, good idea, we can look into that. The way the savings were calculated was by looking at tDCS increasing function in less time leading to faster discharge to independent living. But we could also do calculations in which we assume that patients would receive the same amount of rehab and calculate how much better function they would have than the they would without tDCS

Daniel S. Chao <daniel.s.chao@gmail.com> Wed, Jul 31, 2013 at 6:51 PM
To: Lee von Kraus <leevonk@gmail.com>
Cc: Amol Sarva <amol@haloneuro.com>, Brett Wingeier <brett@wingeier.com>, David Leon Rosenthal <rosenthal.dleon@gmail.com>

guys - i think we're reaching the limits of virtual discussion. short of getting in a room together, we should schedule a time to talk about this. i'm willing to wake up at the crack to accommodate amol in europe. or we can wait for amol to get back (friday, i think).

dan
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Brett Wingeier <brett@haloneuro.com> Thu, Aug 1, 2013 at 2:29 AM
To: "Daniel S. Chao" <daniel.s.chao@gmail.com>
Cc: Lee von Kraus <leevonk@gmail.com>, Amol Sarva <amol@haloneuro.com>, David Leon Rosenthal <rosenthal.dleon@gmail.com>

Agreed. I can generally hop on a call anytime after 6:15 AM, although if Amol is back on Friday that might be easier.

Just to add some clarity, though...

What Amol is getting at is: given one patient who receives treatment with our device, what is a straightfaced estimate of the direct monetary cost saved in medical care / rehab time / whatever for that patient?

And, the second-order analysis I mentioned boils down to including functional improvement and indirect costs of disability (whether expressed in dollars or utility measures such as QALY) in this estimate.

Incidence and all the rest are immaterial for these patient-level cost/benefit calculations, although of course it figures strongly into market size and whatnot.

- B
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Brett Wingeier, PhD - brett@haloneuro.com - 505-463-4119

Amol Sarva <amol@haloneuro.com> Thu, Aug 1, 2013 at 9:43 AM
To: Brett Wingeier <brett@haloneuro.com>
Cc: "Daniel S. Chao" <daniel.s.chao@gmail.com>, Lee von Kraus <leevonk@gmail.com>, David Leon Rosenthal <rosenthal.dleon@gmail.com>

Word. I want to find a class of 25k patients not 300k. Maybe that will help us find guys who need lots of expensive care that we can accelerate by 30%.

Narrower, higher dollar group.

Got one?

Amol Sarva Ph.D. // @amol // a.sarva.co // 530-727-8277
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Lee von Kraus <leevonk@gmail.com> Thu, Aug 1, 2013 at 11:24 AM
To: Amol Sarva <amol@haloneuro.com>
Cc: Brett Wingeier <brett@haloneuro.com>, "Daniel S. Chao" <daniel.s.chao@gmail.com>, David Leon Rosenthal <rosenthal.dleon@gmail.com>

I think it would be best to hold off the call until monday since David is gone for the weekend and he's the one that did 95% of the literature searching for useful stats.
I remember one paper that showed the Barthel Index improvement curves of the worst, medium, and best functionality stroke survivors. We could pick out the worst, correlate the Barthel Index (BI) scores with Fugl Meyr (FM) scores (which is what most tDCS papers use) (although the fit of the FM-BI correlation regression curve is kind of shitty), and then see if any tDCS papers specifically mention/show its effects on people with that FM score.

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David Leon Rosenthal <rosenthal.dleon@gmail.com> Mon, Aug 5, 2013 at 2:46 PM
To: Brett Wingeier <brett@wingeier.com>, Lee von Kraus <leevonk@gmail.com>, "Daniel S. Chao" <daniel@haloneuro.com>
Cc: Amol Sarva <a@sarva.co>

Hi everyone,

Let me know if you want to have a conference call--I'm back in the office and can speak any time.

-D

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