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Évaluation de l'intérêt de la traçabilité de la réévaluation de l'antibiothérapie à 72 heures

Assessing the benefit of the 72-hour antibiotic therapy reassessment documentation

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Parts of these findings have been presented as a poster and an oral presentation at the 35th RICAI in Paris, December 2015.

Keywords: antibiotic therapy, de-escalation, reassessment

Mots clés : antibiothérapie ; désescalade ; réévaluation

Résumé

Objectifs. Évaluer la traçabilité de la réévaluation de l'antibiothérapie à 72h dans le dossier médical.

Méthode. Évaluation un jour donné des antibiothérapies curatives $\geq 72h$. La traçabilité de la réévaluation a été définie selon trois critères : 1) traçabilité « explicite » (commentaire clinique ou microbiologique et commentaire sur la nécessité ou non d'adapter l'antibiothérapie), 2) traçabilité « implicite » (commentaire uniquement clinique ou microbiologique), 3) absence de traçabilité.

Résultats. Évaluation de 114 antibiothérapies dans 26 unités de soins. Seuls 45 (39 %) dossiers comportaient une réévaluation explicite à 72h et 31 (27 %) ne comportaient aucune réévaluation. La durée prévisionnelle de traitement était notée dans 63 (55 %) dossiers. À 72h, sur les 71 antibiothérapies avec documentation microbiologique, 69 (97 %) étaient actives et 44 (62 %) avaient un spectre étroit. Parmi les 48 antibiothérapies avec un spectre élargi à J1, seules 21 (44 %) ont bénéficié d'une désescalade à 72h. Une réévaluation explicitement tracée à 72h était associée à une désescalade ($p=0.025$) et la prescription de la durée prévisionnelle de traitement était associée à une antibiothérapie conforme aux recommandations locales ou nationales ($p=0.018$).

Conclusion. Bien qu'une réévaluation ait été notée dans 73 % des dossiers, celle-ci était correctement tracée à 72h dans seulement 39 % des cas. La traçabilité de la réévaluation et la prescription de la durée prévisionnelle de traitement étaient associées à une meilleure qualité de la prescription (désescalade, adéquation avec les recommandations) et constituent des indicateurs pertinents du suivi du bon usage des antibiotiques.

Abstract

Objectives. To assess the documentation of the 72-hour antibiotic therapy reassessment in medical records.

Methods. One-day prevalence evaluation of curative antibiotic therapies ≥ 72 hours. The documentation of the reassessment was defined according to three criteria: 1) "clear" documentation (clinical or microbiological comment associated with a comment on the need to adjust the antibiotic therapy or on the lack of need) 2) "tacit" documentation (only based on a clinical or microbiological comment), 3) no documentation.

Results. We assessed 114 antibiotic therapies in 26 hospital departments. A clear reassessment at 72 hours was observed in only 45 (39%) records and 31 (27%) records had no reassessment. The planned duration of treatment was written in 63 (55%) records. At 72 hours, among the 71 antibiotic therapies with a microbiological documentation, 69 (97%) were active and 44 (62%) had a narrow spectrum. Among the 48 antibiotic therapies with a broad spectrum on Day 1, only 21 (44%) benefited from a de-escalation at 72 hours. A clearly recorded reassessment at 72 hours was associated with de-escalation ($p=0.025$) and the prescription of a planned duration of treatment was associated with antibiotic therapy compliance with local or national guidelines ($p=0.018$).

Conclusion. Although reassessment was observed in 73% of records, it was correctly recorded at 72 hours in only 39% of cases. The documentation of the reassessment and the prescription of a planned duration were associated with a better quality of antibiotic prescription (de-escalation, compliance with guidelines) and are relevant indicators for monitoring the proper use of antibiotics.

INTRODUCTION

Improving the quality of antibiotic prescriptions in hospital settings is a key objective of antibiotic stewardship programs to tackle the development of resistance [1]. The 2011-2016 French national antibiotic plan [2] recommends reassessing antibiotic prescriptions at 48-72 hours. Prescription reassessment allows physicians to adjust the empirical treatment based on bacteriological findings. The aim is to optimize the antibiotic therapy, to discontinue any useless treatment, and to reduce the selection pressure.

