ORIGINAL ARTICLE

Quality improvement of medical records in a teaching hospital

F. ATTENA, M.A. DI PALMA, S. ESPOSITO*, V. GALDO, A. GIMIGLIANO, C. PARMEGGIANI, E. AGOZZINO*
Postgraduate School in Hygiene and Preventive Medicine, II University of Naples, Italy; * Health Direction, Teaching Hospital, II University of Naples, Italy

Key words

Hospital • Medical record • Quality assurance

Summary

Introduction. *The aim of this study was to evaluate the quality of the MR compilation in some Operative Units of the "Azienda Ospedaliera Universitaria - II Università di Napoli" (AOU-SUN) - Italy, before and after an intervention of quality improvement, underlining the potential differences in the behaviour of different specialists (physicians vs. surgeons).*

Methods. *Two random samples of 660 MRs were reviewed. A four-step program was developed: 1) first assessment of the MR; 2) implementation of the MR quality, sending a letter with the purpose of the study, the results obtained in the first step from that ward, the guidelines to correctly fill out the MR; 3) follow-up step four months later; 4) comparison of the data before and after the distribution of the guidelines using indicators of completeness of all sections of MR, clarity of handwriting and presence and clarity of signature.*

Results. *The main concerns were related to the signature of the duty physician (present in 2.0% and legible in only 15.4%), the presence of the letter of discharge (18.0%) and the clarity of the days of hospital stay (32.0%). After the intervention the improvement of the quality of compilation was modest and regarded mainly medical rather than surgical wards.*

Discussion and conclusions. *The improvement was not satisfying since from a medical and a legal point of view the indicators should reach 100% of clarity and completeness. A further study is being carried out to improve the involvement of health care professional, so that such requirements will be perceived as a common goal, not as mere bureaucratic initiatives.*

Introduction

The clinical documentation, and particularly the medical records (MRs), is a central mean of communication among healthcare professionals, but it is rarely compiled in a satisfactory way [1-6]. Therefore, the implementation of methods in order to improve quality data is very important [7-13].

In Italy, there is a significant gap between the inadequacy of the rules about the control on the correct compilation of the MR and the severity of the legal sanctions provided by the laws. For this reason, in the hospital management, there is a strong need of procedures, guidelines and criteria to identify the responsibilities for each of the three critical points of the process: compilation, preservation and delivery [14-16].

The teaching hospital of the Second University of Naples (SUN) - Italy, since the time of the earthquake in 1980, has displaced its 75 medical and surgical wards in five health centers geographically rather distant from each other. Therefore, to ensure an adequate care provision it is necessary to have a correct process of information exchange among all wards. To this end, the only guideline about the management of medical documentation concerns its preservation: without a centralised archive (which is in preparation), it is entrusted to each ward.

The purposes of this study were 1) to evaluate the quality of the MRs compilation "before" and "after" an intervention of quality improvement in the teaching hospital of the SUN and 2) to point out differences in the behaviors of physicians and surgeons.

Methods

The study was performed from January 2007 to February 2009 by reviewing two random samples of 660 MRs in the teaching hospital of the SUN and involved 66 out of the 75 wards. The Emergency Area were excluded. The 66 wards involved were stratified in two subgroups: 30 medical wards and 36 surgical wards. For each ward, ten MRs were selected before and after, by systematic sampling, for a total of 660 MRs. The criteria used were obtained from the *Agence Nationale pour le Devèlopment de l'Evaluation Mèdicale* (ANDEM) and from the *Joint Commission on Accreditation of Healthcare Organizations* (JCAHO), and adapted to our needs [17, 18].

The study was carried out in four steps: 1) first assessment of the 660 MRs according to clarity and completeness indicators; 2) implementation of the MRs quality, sending an envelope to each ward containing a letter with the purpose of the study, the results obtained from the 10 MRs pertaining to that specific ward, the guidelines to fill out the MR correctly; 3) follow-up step after four months us-

