Author's response to reviews

Title: Ideal timing to initiate interdisciplinary inpatient stroke rehabilitation: an exploratory study.

Authors:

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Version: 2 Date: 12 October 2006

Author's response to reviews: see over
**Reviewer's report**

**Title:** Ideal timing to initiate interdisciplinary inpatient stroke rehabilitation: an exploratory study.

**Version:** 1  **Date:** 8 September 2006

**Reviewer:** Daniel Bereczki

**Reviewer's report:**

**General**
The paper tests in a retrospective analysis if the outcome of post stroke intensive inpatient rehabilitation depends on the period between stroke onset and admission to a rehabilitation ward. The results challenge the traditional view that outcome is better with earlier rehabilitation. The paper also emphasizes the problem that the lack of capacity of rehabilitation wards extends the unnecessary stay of stroke patients at acute stroke units.

**Comment:**
This paper definitively deserves to be published since no other manuscript ever highlighted the importance of initiating rehabilitation efforts very early after a first ever stroke in acute care setting. Such an early start may actually attenuate the detrimental effect of a prolonged hospital stay, for medical or non-medical reasons, while waiting to be admitted to a rehabilitation hospital offering intensive rehabilitation programs. Stroke rehabilitation programs developed in acute care hospitals are certainly an alternative that needs to be encouraged, particularly in publicly-funded healthcare systems where the admission capacity of rehabilitation wards cannot meet the needs and extended unnecessary stays in acute care settings are frequent for stroke patients. The message of this paper is not to pretend that there is no need to hurry with discharging stroke patient to a rehabilitation ward. In fact, the following sentence was added in the discussion to be sure that nobody would share your concerns:

*Overall, these results confirm that if interdisciplinary rehabilitation services are rapidly initiated after the stroke, OAI loses importance independently of the setting (acute hospital vs rehabilitation centre) although a small effect of timing (OAI) might still remain (Efficiency scores: FIM total P=0.120; FIM motor P=0.103). This small effect definitively deserves attention as this can be of clinical importance even if it no statistically significant difference was found. This trend corroborates that individuals who are medically stable following a first CVA should rapidly be transferred to a rehabilitation facility offering an intensive stroke rehabilitation program. Under no circumstance should the admission to a rehabilitation facility from an acute care facility be delayed. (lines 251-259)*

Finally, the robustness of this study is certainly challenged by its retrospective design. However, the innovative conclusions of this manuscript will certainly trigger future prospective researches in this field and may contribute to the development of optimal research designs.

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**Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)**

Although it is clear that rehabilitation in an acute stroke unit differs from rehabilitation in a specialized rehabilitation unit, the most important confounding factor is the initiation of and the intensity of rehabilitation in the acute care. If all patients had their rehabilitation
started in the acute phase i.e. the day or in the next few days after admission for stroke, it is no wonder that it does not make too much difference if rehabilitation in the post acute phase continues on a rehabilitation ward within 20 days or between 40-70 days after stroke onset. Actually, all patients in such a setting get very early rehabilitation. The only difference among the 3 groups is the timing of change of rehabilitation setting, and not the time of initiation of rehabilitation. This is mentioned but should be made more clear in the paper.

**Answer:**
The title of the manuscript was changed to clarify its content. The suggested new title is:
**Ideal timing to transfer from an acute care hospital to an interdisciplinary inpatient rehabilitation program following a stroke: an exploratory study.**

It will help if data were given comparing intensity of rehabilitation in the acute stroke unit and in the rehabilitation unit. Currently it is only mentioned that physical therapy, occupational therapy, speech and language therapy are applied both at the acute care settings and at the rehabilitation wards.