According to the French National Authority for Health (French acronym HAS) guidelines [3], the 24-72-hour reassessment must be documented in the patient's medical record and it is one of the criteria taken into consideration by the composite score for antibiotic stewardship (ICATB.2) [4].

To our knowledge very few French studies assessed the documentation of antibiotic therapy reassessment in medical records. Available studies only focused on specific antibiotics and/or specific wards [5, 6, 7]. The relation between a documented reassessment in medical records and the antibiotic therapy compliance with guidelines has only been assessed in one study [5].

We aimed to assess the documentation of the 72-hour antibiotic therapy reassessment in medical records, the mention of a planned treatment duration prescription, and the quality of antibiotic prescriptions (adequate spectrum of activity, compliance with local or national guidelines) in the various wards of a 1,500-bed teaching hospital of Paris.

METHOD

We performed a one-day prevalence cross-sectional survey in 2014 in the teaching hospitals of the center of Paris (French acronym HUPC) based on data documented in the medical records.

The HUPC hospital group includes the Cochin Hospital (903 beds), the Hôtel-Dieu Hospital (28 beds), and the geriatric Broca Hospital (558 beds). The HUPC is part of the public hospital system of the city of Paris (French acronym AP-HP).

A total of 29 wards were surveyed: medicine, geriatrics, surgery, obstetrics, and intensive care units (ICUs). All patients of each ward receiving a curative antibiotic therapy for at least 72 hours were included in the study, irrespective of the empirical or documented nature of the prescription. Antibiotic therapies initiated in a ward other than the one surveyed (except for the emergency ward), antibiotic prophylaxes, antibiotic therapies administered through another route than the oral or injection route, antibiotic therapies prescribed as part of a tuberculosis treatment, HIV opportunistic infections, or parasitic infections were excluded. We only took into consideration the first antibiotic therapy administered to patients who had received several antibiotic therapies during a single stay.

The main objective of the survey was to assess the documentation of the 72-hour antibiotic therapy reassessment in the medical records. The secondary objectives were 1) to assess the mention of a planned treatment duration prescription, 2) to assess the adequacy of the antibiotic therapy (adequate spectrum of activity based on microbiological data or compliance with local or national guidelines), 3) to look for a relation between the documentation of the antibiotic therapy reassessment in the medical record or the mention of a planned treatment duration prescription and the antibiotic therapy adequacy.

A data collection grid was designed by a working group including physicians, bacteriologists, and pharmacists – all were members of the Committee for anti-infective agents (French acronym COMAI) of the HUPC – based on the HAS guidelines on antibiotic stewardship [3], ICATB.2 criteria [4], and on the regional survey on antibiotic therapy reassessment at 72 hours performed by the health authorities (Omédit and Arlin) of the Haute-Normandie region [8].

The following data was collected for all evaluated antibiotic therapies: ward, infection portal of entry, presence of bacteriological results (type of bacterium and antimicrobial susceptibility

testing), potential associated bacteremia, prescribed molecule(s) on day 1 and day 3, written mention in the medical record of the diagnosis leading to the prescription, mention of a planned treatment duration prescription, and potential intervention of an infectious disease mobile team. The documentation of a reassessment was looked for in medical records within the first 72 hours following antibiotic therapy initiation. Three types of reassessment documentation were defined: 1) “clear” documentation: presence of a clinical or microbiological comment associated with a comment on the need or lack of need for an antibiotic therapy change, 2) “tacit” documentation: clinical or microbiological comments only, without any comment on the antibiotic therapy prescribed, 3) absence of documentation.

When microbiological documentation was present the antibiotic therapy was considered adequate if it was active against the documented bacteria and if the chosen molecule had the best spectrum of activity possible based on the antimicrobial susceptibility test results [9]. Treatment de-escalation was defined as a treatment change leading to the prescription of a molecule with the narrowest spectrum of activity possible. When no microbiological documentation was present the antibiotic therapy was considered adequate if it complied with the local or national guidelines.

The data collection grid was tested in June-July 2014. Data was collected on a given day in each ward between July and October 2014, based on the paper or computerized medical records. Investigators were infectious disease specialists, bacteriologists, and pharmacists, and all were members of the COMAI of the HUPC.