ing the same process and indicators; and 4) comparison of data before and after the distribution of the guidelines.
The evaluation covered all the sections of the MR: patient's history, physical examination, days of hospital stay, patient chart and letter of discharge, using criteria of completeness, and clarity of the data.
For each section, the completeness (completed/uncompleted section) and the clarity (clear/unclear handwriting) were evaluated. In particular, each section was considered complete if in the personal data there were the name, surname, address and telephone number of the patient; if the medical history of the patient was described in each part (family, social, present pathological and past pathological medical history); if the physical examination was described in its general and specific part by organ or apparatus; if in the medical diary there was at least one medical note for each day of stay. Finally, the presence in the MR of the letter of discharge and the patients chart was verified. The signatures – in the medical diary, of the consultancies, of the doctor responsible for the patient – were evaluated as present/absent and legible/illegible.
Four physicians, who were not involved in care and who had been previously trained, collected the data by reviewing MRs. Before starting the study, 20 MRs were analysed separately from the four physicians to evaluate the agreement between the operators.
The before-after comparison of proportions was carried out using the Z test. The statistical significance was set to 0.01.

Results

Table I shows the results of the evaluation performed on the 660 MRs, according to the criteria of completeness and clarity. A low quality of compilation is observed, because before, as well as after, the observed values are quite lower than the reference standard value of 100%. Before the intervention, the worst data concerned: the completeness of the physical examination (56.2%) and the low presence of the patient chart (12.9%) and the letters of discharge, particularly in surgical wards (medical wards 31.6%; surgical wards 6.7% before the intervention, and 46.7% *vs*. 12.3% after the intervention). The main differences between medical and surgical wards concern the clarity of handwriting that results clearer in all sections of the medical wards (Tab. II).

Tab. I. Completeness of information in each section of Medical Records (MR).

	Medicine (300 MR)						Surgery (360 MR)						Total (660 MR)					
	Completeness						Completeness						Completeness					
	Before		After		Diff.		Before		After		Diff		Before		After		Diff.	
	N	%	N	%	%	p	N	%	N	%	%	p	N	%	N	%	%	p
Patient's identity	231	77.0	247	82.3	+5.3	0.13	323	89.7	320	88.9	-0.8	0.82	554	83.9	567	85.9	+2.0	0.35
Patient's history	240	80.0	281	93.7	+13.7	< 0.001	321	89.1	336	93.3	+4.2	0.06	561	85.0	617	93.5	+8.5	< 0.001
Physical examination	145	48.3	248	82.7	+34.4	< 0.001	226	62.7	247	68.6	+5.9	0.11	371	56.2	495	75.0	+18.8	< 0.001
Days of hospital stay	171	57.0	182	60.7	+3.7	0.40	303	84.1	301	83.6	-0.5	0.94	474	71.8	483	73.2	+1.4	0.61
Description of surgical procedures	–	–	–	–	–	–	312	86.6	345	95.8	+9.2	< 0.001	312	86.6	345	95.8	+9.2	< 0.001
Letter of discharge	95	31.6	140	46.7	+15.1	< 0.001	24	6.7	56	15.6	+8.9	< 0.001	119	18.0	196	29.7	+11.7	< 0.001
Patient chart	42	14.0	37	12.3	-1.7	0.62	43	11.9	39	10.8	-1.1	0.73	85	12.9	76	11.5	-1.4	0.49

Tab. II. Clarity of handwriting in each section of Medical Record.

	Medicine						Surgery						Total					
	Clarity						Clarity						Clarity					
	Before		After		Diff.		Before		After		Diff.		Before		After		Diff.	
	N*	%	N*	%	%	p	N*	%	N*	%	%	p	N*	%	N*	%	%	p
Patient's identity	262	86.2	298	93.6	+7.4	0.005	358	79.6	357	75.9	-3.7	0.27	620	82.4	655	84.0	+1.6	0.49
Patient's history	287	51.2	298	62.4	+11.2	0.008	352	29.0	358	32.7	+3.7	0.32	639	39.0	656	46.2	+7.2	0.010
Physical examination	273	49.8	296	93.6	+43.8	<0.001	344	25.3	346	27.7	+2.4	0.53	617	36.1	642	58.1	+22.0	<0.001
Days of hospital stay	278	43.5	282	55.0	+11.5	0.008	344	22.7	346	28.0	+5.3	0.13	622	32.0	628	40.1	+8.1	0.003
Description of surgical procedures	–	–	–	–	–	–	252	36.5	288	47.2	+10.7	0.015	252	36.5	288	47.2	+10.7	0.015
Letter of discharge	95	84.2	140	99.3	+15.1	<0.001	24	91.7	56	87.5	-4.2	0.87	119	85.7	196	95.9	+10.2	0.002
Patient chart	44	65.4	37	94.6	+29.2	0.003	43	95.3	39	74.3	-21.0	0.018	87	95.4	76	84.2	-11.2	0.03

* Because not all sections are completed, in these columns is reported the total number of MR on which clarity has been evaluated.