**Answer:**
The retrospective design of this study prevent us from being able to precisely report the amount of therapy received in acute care hospital land in rehabilitation hospital. This sentence, included in the limits of the study, was improved:
Moreover, measurements of therapeutic specificity and intensity at the acute care and rehabilitation hospitals should definitively be included in future prospective study given its possible influence on rehabilitation LOS and efficiency. (lines 347-349)

To this effect, another sentence was also added in the abstract:
**However, other studies considering factors such as the type and intensity of the rehabilitation are required to support those results. (lines 54-56)**

In the current form of the manuscript the paper can be misleading and has the message that there is no need to hurry with discharging the stroke patient to a rehabilitation ward. This might be true if there is active rehabilitation in the acute setting, but can be a completely false message for hospitals where e.g. due to lack of resources rehabilitation can not be initiated for acute stroke patients within the first few days after stroke onset.

**Answer:**
As previously mentioned, the following sentence was added in the discussion to be sure that nobody would share your concerns:

**Overall, these results confirm that if interdisciplinary rehabilitation services are rapidly initiated after the stroke, OAI loses importance independently of the setting (acute hospital vs rehabilitation centre) although a small effect of timing (OAI) might still remain (Efficiency scores: FIM total P=0.120; FIM motor P=0.103). This small effect definitively deserves attention as this can be of clinical importance even if it no statistically significant difference was found. This trend corroborates that individuals who are medically stable following a first ever CVA should rapidly be transferred to a rehabilitation facility offering an intensive stroke rehabilitation program. Under no circumstance should the admission to a rehabilitation facility from an acute care facility be delayed. (lines 251-259)**

2. Of the 534 (or 418) stroke patients, only 120 were included in the analysis. This decrease in the number of subjects available for analysis decreases the power. I
recommend to perform a sensitivity analysis and use all patients available, instead of trichotomizing, use the onset-admission interval (OAI) as a continuous variable, use the FIM score as the outcome measure and perform a multivariate analysis including gender, stroke severity (e.g. a stroke scale score or level of disability or case mix group on admission) and if possible rtPA use as covariates in the model. I admit that strictly speaking neither OAI nor FIM are really continuous variables, but as OAI can have any discrete value between 0 – 70 and FIM from 0 – 126, these variables could be handled statistically as continuous variables. If this analysis will result in the same conclusion as the currently presented one, we still have to consider the problem mentioned in point 1 above, but the results at least could give support for the present conclusions. This analysis seems to be important, as the data in Table 4 suggest a trend of better outcome with shorter OAI: with similar admission FIM discharge FIM is larger in the short OAI group; the median relative change is over 30% in the short OAI group but below 30% in the longer OAI groups; the total efficiency decreases from 0.62 to 0.53 to 0.42 as the OAI increases.

Answer:
With regard to this comment, we have consulted a statistician to review the statistical approach selected in this study and further validate our findings. Since the goal of the present preliminary study was to determine if rehabilitation efficiency (FIM-total, motor and cognitive gains, LOS and FIM-total, motor and cognitive efficiency score) differences existed between groups of individuals who sustained a first ever stroke admitted to rehabilitation hospital at different times post-stroke (OAI), the statistician agreed that the matching procedure used is definitively appropriate. We used a stratified sampling method (pre-stratification) to control for the covariant effects of age, gender and stroke severity (CMG) between the different OAI groups. Methods of control a posteriori for potential confounding variables (post-stratification) were thought to unnecessarily lower the power of the analyses with the group having the longest OAI being underrepresented.

To further support the statistical approach, each OAI subgroup formed of 40 participants was compared to all participants of the same stratum to confirm that the cases were representative of the OAI subgroups (short, moderate, long) from where they were selected. To this effect, this sentence was added in the methodology section:
Participants included in the short, moderate and long OAI subgroups were found to be well representative of the entire stratum from which they were selected as no difference was found for the age, gender and stroke severity (CMG) between the groups (p=0.226-0.924).(lines 179-182)

It is also important to consider that similar matching procedures have been used numerous times in the past in other published scientific manuscripts. For examples, see the following references:

We definitively remain open to your recommendations concerning the statistical analysis performed in this preliminary study. In fact, your recommendations have been seriously considered and will be beneficial to the preparation of a future larger scale prospective study. However, we feel that the matching-procedure used in this retrospective study is adequate to explore the influence of short, moderate and long OAsIs on rehabilitation outcomes across homogeneous subgroups of individuals who sustained a first ever stroke. This is further supported by the second reviewer of this manuscript who did not challenge the statistical approach proposed in this manuscript.