Data was analyzed using the SPSS software, version 17.0. Qualitative variables were expressed as frequencies and 95% confidence intervals as per the binomial distribution. On the basis of the bivariate analysis, the relation between 1) the clear documentation of a reassessment at 72 hours, 2) the prescription of a planned treatment duration and the categorical variables was tested using a Chi-square test or Fisher’s exact test if the theoretical

expected numbers in each category were <5 (bilateral test, significance threshold was set at $p<0.05$).

RESULTS

The investigators analyzed 167 stays associated with one antibiotic therapy prescription in 29 hospital wards. No curative antibiotic therapy had been prescribed on the day of the survey in three wards (maternity ward, endocrinology, physical rehabilitation). Overall, 114 antibiotic therapies (Table 1) meeting the inclusion criteria were assessed: 49 (43%) in the medical wards, 26 (23%) in the geriatric wards, 24 (21%) in the surgical wards, and 15 (13%) in the ICUs. Infections were community-acquired in 43% ($n=49$) of cases, healthcare-associated in 51% ($n=58$), and of unknown origin in 6% ($n=7$) of cases.

Among the 114 antibiotic therapies assessed, 66 (58%) were monotherapies prescribed on day 1 and 65 (57%) on day 3, 40 (35%) were two-drug combination therapies prescribed on day 1 and 44 (39%) on day 3, and eight (7%) included three or four antibiotics prescribed on day 1 and five (4%) on day 3. The three most frequently prescribed antibiotics among the 170 prescribed on day 1 were ceftriaxone ($n=32$, 19%), tazocilline ($n=23$, 14%), and metronidazole ($n=18$, 11%).

The three most frequent portals of entry were the lungs, the urinary tract, and the gastrointestinal tract. At 72 hours 16 (14%) patients did not have any microbiological sample taken, one bacterium or several bacteria had been isolated in 71 (62%) patients, and seven (6%) results were pending. Among the 110 isolated bacteria, the most frequent were *Escherichia coli* ($n=30$, 27%), *Klebsiella pneumoniae* ($n=11$, 10%), *Staphylococcus epidermidis* ($n=10$, 9%), *Staphylococcus aureus* ($n=7$, 6%), and *Pseudomonas aeruginosa* ($n=7$, 6%).

The adequacy of documented and empirical antibiotic therapies at 72 hours is detailed in Table 2.

Two (3%) of the 71 antibiotic therapies with microbiological documentation were inactive *in vitro* against the bacterium or bacteria documented at 72 hours. A molecule with a narrower spectrum of activity could have been prescribed at 72 hours for 48 of these antibiotic therapies, but the de-escalation could not be performed in 27 (56%) patients. Fourteen (52%) of these 27 antibiotic therapies without de-escalation at 72 hours were associated with clear documentation of the reassessment at 72 hours and/or with a change in the antibiotic therapy between day 1 and day 3.

Eleven (26%) of the 43 antibiotic therapies prescribed in the absence of microbiological documentation did not comply with local or national guidelines at 72 hours.

Overall, 38 (33%) antibiotic therapies were not adequate at 72 hours (i.e., inadequate spectrum or non-compliant with guidelines): 19% (5/26) in the geriatric wards, 33% (16/49) in the medical wards, 37% (9/24) in the surgical wards, and 53% (8/15) in the ICUs, without any significant difference between the wards. The inadequacy of prescriptions observed in the ICUs was mainly due to the non-prescription of a molecule with a narrower spectrum.

The planned duration of the antibiotic therapy was mentioned in 55% of medical records (Table 3): 96% (25/26) in the geriatric wards, 53% (8/15) in the ICUs, 46% (11/24) in the surgical wards, and 39% (19/49) in the medical wards ($p<0.0001$). When no microbiological documentation was available, the prescription of a planned treatment duration was significantly associated with compliance with local or national guidelines (90% versus 59%, $p=0.018$).

The antibiotic therapy reassessment at 72 hours was clearly documented in 39% of medical records: 54% (14/26) in the geriatric wards, 41% (20/49) in the medical wards, 25% (6/24) in the surgical wards, and 33% (5/15) in the ICUs, without any significant difference between the wards.