In the second evaluation, several, but modest, improvements can be observed; they interest above all the medical wards where a little improvement in clarity has been revealed. The most evident improvement concerns the completeness and the clarity of the compilation of the physical examination in the medical wards (completeness: from 48.3% to 82.7%; clarity: from 49.8% to 93.6%), compared with the same fields of the surgical wards, where no significant difference emerges.
The worst result observed in Tables III and IV concerns the presence and the legibility of the signatures of the duty physician (2.0% and 15.4% respectively). In the consultancies, instead, the signature was almost always present (95.6%), but, also in this case, it was rarely legible (13.9%). A modest improvement has been observed in same section with, for example, an increase of signatures on the medical diary, moving from 2.0% to 10.8%.

Discussion and conclusions

The present intervention investigated the quality of compilation of the MRs in the teaching hospital of the SUN and researched potential differences between physicians and surgeons in filling out medical records.
The first step of the study showed a low quality of compilation, mainly regarding completeness of information and clarity of handwriting.
After the second step of the study, it was possible to observe a certain improvement in the quality of the compilation. However, this cannot be considered satisfactory because, as known, the criteria of completeness, clarity and legibility must be completely satisfied. Nevertheless, lacking of these criteria are detectable in various health charts and in different settings [1-4, 6, 13, 19, 20].
About the differences between medical and surgical wards, while there are no substantial differences concerning the completeness of the data, the clarity of handwriting, as well as the legibility of the signature are better in the medical wards. The outcome of the quality improvement intervention was better in the medical wards.
The reasons for this unsatisfactory result may be explained in two ways. First, the personnel's attitude to change. Indeed, it is noted that one of the main obstacles to the improvement of quality is represented by the resistance to modify well-established behaviours in the course of time. Second, the evident weakness of the methodology. The intention of this study was to carry out an intervention for improvement by the active and direct involvement of the operators (plenary meetings with all the operators, presentation of the results of the first survey, illustration of the guidelines of correct compilation, discussion). However, after several unsuccessful efforts to implement this intervention, an approach by written communication, although less direct and presumably less efficient, has been adopted. An indirect and approximate evaluation on the reaction of the operators to our written communication came from the quantity of the received telephone calls (10 out of 66 wards), asking for further clarifications or for even more incisive interventions. Given the weakness of the obtained improvements and in order to obtain more satisfying results, a further study has been implemented with a pilot intervention on a lower number of wards, performed with a direct and in-depth method and an involvement of all the other wards in sequence.

Tab. III. Completeness of signatures on the sections of Medical Record (MR) where they were necessary.

	Medicine (300 MR)						Surgery (360 MR)						Total (660 MR)					
	Complete						Complete						Complete					
	Before		After		Diff.		Before		After		Diff.		Before		After		Diff.	
	N	%	N	%	%	p	N	%	N	%	%	p	N	%	N	%	%	p
Signature of attending physician	260	86.7	255	85.0	-1.7	0.63	83	23.0	201	55.8	+32.8	<0.001	343	52.0	456	69.1	+17.1	<0.001
Signature of duty physician	6	2.0	36	12.1	+10.1	<0.001	7	1.9	35	9.7	+7.8	<0.001	13	2.0	71	10.8	+8.8	<0.001
Signature of clinical consultant	289	96.3	288	96.0	-0.3	0.98	342	95.0	337	93.6	-1.4	0.50	631	95.6	625	94.7	-0.9	0.53

Tab. IV. Legibility of Signatures on the sections of Medical Record (MR) where they were necessary.

	Medicine Legibility						Surgery Legibility						Total Legibility					
	Before		After		Diff.		Before		After		Diff.		Before		After		Diff.	
	N*	%	N*	%	%	p	N*	%	N*	%	%	p	N*	%	N*	%	%	p
Signature of attending physician	260	43.1	255	31.4	-11.7	0.008	83	2.4	201	29.8	+27.4	<0.001	343	33.2	456	30.7	-2.5	0.5
Signature of duty physician	6	16.7	36	5.5	-11.2	0.90	7	14.3	35	14.3	0	0.55	13	15.4	71	9.8	-5.6	0.91
Signature of clinical consultant	289	14.9	288	17.4	+2.5	0.48	342	12.9	337	19.9	+7.0	0.018	631	13.9	625	18.7	+4.8	0.03

* Because not all sections are completed, in these columns is reported the total number of MR on which legibility has been evaluated.

