Original article

Effect of co-management with Internal Medicine on hospital stay in Ophthalmology

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ABSTRACT

Objective: Patients admitted to the Department of Ophthalmology (OPH) are of increasing age, comorbidity and complexity, leading to increased consultations/referrals to Internal Medicine (IM). An alternative to consultations/referrals is co-management. The effect of co-management on length of hospital stay was studied in patients admitted to OPH.

Methods: Retrospective observational study was performed that included patients ≥14 years old discharged from OPH between 1 January 2009 and 30 June 2013, who were co-managed from May 2011. An analysis was made including age, sex, type of admission, whether it was operated on, administrative weight associated with GRD, total number of discharge diagnoses, Charlson comorbidity index (CCI), mortality, readmissions, and LoS.

Results: There were statistically significant differences between the groups in operated patients (odds ratio [OR] 2.3, 95% confidence interval [95% CI] 1.5 to 3.6), administrative weight (0.1160; 95% CI 0.0738 to 0.1583), and number of diagnoses (0.9, 95% CI 0.5 to 1.3). On adjustment, co-management reduced LoS in OPH by 27.8%, 0.5 days (95% CI 0.1 to 1).

Conclusions: Patients admitted to OPH have increasing comorbidity and complexity. Co-management is associated with a reduced LoS and costs in OPH, similar to that observed in other surgical services.

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Efecto de la asistencia compartida (comanagement) con Medicina Interna sobre la estancia hospitalaria de los pacientes ingresados en el servicio de Oftalmología

RESUMEN

Objetivo: Los pacientes ingresados en el Servicio de Oftalmología (OFT) están aumentando su edad, comorbilidad y complejidad, induciendo un incremento de interconsultas a Medicina Interna (MI). Una alternativa a las interconsultas es la asistencia compartida (AC). Estudiamos el efecto de la AC con MI sobre la estancia hospitalaria de los enfermos ingresados en OFT.

Métodos: Estudio observacional retrospectivo de los pacientes \( \geq 14 \) años ingresados desde el 1/1/2009 al 30/6/2013 en OFT; desde mayo de 2011 con AC con MI. Analizamos edad, sexo, tipo de ingreso, peso administrativo asociado a GRD, número total de diagnósticos al alta, índice de comorbilidad de Charlson (ICh), fallecimiento, reingresos y estancia hospitalaria.

Resultados: Entre ambos grupos, hubo diferencias estadísticamente significativas en el porcentaje de pacientes operados (odds ratio [OR] 2,3, intervalo de confianza del 95% [IC 95%]: 1,5 a 3,6), peso administrativo (0,1160; IC 95%: 0,0738 a 0,1583) y número de diagnósticos (0,9; IC 95%: 0,5 a 1,3). Al ajustar, observamos que la AC redujo el 27,8% la estancia en OFT, 0,5 días (IC 95%: 0,1 a 1).

Conclusiones: Los enfermos ingresados en OFT están aumentando su comorbilidad y complejidad. La AC se asocia a una disminución de la estancia y costes en OFT, similares a los observados en otros servicios quirúrgicos.

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Introduction

Improvements in anesthetic and surgical techniques and procedures are enabling surgery services to increase operations on older patients and those exhibiting comorbidity. On the other hand, the development of outpatient and short-stay surgery enables many patients to return home a few hours after an operation or to remain in hospital for very brief periods. As a result, patients remaining in hospital after surgery are of increasing age, comorbidity and complexity, making the surgeons work more difficult. This difficulty gives rise to greater cooperation between medical departments to attend surgery patients with the ensuing increase of interdepartment consultations with Internal Medicine (IM), which is not the most efficient method.

Even though there is very little information on this issue, the Ophthalmology Dept. (OPH) is also involved in the situation as it is a specialty which performs most of its surgical interventions on an outpatient basis, in addition on patients with very low overall morbidity and mortality considered to be of low risk. Accordingly, our specialty has very little weight in hospitalization (low number of admissions and intra-department consultations) and virtually no information about patients admitted in OPH. However, the low number of ophthalmological patients who remain in hospital is definitely not within the low risk group, as they are admitted due to their disease and comorbidity as well as to complications. In fact, their mean age and comorbidity is higher than that of the majority of hospital departments and over 70% exhibited significant medical comorbidity.