Overall, only 23 (21%) antibiotic therapies were adequate and associated with clear documentation of the 72-hour reassessment and with planned treatment durations.

The bivariate statistical analysis revealed that a clearly documented 72-hour reassessment was significantly associated with antibiotic therapy de-escalation to prescribe a narrower spectrum molecule (62% versus 30%, $p=0.025$).

DISCUSSION

This study was performed on a given day in 26 hospital wards and included all curative antibiotic therapies (irrespective of the infection site) prescribed on that day. Findings from the study give an “instant” and quite accurate representation of the quality of antibiotic therapy reassessment at 72 hours in a teaching hospital of Paris. Findings reveal that the 72-hour reassessment and the planned treatment duration are only clearly documented in one in four medical records, while such documentation is significantly associated with the better quality of the antibiotic therapy prescription (de-escalation, compliance with local or national guidelines).

Other recent studies reported similar results: 49% of clearly documented reassessments at 72 hours in 2012 in 33 health facilities of Haute-Normandie [8], 39% in 2014 for fluoroquinolone prescriptions made in the neurology department of a teaching hospital of Toulouse [6], 54% in 2015 for amoxicillin-clavulanic acid prescriptions made at the APHP [7]. It is, however, difficult to compare these results as the studies did not use the same definition for the documentation of the 72-hour reassessment in medical records.

The low rate of documented reassessments in the medical records may be explained by the absence of writing habits in hospitals, hence the lack of time dedicated to such a time-consuming activity. This may also highlight the lack of benefit perception for a rational and written “justification” of medical prescriptions on the quality of management as well as poor

knowledge of its regulatory nature. Documentation is most likely often viewed as an administrative requirement rather than a medical task per se.

However, the HAS guidelines [3] mention that the reassessment of the antibiotic therapy must always be documented in the patient's medical record at 72 hours. Even though the clinical efficacy and tolerability of the antibiotic therapy are reevaluated on a daily basis at the patient's bedside, the reassessment findings must be officially documented in medical records once microbiological data has been obtained and always taking into account the clinical outcome. Treatment reassessment is therefore ensured, and clinical and microbiological data considered to decide on the continuation or change of the antibiotic therapy is clearly documented [10,11].

Although almost all microbiologically documented antibiotic therapies of our study were active at 72 hours, de-escalation was only performed in 44% of possible cases. Other studies [12,13] also reported that antibiotic therapies were not always reassessed at 72 hours and properly adapted to the microbiological data. Twenty per cent of the microbiologically documented antibiotic therapies of our study had been reassessed at 72 hours (i.e., change in antibiotic therapy and/or clearly documented reassessment) without reduction of the antibiotic spectrum. This finding highlights the insufficient mastering of antibiotic de-escalation criteria by prescribers. The physicians' reluctance to change a susceptible and clinically effective antibiotic therapy and the lack of consideration related to the collective interest of reducing the antibiotic pressure could also explain the absence of de-escalation.

Microbiologically documented antibiotic therapies with a clear documentation of the 72-hour reassessment were more often associated with de-escalation. Prescribers with the best knowledge in antibiotic stewardship may be those spending the most time to clearly document antibiotic therapy reassessment. This could improve the quality of antibiotic prescriptions. However, this has not been unequivocally demonstrated. Pulcini *et al.* [5] demonstrated that better documentation of the 72-hour reassessment did not improve the quality of antibiotic

prescriptions, especially de-escalation. However, the authors used slightly different criteria for defining documentation in the medical records, e.g. prescribers were not asked to note whether the antibiotic therapy had to be adapted.

The planned duration of the antibiotic therapy was mentioned in only 55% of the evaluated medical records. This figure, although low, is higher than those reported in other studies [6,14,15]: from 24% to 40%. The prescription of a planned duration for the antibiotic therapy mentioned in the medical record was significantly associated with treatment compliance with local or national guidelines. This probably reflects on the prescribers' knowledge of guidelines. Treatment duration suggestions recently published by the Guidelines Committee of the SPILF [16] should help reduce the duration of many antibiotic therapies and improve monitoring.