References

[1] Winslow EH, Nestor VA, Davidoff SK, et al. *Legibility and completeness of physicians' handwritten medication orders*. Heart Lung 1997;26:158-64.

[2] Attena F, D'Agostino F, Oriente P, et al. *Intervento di miglioramento della qualità di compilazione della Cartella Clinica*. Ig Sanità Pubbl 2003;59:157-65.

[3] Cardo S, Agabiti N, Picconi O, et al. *The quality of medical records: a retrospective study in Lazio Region, Italy*. Ann Ig 2003;15:433-42.

[4] Farhan J, Al-Jummaa S, Alrajhi AA, et al. *Documentation and medical records in a tertiary care center: a pilot study*. Ann Saudi Med 2005;25:46-9.

[5] de Mul M, Berg M. *Completeness of medical records in emergency trauma care and an IT-based strategy for improvement*. Med Inform Internet Med 2007;32:157-67.

[6] Dunlay SM, Alexander KP, Melloni C, et al. *Medical records and quality of care in acute coronary syndromes: results from CRUSADE*. Arch Intern Med 2008;168:1692-8.

[7] Quigley P, Mathis A, Nodhturft V. *Improving clinical documentation quality*. J Nurs Care Qual 1994;8:66-73.

[8] Hiddema-van de Wal A, Smith RJ, van der Werf GT, et al. *Towards improvement of the accuracy and completeness of medication registration with the use of an electronic medical record (EMR)*. Fam Pract 2001;18:288-91.

[9] Larrabee JH, Boldreghini S, Elder-Sorrells K, et al. *Evaluation of documentation before and after implementation of a nursing information system in an acute care hospital*. Comput Nurs 2001;19:56-65.

[10] Daly P, Moloney FJ, Doyle M, et al. *Legibility of doctor's signatures: novel approaches to improving an age-old problem*. Ir Med J 2006;99:214-5.

[11] Cassidy LD, Marsh GM, Holleran MK, et al. *Methodology to improve data quality from chart review in the managed care setting*. Am J Manag Care 2002;8:787-93.

[12] Cruz-Correia R, Vieira-Marques P, Ferreira A, et al. *Monitoring the integration of hospital information system: How it may ensure and improve the quality of data*. Stud Healt Technol Inform 2006;121:176-82.

[13] Boehringer PA, Rylander J, Dizon DT, et al. *Improving the quality of the order-writing process for inpatient orders in a teaching hospital*. Qual Manag Health Care 2007;16:215-8.

[14] Giannini R, Pistoresi T, Brizzi S, et al. *Cartella clinica: analisi di qualità e sistemi di valutazione a confronto*. Tecnica Ospedaliera 2003;94:94-101.

[15] Pasini E, Ravizza PF. *La cartella clinica come documento del sistema qualità: un esempio pratico*. Ital Hearth J Suppl 2004;5:112-8.

[16] Barni M, Lorè C. *Le conseguenze legali del malgoverno della cartella clinica*. Professione 2005;8:2-9.

[17] Agence Nationale dì Accréditation et d'Evaluation en Santé. *Les Conférences de consensus. Base méthodologique pour leur realization en France*. Paris: ANDEM 1990.

[18] J.C.A.H.O. Available from http://www.jcaho.org/index.htlm.

[19] Mayer TA. *Improving the quality of the order-writing process for inpatient orders and outpatient prescriptions*. Am J Healt Syst Pharm 2000;57:18-22.

[20] Attena F, Panico G, Troisi MR, et al. *Appropriatezza d'uso dell'ospedale e qualità della cartella clinica*. QA 2002;13:155-60.

■ Received on November 19, 2009. Accepted on May 11, 2010.

■ Correspondence: Francesco Attena, Postgraduate School in Hygiene and Preventive Medicine, II University of Naples, via Luciano Armanni 5, 80138 Naples, Italy - Tel. +39 081 5666030 - Fax +39 081 5666030 - E-mail: francesco.attena@unina2.it