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ORIGINAL ARTICLE

How appropriate is the use of rehabilitation facilities? Assessment by an evaluation tool based on the AEP protocol

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Key words

Summary

Background. *During the last few decades, an increasing attention has been drawn to public health expenditure and resource use. The increasing aging population has highlighted the need to deliver post-acute care and to assess its appropriateness. The "PRUO rehab" (Protocollo di Revisione dell'Utilizzo dell'Ospedale riabilitativo) protocol was realized and validated to assess the appropriateness of use of rehabilitation units. The aims of this study were to test the validity of the PRUO-rehab tool and to analyse the causes for Inappropriate Hospital Stay (IPS) in rehabilitation units.*

Methods. *The PRUO rehab tool was retrospectively applied to the medical records of 502 patients who stayed at least overnight in one of ten different rehabilitation units set in Northern Italy, during 2007.*
Results. *The tool was valid and the inappropriate patient stay (IPS) score was 25.0%.*
Conclusion. *Although reasonably low, the IPS indicates that the rehabilitation structures analysed could be used more efficiently.*

Background

Similar to other industrialized countries, the health expenditure in Italy increased throughout the past few decades, from 8.1% of the Gross National Product in 2000 to 9.0% in 2006 [1]. The biggest part of health expenditure is represented by hospital services [2-4]. The Italian healthcare reforms launched in the 90s mainly aimed to introduce a prioritization system, thus increasing the appropriateness of resource usage, especially at hospital level. Tools to assess the appropriateness of hospital functioning were introduced alongside such reforms. The *Protocollo di Revisione dell'Utilizzo dell'Ospedale* (PRUO), based on the Appropriateness Evaluation Protocol (AEP) [5] was one such tool. Similar to AEP, PRUO is based on a set of criteria assessing the appropriateness of the day under analysis accompanied by a set of reasons analysing its eventual inappropriateness. This instrument was first validated and applied in selected cases followed by auditing procedures [6-8]. PRUO was employed as an instrument for both internal (i.e. for hospital management assessment of medical staff performance) [9] and external control (i.e. by Regional Health Authorities) [10]. PRUO was initially used to asses the appropriateness of acute care delivery [9, 11]. Subsequently, the need to assess different levels of care led to the development of several distinct versions, including the PRUO-day hospital [7] and PRUO-paediatrics [12].

In the last years the needs of the growing Italian elderly population, increasingly draw the attention to the area of post acute long term care [3]. The costs and appropriateness of care need to be investigated [2, 4], especially in the field of rehabilitation, which has gained particular importance. Building on past experience [13], a PRUO modified protocol - PRUO Rehab was devised, which kept some of the original criteria and reasons of PRUO but introduced a new set, specific to this particular level of assistance. The PRUO-rehab used in this study was derived from the PRUO for acute hospital stays. In the modified tool, the criteria and reasons related to the medical conditions and needs of the patient were maintained, while those related to surgical activity were substituted by a set of criteria specific to rehabilitation therapy such as the presence of rehabilitation planning and the possibility for the patient in each day of recovery to be rehabilitated. As known, the PRUO appropriateness protocol does not refer to the clinical diagnosis or the type of medical services offered, but rather to whether such services are issued at the right level of assistance. Hence, an inappropriate day of stay indicates that medical services are given at the wrong level of assistance.

The aims of this study were:
a) to validate to the PRUO-rehabilitation tool;
b) to assess the inappropriate use of rehabilitation facilities.

Methods

The study involved a retrospective evaluation on medical records from 502 patients who stayed at least overnight in one of 10 rehabilitation centres or hospital-based rehabilitation wards located in the northern Italian regions: Lombardia, Piedmont and Liguria, during 2007.

PRUO-rehab is a criteria-based tool composed of two parts: the first assesses the medical needs of hospital admissions and the second evaluates days of care. The tool includes 15 criteria and 6 reasons for inappropriate patient stay (IPS) for the admission day and 22 criteria and 12 reasons for IPS for the following days of care.

The admission day criteria are as follows:
- the drafting of a complete, or incomplete, rehabilitation plan;
- the impossibility of using a lower level of assistance (day hospital or outpatient facilities) due to patient immobility or to family logistic reasons (criterion never applied);
- the start of rehabilitation delivery according to the plan.

The criteria applied for the days of stay include:
- the drafting of a complete, or incomplete, rehabilitation plan;
- the assessment, using scales and tools, allowing the drafting of a rehabilitation plan;
- the daily rehabilitation session.

As in the AEP method one criterium is sufficient to appropriate each day of admission and day of care.

The days of stay evaluation took into account the entire period of hospitalization in the 502 medical records. However, to facilitate the analysis, thirty days were assessed for each medical record and these were chosen according to the following criteria:
- the admission day, the first and the last two days of stay were always used;
- all days were used in cases of clinical stays up to 30 days;
- alternate days were used for clinical stays lasting from 31 to 60 days;
- one every three days were used for clinical stays lasting over 61 days, until the 30 days threshold was reached.