Our study findings seem to suggest that physicians should be made aware of the benefit of documenting the adaptation or lack of adaptation of the antibiotic therapy at 72 hours in the patient's medical record. Focus should be put on improving prescription quality which will help tackle the emergence of resistance. The awareness of physicians should also be raised on the regulatory aspect of reassessment documentation. Physicians must therefore be informed that antibiotic therapy reassessment will be taken into consideration in the quality-dependent payment process – which is starting to be implemented – and that it is one of the certification criteria for health facilities. However, prescribers must be assisted in better documenting the antibiotic therapy reassessment and in improving prescription quality. IT tools are available or are being developed, such as signals set up on the prescription software as a reminder for the 72-hour reassessment or reminder questionnaires asking prescribers if the antibiotic therapy can be discontinued, shorten, or changed to prescribe a narrower spectrum antibiotic. However, these tools are not extensively used or are even not compatible with existing IT systems. The pharmacists of our study working in geriatrics send a message to geriatricians via the prescription software, asking them to reassess the antibiotic therapy, but the impact of

such message seems to be limited because no significant difference was observed on the clear documentation of the 72-hour reassessment compared with the other wards. Various studies reported the same finding [5, 13, 17] and demonstrated the limited impact of these IT tools on the quality of prescriptions. Treatment reassessment is not enough if physicians are not well aware of the criteria for a proper antibiotic prescription. Official guidance for antibiotic prescribing should therefore be provided through antibiotic therapy advice given to prescribers by infectious disease mobile teams with close collaboration with the pharmacy, the microbiological ward, and the operational hygiene team. Numerous studies agree with this strategy [13, 18, 19] and highlight the positive impact of the intervention of an infectious disease specialist on the quality of antibiotic prescriptions. Easily accessible training, especially e-learning modules, guidelines, and regular evaluations of prescriptions with feedback may also improve the prescribers' knowledge [20, 21, 22].

Implementing and monitoring these improvement strategies require time and human means, which are often lacking. Major multidisciplinary involvement was required to perform this study with the pharmacy, the microbiological ward, the infectious disease mobile team, the operational hygiene team, the COMAI, and the infection control committee (French acronym CLIN). The implementation of computerized medical records in the whole hospital group and in all wards, should help reduce the time dedicated to data collection for future studies. The documentation of the antibiotic therapy reassessment and the prescription of a planned duration for the antibiotic therapy in the medical record can, however, be regularly performed. This is relevant to monitor the effectiveness of the means used to improve both of these indicators.

Part of our study was performed during summer and three wards did not have any antibiotic therapy to evaluate on the day of the survey. This could have led to underestimating the number of curative antibiotic therapies prescribed.

To make data collection easier we decided to only assess the relevance of the prescribed molecule, and we did not assess the dosing regimen, administration modalities, and prescription duration.

CONCLUSION

The antibiotic therapy reassessment at 72 hours must be better documented in the medical records to comply with regulations but mainly to improve the quality of prescriptions and their compliance with guidelines, and to limit the emergence of bacterial resistance in microbiota. This indicator seems to be relevant and will regularly be evaluated in our facility. The use of IT tools could help document the antibiotic therapy reassessment but will not be enough to improve the quality of prescriptions if no assistance to prescribing is provided alongside a long-term involvement of physicians to tackle the emergence of multidrug-resistant bacteria.

Declaration of interests

The authors declare no competing interests.

Contribution of authors

V. Perut designed the study protocol, wrote the initial version of the article, and performed the statistical analyses.

R. Gauzit contributed to designing the study protocol and to collecting data, and wrote the final version of the article.

S. Kernéis, S. Bouam, F.X. Chedhomme, R. Batista, O. Conort, J. Loubinoux, A. Chevallier, and J. Raymond contributed to designing the study protocol and to collecting data and reviewed the final version of the article.

E. Canouï reviewed the final version of the article.

D. Salmon-Ceron designed the study protocol, contributed to interpreting the data, and wrote the final version of the article.