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Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

1. In the abstract an abbreviation appears without definition (FIM). Please, define abbreviation at first occurrence.

**Answer:**
*The FIM abbreviation was defined at the first occurrence in the abstract*

2. It should be discussed and justified why the 20 – 40 – 60 days were specifically selected as limits for short, moderate and long onset-admission interval. In several centers stroke patients are kept on the acute ward for about 3-5 days and sent to rehabilitation wards immediately thereafter. For such settings a 15-20-day admission to a rehabilitation ward is considered late and not early admission.

**Answer:**
*Currently, the mean national OAI reported in the USA is 11 days which seems to be different from the 3-5 days you are suggesting. In addition, the following sentence added in the discussion also needs to be considered when looking at this OAI reported in the USA: This reduced OAI reported in the USA may result, in part, from the presence of numerous constrained for admission to rehabilitation (eg: financial) and from the limited number of severe cases (FIM-Total score lower than 40) admitted to rehabilitation facilities despite evidence of slow recovery among these individuals. (lines 266-270)*

*This may explain why the OAI is more elevated in Canada (publicly-funded universal access healthcare) and the use of a similar classification in other countries with similar healthcare environment. The following sentence was added in the method section: ..... subgroups since a similar classification has been previously used in a other stroke studies. Although a period of 20 days may not appear as a short OAI in certain countries, other recent studies have even defined a period of less than 30 days as being a short OAI (early admission). (lines 144-147)*

3. It is stated that “subjects were randomly matched”. The method of randomization should be given, or if it was not a real randomization, more details should be given about patient allocation to the groups.
When multiple subjects were identified within the same OAI subgroups, subjects were matched automatically with the first subject who presented similar characteristics (age, gender, CMG) until no more triads could be created (lines 172-174).

4. ANOVA is used in data comparison for continuous variables. Before that normality of continuous variables should be checked. If distribution is non normal, then nonparametric tests (e.g. the Kruskal-Wallis ANOVA) should be applied for these comparisons as well.

When this type of ANOVA is used, we assume for the fixed effect model the following: the k sets of observed data constitute k independent random samples from their respective populations, the populations from which the samples were drawn are normally distributed (although in the case of large samples, the central limit theorem applies and the statistic will tend to have a normal distribution) and all k populations have equal variances. We did use the Levene statistic to check for heterogeneity of variances and we determined that, since the residuals followed a relatively normal distribution, the assumptions were true.

Between-group differences for participants with different OAI intervals were calculated using a one-way independent-samples analysis of variance (ANOVA) for the age, OAI, and LOS after verifying the heterogeneity of variances. (line 204)

1. Page 8: “….scores reports” should be changed to “scores report”

2. Page 11: “This definitively need to be…” should be changed to “needs to be”

3. Page 11: “during these program” should be changed to “during these programs”.

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

Level of interest: An article of importance in its field

Acceptable Quality of written English: Yes

Statistical review: Yes
Declaration of competing interests: I declare that I have no competing interests.
Reviewer's report

Title: Ideal timing to initiate interdisciplinary inpatient stroke rehabilitation: an exploratory study.