An alternative to inter-department consultations is comanagement (CM) with IM, a practice that is gradually extending, particularly in large hospitals, and has demonstrated a significant efficiency in our environment. In May 2011, comanagement was initiated with the OPH department, which is very different to other surgical services due to its characteristics and type of patients. We have not found in the literature any type of cooperation between IM and OPH comparable to that described in this article.

The objective is to analyze the effect of CM with IM on the hospital stay of patients admitted in OPH.

Material and method

At present, our hospital has 450 beds and covers an almost exclusively urban population of 250,000 inhabitants. It includes pre-and post-graduate teaching and is accredited for training medical and surgical residents. The study included all patients \( \geq 14 \) years of age released from January 1, 2009 up to June 30, 2013 from the OPH service. During this period the activity of this department did not undergo significant organizational changes with the sole exception of CM with IM, which was initiated on May 1, 2011.

CM is implemented according to established criteria. Briefly, it involves internists providing attention to all patients throughout their stay in hospital, as provided in the IM department, i.e., obtaining clinical history and physical examinations, requesting supplementary tests and prescribing treatments with freedom of criteria but in coordination with ophthalmologists. Internists do not participate in the
decision of admitting a patient, in surgical indications or in the preparation of the release report, which are exclusively up to ophthalmologists. Admission criteria are those usually indicated by ophthalmologists (generally ophthalmological reasons), and on some occasions patients are admitted due to systemic disease, without significant changes occurring during the period of study.

The variables analyzed by the study are age, sex, emergency admission, surgery or lack thereof, administrative weight associated to GRD, overall number of diagnostics, Charlson (ICh) comorbidity index (validated for use with administrative databases), age-adjusted and with updated weights, hospital stay, demise and readmission within 15 days for any reason and in any department. The data were obtained from the basic minimum data of the hospital, which accepts up to 13 diagnostics coded according to CIE-9-MC. In 2010, the overall mean daily cost of stay in our hospital was of 3982€ for OPH and 323€ for IM.

### Statistical analysis

Age, stay, administrative weight, number of diagnostics and ICh are described against median values and 95% confidence interval (CI 95%). The rest of variables, all qualitative, are described in percentages and 95% CI. Considering the type of work and the clinical nature of results, a precision of ±5 centesimal points was considered sufficient, and therefore the numbers were rounded to one decimal point, with the exception of the administrative weight in which the 4 decimals were maintained. The differences of median values between both groups were analyzed with the T for student. The remaining variables were analyzed by obtaining the odds ratio (OR). The stay was adjusted with a multiple linear regression model. Variables were introduced in the model by means of the step regression method. Inclusion and exclusion criteria for variables in the model were established at p < 0.05 for inclusion and p > 0.10 for exclusion. The final model was selected by applying the square of the multiple adjusted correlation coefficient. The statistical significance level was established at p < 0.05. All calculations were executed with the SPSS 15.0 application (SPSS Inc. Chicago, USA).

### Results

During the study period, OPH released 589 patients ≥14 years. The CM group exhibited 15.9% of significant variations in the number of patients submitted to surgery, 12% in administrative weight and 47.4% in the number of diagnostics (Table 1). The mean adjusted stay was of −0.5 days (CI 95% −1 to −0.1; p = 0.039), a reduction of 27.8%. No demise occurred during the period of the study.

Utilizing as reference the cost of stay in IM, the least expensive one, CM achieved a mean reduction of stay associated to cost reduction of 39,406€.

### Discussion

The relevance of analyzing hospital stays lies in that, among other reasons, is a good indicator of adverse events and cost of attention. Our results show that comorbidity and complexity of patients admitted in OPH is on the increase, and that CM with IM is associated to a reduction in hospital stays and associated economic costs. Even though the economic repercussions of CM do not seem to be very big, the workload for the IM service is not very large either as its involves visiting a mean amount of 0.5 OPH patients a day.