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Tableau 1. Caractéristiques des 114 antibiothérapies curatives évaluées à 72 heures

Table 1. Characteristics of the 114 curative antibiotic therapies assessed at 72 hours

	n/N	%	95% CI
Wards			
Medicine	49/11	43	34-53
Geriatrics	26/11	23	15-32
Surgery	24/11	21	14-30
Intensive care unit	15/11	13	8-21
Infection portal of entry			
Lungs	28/11	25	17-34
Urinary tract	27/11	24	16-33
Intra-abdominal	20/11	18	11-26
Bone and joint	10/11	9	4-16
Genitals	7/114	6	3-12
Bacteremia/catheter-related	7/114	6	3-12
Other	6/114	5	2-11
Skin and soft tissues	5/114	4	1-10
Febrile neutropenia	4/114	3	1-9
Associated bacteremia	19/11	17	10-25
Origin of the infection			
Community-acquired	49/11	43	34-53
Healthcare-associated	58/11	51	41-60
Unknown	7/114	6	3-12
Microbiological documentation at			
Yes	71/11	62	53-71
Negative or flora	20/11	18	11-26
Ongoing	7/114	6	3-12
Not performed	16/11	14	8-22
Bacteria			
Enterobacteriaceae	57/11	52	42-61
Other Gram-negative bacilli	12/11	11	6-18
Gram-positive cocci	36/11	32	24-42
Gram-negative cocci	2/110	2	0-6
Anaerobes	2/110	2	0-6
Gram-positive bacilli	1/110	1	0-5
Number of antibiotics prescribed			
One antibiotic	66/11	58	48-67
Two antibiotics	40/11	35	26-45
Three or four antibiotics	8/114	7	3-13
Antibiotic classes prescribed on			
penicillin	43/17	25	19-33
cephalosporins	43/17	25	19-33
carbapenems	15/17	9	5-14
metronidazole	18/17	11	6-16
quinolones	16/17	9	5-15
carbapenems	15/17	9	5-14
glycopeptides	10/17	6	3-11
aminoglycosides	9/170	6	3-10
macrolides	6/170	3	1-8
Various classes	10/17	6	3-11
Route of administration of the antibiotic therapy on Day 1			
Parenteral	152/1	89	84-94
Oral	18/17	11	6-16

Change in antibiotic therapy	40/11		
between Day 1 and Day 3	4	35	26-45

Tableau 2. Conformité^a des 114 antibiothérapies évaluées à 72 heures

Table 2. Adequacy^a of the 114 curative antibiotic therapies assessed at 72 hours

	n/N	%	95%
With microbiological documentation at 72 hours			
Antibiotic therapy prescribed at 72 hours active against the documented bacteria	69/71	97	90-100
Active antibiotic therapy prescribed at 72 hours, with an appropriate spectrum	44/71	62	50-73
De-escalation performed at 72 hours if extended spectrum on Day 1	21/48	44	29-59
No microbiological documentation at 72 hours			
Compliance of the antibiotic therapy with guidelines	32/43	74	59-86
Adequate antibiotic therapy^a	76/114	67	57-75

^a Adequate antibiotic therapy = in the presence of a microbiological documentation: active antibiotic therapy with an adequate spectrum or in the absence of microbiological documentation: compliance of the antibiotic therapy with the local or national guidelines.

Tableau 3. Traçabilité des informations retrouvées dans les dossiers médicaux pour les 114 antibiothérapies évaluées à 72 heures

Table 3. Documentation of the 114 antibiotic therapies assessed at 72 hours in the medical records

	n/N	%	95% CI
Antibiotic therapy reevaluation			
^a Clearly documented at 72 hours	45/114	39	30-49
Clearly documented after 72 hours	10/114	9	4-16
^a Tacitly documented at 72 hours	24/114	21	14-30
Tacitly documented after 72 hours	4/114	4	1-9
No documented reassessment	31/114	27	19-36
Planned duration of the antibiotic therapy mentioned in the medical record	63/114	55	46-65
Clearly documented reassessment at 72 hours + planned duration	29/114	25	18-34
Diagnosis leading to the antibiotic therapy prescription documented on Day 1	94/114	82	74-89
Documented advice from an antibiotic lead specialist	23/114	20	13-29

^a Clear documentation: clinical or microbiological comment associated with a comment on the need or lack of need for adapting the antibiotic therapy documented in the medical record

^b Tacit documentation: only a clinical or microbiological comment documented in the medical record