Version: 1 Date: 30 June 2006

Reviewer: Salvatore Giaquinto

Reviewer's report:

General

The study was aimed at examining the influence of short, moderate and long onset-admission intervals (OAI) on rehabilitation outcomes across homogeneous subgroups of patients who were admitted to a standardized interdisciplinary inpatient stroke rehabilitation program after a first ever stroke. The Authors reach an apparently provocative conclusion, i.e. inpatient rehabilitation outcome is not influenced by OAI. Indeed, the impact of OAI on stroke rehabilitation outcomes was offset, when controlling for the degree of severity, gender, and age. These results would challenge the opinion that stroke patients must be soon admitted to inpatient rehabilitation potentially, because they can reach more favourable outcomes than those admitted later. These results would also challenge the opinion that delayed inpatient stroke rehabilitation may hamper outcome.

The research is very serious and accurate, but it would be dangerous to spread a wrong information. Patients after the acute cerebrovascular episode should not kept idling, while they wait for their admission to a stroke rehabilitation centre. If rehabilitation begins soon after stroke and does not stop, OAI loses importance. By contrast, if rehabilitation is delayed, OAI becomes critical, because uncontrolled adverse effects may arise in that interval. The Authors acknowledge this criticism in the Conclusion paragraph.

Answer:

The following sentences were added in the discussion to clarify the points raised by this reviewer (and the other one):

Overall, these results confirm that if interdisciplinary rehabilitation services are rapidly initiated after the stroke, OAI loses importance independently of the setting (acute hospital vs rehabilitation centre) although a small effect of timing (OAI) might still remain (Efficiency scores: FIM total P=0.120; FIM motor P=0.103). This small effect definitely deserves attention as this can be of clinical importance even if it no statistically significant difference was found. This trend corroborates that individuals who are medically stable following a first ever CVA should rapidly be transferred to a rehabilitation facility offering an intensive stroke rehabilitation program. Under no circumstance should the admission to a rehabilitation facility from an acute care facility be delayed. (lines 251-259)

Rapid access to rehabilitation programs for all individuals who sustain a stroke should never be jeopardized from an ethical, biological, clinical and administrative points of view. (lines 283-285)
The weak part of the study is the lack of information about the kind of rehabilitation offered throughout the stay in acute care facilities and later on, during OAI. The weakness is due to the retrospective design of the study.

**Answer:**
The retrospective design of this study certainly prevents us from being able to precisely report the amount of therapy received in acute care hospital and in rehabilitation hospital. This sentence, included in the limits of the study, was improved:

Moreover, measurements of therapeutic specificity and intensity at the acute care and rehabilitation hospitals should definitely be included in future prospective study given its possible influence on rehabilitation LOS and efficiency. (lines 347-349)

To this effect, another sentence was also added in the abstract:

However, other studies considering factors such as the type and intensity of the rehabilitation are required to support those results. (lines 54-56)

Political and fiscal issues should be clarified. About stroke rehabilitation length of stay (LOS), the Authors say that the publicly-funded and universal-access health care system permits a more prolonged LOS during inpatient rehabilitation than what is reported in the United States of America. By contrast, OAI is shorter in US. But, it should be acknowledged that the US system places several constraints at admission and severe cases (for example, cases with a FIM below 40) may not be admitted. Yet, there is the evidence of a slow recovery of the survivors. Each system has its own drawbacks and this article has the ideal background for a general criticism.

**Answer:**

The following sentence was added in the discussion:

This reduced OAI reported in the USA may result, in part, from the presence of numerous constrained for admission to rehabilitation (eg: financial) and from the limited number of severe cases (FIM-Total score lower than 40) admitted to rehabilitation facilities despite evidence of slow recovery among these individuals. (lines266-270)

Last comment. The Authors often say ‘enonmedical bed days’. It can be misleading. Indeed, a delayed discharge from acute care wards can be due to acute or chronic comorbidity, which represents a medical intervention.

**Answer:**
The term nonmedical bed-days was kept given its importance but precision was added to assure good understanding of the term for those not familiar:

…..commonly refer to as nonmedical bed-days (not resulting from medically unstable acute or chronic comorbidity)….. (lines 68-69)
Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

Discretionary Revisions (which the author can choose to ignore)