But all using the same set of criteria and reasons of the PRUO Rehabilitation Tool used for the shorter lengths of stay.

The level of appropriateness was assessed separately for the admission day and the days of stay, with two different sets of criteria. All the criteria observed were registered to assess and validate the tool but, as usual, one criterium was considered sufficient to appropriate the admission day and the days of stay also in the longer lengths of stay.

The assessment also took into account the Major Diagnostic Categories (MDC) and the patient's age, with two distinct age categories - under 65 and over 65 years old. The level of reliability among the reviewers was preliminarily assessed applying the kappa coefficient to the data collected in the first eight medical records of each health structure.

Results

Five hundred and two admission days and 9387 days of stay were assessed. Of these, 75 admission days and 1365 days of stay were used to assess the concordance among the four data reviewers. The *kappa coefficient* on these results was 0.94, which indicates high reliability.

Thirty-eight admission days were judged inappropriate, with a mean IPS of 7.53%. Of the 9387 days of stay analysed 2430 were considered inappropriate with an IPS of 25.89%, a score noticeably higher than that observed for the admission days. The criterion most often used in cases of inappropriate admission day was "the patient enters hospital so that a rehabilitation plan can be laid out". This criterion was considered incomplete. In fact, in these cases, either the duration of the rehabilitation plan was missing, no time had been set for the rehabilitation plan, or planned sessions lasted less than 40 minutes, which is the minimum duration by law. The main

Tab. I. Type and frequency of the main criteria used to assess admission days.

Criteria used	Number of cases	%	Number of cases where criteria were used individually	%
Incomplete rehabilitation plan	328	36.8	73	52.1
Observation or services carried out by non medical staff	305	34.2	45	32.1
Medical observation (at least twice within 24h)	103	11.6	9	6.43
Respiratory assistance (continuous or intermittent)	53	5.9	5	3.57
Rehabilitation plan started	51	5.7	3	2.14

Tab. II. Type and frequency of the main criteria used to assess the days of stay.

Criteria used	Number of cases	%	Number of cases when criteria were used individually	%
Medical observation (at least once in 24h)	5434	45.1	1531	53.5
Rehabilitation without indication of duration	4509	37.4	1003	35.1
Respiratory assistance (continuous or intermittent)	973	8.1	142	4.97

criterion used for the inappropriate days of stay was "for medical observation" (Tabs. I, II).

The main reason for IPS for both the admission day and the days of stay was that the patient was admitted for basic nurse care.

Two criteria were jointly used to justify the appropriateness of 237 days of admission (51%); three criteria were employed in 71 cases (15.3% of the days of admission). The same was observed for the days of stay: two criteria were used to justify the appropriateness of 3.196 days of stay (45.9%) and three criteria were used for 798 days (11.4%).

The analysis of the level of appropriateness of the days of admission and of stay shows that days of stay associated to an appropriate admission day were more likely to be appropriate than those associated with an inappropriate admission day: 77.13% of appropriate days of stay followed an appropriate admission day.

All inappropriate admission days occurred on weekdays and the inappropriate days of stay covered both weekdays and weekends (Tab. III).

In the Table IV are presented the levels of appropriateness of admission days and days of stay according to different MDCs. Respiratory system and musculoskeletal system diseases reached IPS values over 30%. On the admission day all the categories show high appropriateness percentages, except for the respiratory system with IPS values approaching 40%.

Appropriateness values on both the admission days and the days of stay were similar in the under and at least 65 years old age groups.

Discussion

The "PRUO rehab" tool was applied in a similar way by all four data collectors, indicating its reproducibility. The *kappa coefficient* calculated was 0.94, which reflects the high reliability shown in the results. The four data collectors declared that the tool was easy to understand and to administer.

The criteria chosen for the tool were considered suitable for detecting the appropriateness of activities in the rehabilitation units, as shown by the presence of more than one criterion in almost 50% of both the admission days and days of stay.

7.57% of admission days and 25.89% of days of stay were inappropriate. Both values were lower than those observed in other published studies [6, 8, 9, 11, 12, 14-16] concerning acute hospital stays. The medical records in this study belonged to patients undergoing intensive rehabilitation after an acute illness. Hence, these lower percentages can be explained by the fact that the medical services needed by the study patients are easier to program.

Only 36.8% of the patients had a rehabilitation plan laid out on the admission day. This criterion was indicated in 52.1% of the clinical records reporting a single reason for admission. This indicates that, though justified by other medical reasons, the majority of admissions to rehabilitation units were not connected to the rehabilitation process itself.

The main reasons for inappropriate admission were:
• the patient entered the rehabilitation unit for basic nurse care;
• the patient was admitted before the programmed rehabilitation plan could be initiated.

In all the above cases a single reason was selected to indicate the inappropriateness of admission day. Hence, most patients were referred to a rehabilitation unit either while still in need of medical care that should have been given at different assistance levels, or simply too early in the rehabilitation process. Both reasons might be indicative of an incorrect use of healthcare resources and an increase in inefficiency due to the deployment of wrong levels of care.

