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Clinical implications of the implementation of a new automated peritoneal dialysis remote patient management system with cloud-based connectivity

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Résumé

Ces dernières décennies, la télémédecine et la gestion des patients à distance (remote patient management) ont connu un succès grandissant. Cet article décrit les implications cliniques de l'implémentation dans le domaine de la dialyse péritonéale automatisée d'une plateforme de connectivité à distance. Cette dernière permet d'une part une analyse quotidienne des données relatives au déroulement de la thérapie à domicile par leur rapatriement à chaque mise en route du cycleur et d'autre part la modification à distance par l'équipe médicale des données de prescription qui sont ensuite retransmises. Les avantages présentés sont une épargne de transport, notamment pour les patients avec des limitations physiques ou géographiques, une détection et une prise en charge précoces d'évènements indésirables tels la dysfonction de cathéter ou la non-adhérence au traitement, une éventuelle aide au diagnostic précoce de péritonite, et une thérapie plus personnalisée. Les impacts à long terme de la connectivité à distance sur le devenir des patients en dialyse péritonéale, les coûts de la santé et son éventuelle contribution à un essor de la technique restent encore à évaluer

Mots clés : télémédecine, télésurveillance, Dialyse Péritonéale Automatisée

Abstract

In the last decades, remote patient management (RPM) has been of growing interest in medical fields. In this article we describe the clinical implications of the implementation of a newly available automated peritoneal dialysis (APD) RPM system with cloud-based connectivity. This system provides data sent from the cycler about the course of the peritoneal dialysis (PD) therapy, offering the medical team the opportunity to analyse them on an everyday basis and subsequently remotely alter PD prescription.The main advantages discussed here are sparing of long or difficult travels, especially for patients with social, geographical or physical limitations, early identification and management of occurring issues such as catheter dysfunction or non-adherence to prescribed PD therapy, a potential clue to an imminent peritonitis, and finally a more personalized APD prescription. Further impacts of the implementation of RPM in peritoneal dialysis on patients outcomes, health costs and its potential influence on a greater take-on rate of the technique have still to be evaluated

Keywords : telemedicine, automated peritoneal dialysis

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The last decades have seen the implementation of telemedicine as well as remote patient management (RPM) in many medical fields such as cardiology, neurology and diabetology with a significant positive impact for patients in terms of morbidity and mortality(1). In nephrology, automated peritoneal dialysis is particularly conducive to the development of remote management methods, such as the Sharesource connectivity platform, the use of which has spread to several European countries such as England, Switzerland, Italy and just recently France. This platform allows a daily repatriation of data relating to the sessions of peritoneal dialysis therapy at home, thanks to which the medical team is able to quickly identify the occurrence of adverse events and to modify the prescriptions; these are then transmitted directly to the cycler of the patient, without him having to move, which represents a major advantage for specific populations of patients such as those with reduced mobility or living in remote areas or difficult to access.

Beyond this advantage linked to the reduction of transport, there is the question of the potential clinical implications of the implementation of this type of platform and its influence on the future of patients.

Our team has already illustrated, based on the case of the first Swiss patient who has benefited from remote connectivity, that its use allows the early recognition of adverse events (2). Indeed, the progress of each session is summarized in the form of a flag (green when no particularity, yellow or red in case of minor or major difficulty respectively, the alarm thresholds having to be defined by the clinician beforehand in the settings). The sudden appearance of red flags on the dashboard of the connectivity platform in this incidental patient a few days after the initiation of automated peritoneal dialysis led to the analysis of the course of the cycles and the identification of a catheter dysfunction based on extremely prolonged drainage times. This made it possible to call the patient for consultation and, after clinical examination and imaging, to diagnose catheter migration, subsequently repositioned by laparoscopic surgery after failure of conservative treatment; the dashboard, on which green flags were displayed for each session, allowed us to ensure that the therapy went then smoothly, without any new complications. Since catheter dysfunction is one of the major causes of technique failure and permanent hemodialysis transfer in the first 3-6 months,(3-4), its identification is of paramount importance; any tool that can contribute to early recognition is a valuable aid to the clinician.