There are several reasons that explain the above findings. CM with IM diminishes stays, mortality and readmission, among other parameters, for surgical patients, probably because medical history is one of the factors that increases complications in surgical patients. There are multiple medical diseases, as well as ICh, that have demonstrated clear prognostic implications for cataract surgery on which the action of internists is crucial. In addition, failure due to delayed diagnostic or treatment of post-surgery complications is essential for results. In this regard, the daily work of internists could be of crucial importance. At least 88% of patients admitted in surgery departments could benefit from CM with IM.

Mortality and readmissions, which are partly due to premature releases, could play a very important role on stays. None of the patients died and readmissions did not increase. The action of internists allows patients to be released in better

### Table 1 - Results in Ophthalmology.

<table>
<thead>
<tr>
<th>% (CI 95%)</th>
<th>Total</th>
<th>Without CM</th>
<th>With CM</th>
<th>Diff/OR (CI 95%)</th>
<th>SS</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>589</td>
<td>345</td>
<td>244</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age in years</td>
<td>64 (62.6 to 65.3)</td>
<td>63.6 (61.7 to 65.4)</td>
<td>64.6 (62.6 to 66.5)</td>
<td>1 (−1.7 to 3.7)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Female</td>
<td>42.8 (38.8 to 46.8)</td>
<td>45.2 (40 to 50.5)</td>
<td>39.3 (33.2 to 45.5)</td>
<td>OR 0.8 (0.6 to 1.1)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Emergency admissions</td>
<td>16.6 (13.6 to 19.6)</td>
<td>18.6 (14.4 to 22.7)</td>
<td>13.9 (9.6 to 18.3)</td>
<td>OR 0.7 (0.5 to 1.1)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Operations</td>
<td>80.6 (77.5 to 83.8)</td>
<td>75.7 (71.1 to 80.2)</td>
<td>87.7 (83.6 to 91.8)</td>
<td>OR 2.3 (1.5 to 3.6)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Administrative weight</td>
<td>1.0177 (0.9964 to 1.0390)</td>
<td>0.9696 (0.9466 to 0.9927)</td>
<td>1.0857 (1.0473 to 1.1241)</td>
<td>0.1160 (0.0738 to 0.1583)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td># of diagnostics</td>
<td>2.3 (2.1 to 2.5)</td>
<td>1.9 (1.7 to 2.1)</td>
<td>2.8 (2.4 to 3.2)</td>
<td>0.9 (0.5 to 1.3)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>ICh</td>
<td>2.2 (2 to 2.3)</td>
<td>2.1 (2 to 2.3)</td>
<td>2.3 (2 to 2.5)</td>
<td>0.2 (−0.1 to 0.4)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Readmissions</td>
<td>3.7 (2.2 to 5.3)</td>
<td>3.2 (1.3 to 5)</td>
<td>4.5 (1.9 to 7.1)</td>
<td>OR 1.4 (0.6 to 3.4)</td>
<td>n.s.</td>
</tr>
<tr>
<td>Stay in days</td>
<td>1.6 (1.4 to 1.9)</td>
<td>1.8 (1.4 to 2.1)</td>
<td>1.5 (1.1 to 1.8)</td>
<td>−0.3 (−0.8 to 0.2)</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

CM: Co-management; Diff: difference; CI 95%: Confidence Interval of 95%; ICh: Charlson comorbidity index; n.s.: not significant; OR: odds ratio; SE: statistical significance.
conditions, thus reducing readmissions. It must be taken into account that 72.6% of re-admitted surgical patients return due to medical reasons.  

The present study exhibits limitations. The type of design, with historic controls, involves a bias risk due to the somewhat large period of study (the period effect), among others. In the present study, this effect means that patients under CM with IM are more complex and with greater comorbidity. It could be stated that part of the differences found in the study could be due to changes in the way of preparing the release report, which is at the core of the minimum basic data set, induced by internists, although these have not taken part in the preparation of this report which has remained as an exclusive province of ophthalmologists. A further limitation is that the study was carried out in a single hospital and therefore it is necessary to verify the results with those of other hospitals and in different conditions. An additional drawback is that the authors have not found references against which to compare results.

As conclusion, CM with IM is associated to diminished mean hospital stays and costs related to OPH, in line with the observations made in other surgery departments. CM with IM is an organization model to be taken into account in OPH.

**Conflict of interests**

No conflict of interests has been declared by the authors.

**REFERENCES**