Only in 37.4% of cases the programmed rehabilitation plans have indeed been carried out during the days of

Tab. III. Number of inappropriate days of stay in correlation to the week.

	Week day N cases	Saturday N cases	Sunday N cases	Other festivities N cases	Miss N cases	Tot
Appropriate	5790	754	362	45	6	6957
Inappropriate	867	546	912	105	0	2430
Total	6657	1300	1274	150	6	9387
% inappropriate days	13.02 [IC: 12.24-13.80]	42.00 [IC: 40.60-43.40]	71.59 [IC: 70.29-72.89]	70.00 [IC: 66.30-73.70]	0.00	

Tab. IV. Type and frequency of appropriate days of admission and days of stay per MDC.

MDC	N cases	% of appropriate admission per MDC	% of appropriate days of stay
Nervous System	110	94.55 [IC: 92.35-96.75]	76.87
Respiratory System	65	61.54 [IC: 55.54-67.54]	67.93
Circulatory System	134	99.25 [IC: 98.55-99.95]	84.43
Musculoskeletal System	150	97.33 [IC: 96.03-98.63]	69.72
Factors Influencing Health Status	32	93.75 [IC: 89.45-98.05]	78.84
Non specified cases	11	100.00	70.06

stay. The reason most frequently used to describe inappropriate days of stay was "basic nurse care". As in the case of the admission day, these results indicate an incorrect level of assistance.

It is conceivable that an appropriate admission day leads to a higher percentage of appropriate days of stay, indicating how a well planned hospital stay results in more efficient use of health resources.

All admissions occurring during weekends or festivities have been appropriate. This may be explained by the fact that such admissions were more likely to reflect a real medical need.

Vice versa, inappropriate stays were considerably higher on weekends or festivities, which may be attributed to the reduced medical staff on these days, or to the fact that rehabilitation was not carried out during weekends (Tab. III).

As shown in Table IV, respiratory diseases were the only MDC with a high inappropriateness value for the admission day. A possible explanation is that respiratory patients have been admitted to the units too early for a rehabilitation plan to be in place [17]. These patients could have otherwise received medical services on an out-patient basis. The respiratory system was the MDC with the highest inappropriateness value (32.07%) also for what concerns the days of stay, followed by the musculoskeletal system and unspecified cases (inappropriateness values 30.28% and 29.93%, respectively). The latter, consisting in medical records with missing MDC, only included 11 clinical records and was not therefore considered numerically sufficient to offer clinically relevant information. As for the musculoskeletal system, the higher percentage of inappropriate days could be explained by the fact that these rehabilitation patients normally have little or no accompanying complications and therefore no medical justification can be offered for their day of stay when the rehabilitation programme is not carried out. In comparison, in respiratory patients, rehabilitation may be suspended due to minor complications of the underlying disease, which could possibly justify the days of stay lacking rehabilitation sessions.

The analysis by age group (under and at least 65 years old) showed very similar percentages of appropriateness for both admission and days of stay. The appropriateness values in the at least 65 year old group were somewhat higher for the admission day, but slightly lower for the days of stay. A possible explanation is that older patients may present a higher level of co-morbidity, and

may therefore benefit from longer hospital stays for clinical reasons, while even more complex social factors may come into play. The analysis of the group of patients under 65 years of age is particularly difficult as patients' ages range from individuals in their twenties to those over sixty years old, thus presenting highly diverse co-morbidities and rehabilitation recovery times. As a result, the appropriateness levels in this last group are difficult to comment. Finally, the difference in the appropriateness levels between the two groups, considering the number of clinical records, was too small to reach statistical significance.

In conclusion, this study showed the PRUO-rehab to be reliable and valid tool for measuring rehabilitation ward functioning. The results warrant a thorough investigation of the appropriateness of use of rehabilitation units. Taken together, the observations from all 9889 days studied, indicate that the efficiency of health resource allocation could be improved. In fact, although the appropriateness percentage in this study was high, many criteria were not specifically due to the rehabilitation process itself, but rather, attributable to more generalized medical care. Hence, this study indicates the possible causes of inappropriate days, but also that medical care, when needed, could have been provided at different levels of assistance. Another problem that should be addressed is that inappropriateness levels tend to be higher during weekends or festivities.

Though the reduction of IPS to zero may be utopia, considering the high number of uncontrollable variables [7], this study indicates that there is definitely room for improving the efficiency of rehabilitation units management and resource allocation.

Keypoints

The increased health expenditure and the changing italian demographics with an increasing aging population should be reflected in the use of health care facilities and in particular that those dedicated to rehabilitation.

Many available protocols assess the appropriateness of acute care but very little has been done specifically in the field of rehabilitation.

The PRUO Rehab, validated by this study, is an easy to understand simple to administer tool, offering consistent information on the appropriateness of use of rehabilitation structures.

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