Analysis of the data provided by the Sharesource connectivity platform allowed us a few months later to identify in the same patient the occurrence of non-adherence to peritoneal dialysis therapy (defined in the literature by the achievement of less than 90% of the prescribed therapy). Indeed, several sessions were found to be missing (illustrated by blank boxes, devoid of symbols on the weekly dashboard as well as on the calendar listing all the therapies of the past month). On this basis, we were able to establish dialogue and convince the patient of the importance of following her treatment in a more rigorous way in order to avoid complications related to non-adherence (increased risk of peritonitis, hospitalization, technique failure and death(5-7)).

A team from Mexico City investigated the potential role of remote connectivity in the early detection of peritonitis, a major complication of peritoneal dialysis, based on the principle that ultrafiltration decreases during an acute episode(8-9). The data from the latter being transmitted daily by the remote connectivity platform, they retrospectively studied them in 10 patients and were able to demonstrate that UF drops significantly 24 hours before the symptoms occur and before they were diagnosed with peritonitis (10). A significant decrease in ultrafiltration may therefore raise the suspicion of impending peritonitis. However, the intra and interindividual variability of ultrafiltration may make it difficult to define and implement in the remote connectivity platform reliable warning thresholds; therefore the practical application of this observation looks difficult. It remains however very interesting.

In view of the postulated advantages, among which those previously discussed, of remote connectivity in the management of patients on automated peritoneal dialysis, a retrospective Italian case-control study has recently been conducted to evaluate its clinical utility in everyday practice. They have, for this purpose, replaced the standard automated peritoneal dialysis (APD) (cyclers operating on the basis of a card containing the prescriptions as well as the recorded data of the therapies carried out and brought to the dialysis center at each visit for reading and possible adaptation) by connected APD: they analyzed prescribing changes over a 6-month period before and after the change by looking at incident patients and prevalent patients separately (11). They were able to demonstrate a significant increase in the total number of prescribing

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changes after initiating remote connectivity in both incident and prevalent patients, as well as a significant decrease in the number of outpatient visits to the center in the incident group. In addition, 50% of the changes defined as major, namely to improve the purification or ultrafiltration (minor changes being those caused by the occurrence of alarms), were made pro-actively in the incident group, through remote connection, namely before the patient calls the dialysis center or comes to it (42% in the prevalent group). The introduction of the remote connection has therefore enabled the medical team to work proactively and not only in response to a proven problem and to offer patients a more personalized therapy (in view of the greater number of prescription modifications made).

In summary, a connectivity platform, such as Sharesource, allows not only a daily analysis of the data during of the course of the automated peritoneal dialysis therapy, but also a great reactivity in the adaptation of the treatment by the remote prescription. Advantages hitherto documented include early recognition of adverse events leading to prompt management, as illustrated by catheter dysfunction or non-adherence. Concerning peritonitis, the practical application has still to be demonstrated but the concept remains attractive. It also appears from the Italian study that it allows for a more personalized prescription of APD and could have an impact in terms of costs since it allowed a decrease in the number of clinical visits of APD incident patients with remote connectivity, compared to the standard APD (card system). Finally, it is easy to imagine that specific patient populations, such as those with reduced mobility, would particularly benefit from its implementation, which would make it possible to reduce the number of clinic visits to the minimum necessary. However, it is essential to keep in mind that remote connectivity remains a tool and cannot substitute for medical care in the peritoneal dialysis unit because the clinical evaluation of the practitioner and the doctor-patient relationship remain paramount for quality of care.

In the long term, it will be necessary to determine whether remote connectivity to automated peritoneal dialysis has measurable impacts on the patient's future in terms of morbidity, mortality, hospitalization and quality of life, health costs, as well as the lifetime of the technique and the permanent transfer rate to hemodialysis.

Finally, more generally, its possible contribution to an expansion of peritoneal dialysis will have to be evaluated. Indeed, only 11% of incident patient on chronic renal replacement therapy in Europe are on PD according to ERA-EDTA report (12), compared to 85% on hemodialysis (the remaining 4% being pre-emptively transplanted).); figures are still lower for prevalent patients, since only 5% are on peritoneal dialysis versus 58% on hemodialysis (the remaining 37% being transplanted). As this technique has demonstrated a significant positive impact on the preservation of residual renal function (13) and the latter being associated with a survival advantage (14), any contribution to its development is of value to the nephrological community.

CONFLICTS OF INTEREST

The author claims to have received a fee from Baxter for oral presentations and a fellowship

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