

Nursing and wound care in the patient with chronic kidney disease in dialytic treatment

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ABSTRACT

Patients with end stage renal disease on hemodialysis are at high risk of developing skin wounds, especially those secondary to uremia, such as xerosis and pruritus, or to diabetes and vasculopathy. In fact, uremic complications, as metabolic acidosis and alteration of calcium-phosphorus metabolism, and the increased incidence of diabetes and vasculopathy in this population, represent the major risk factors of skin wounds. This problem significantly affects the quality of life of hemodialysis patients, representing a serious and disabling condition. This three-year project (2016-2018), which ended in 2019 with the analysis of the database, led to a significant improvement of the quality of the nursing care, with a 46% reduction in the incidence of relevant skin wounds during this three-year period and implementation of the knowledge of the trained staff. Nurses also optimized the use of advanced dressing devices. Finally, patients' satisfaction was measured with a questionnaire. During the last survey a high participation was achieved (98%) with a 95% satisfaction regarding the care provided.

INTRODUCTION

Skin diseases represent a serious and disabling problem, with a high incidence in patients with end stage renal disease on hemodialysis.^{1,2} In fact, these patients have an increased risk of developing skin wounds caused by the primary disease and the associated comorbidities.

The etiology of these lesions is mainly attributable to the consequences of diabetes mellitus,³ arterial disease,

calciophylaxis^{4,5} and uremic complications (xerosis, pruritus, etc.).

A pivotal role in pathophysiology is played by endothelial damage, mediated by a microinflammatory state with high levels of C-reactive protein, oxidative and carbonyl stress, high glycated hemoglobin and the alteration of calcium-phosphorus metabolism and lipid metabolism.⁶ Furthermore, it must be considered that most of hemodialysis patients are elderly and at high risk of accidental trauma (skin tears) which could develop into difficult injuries (trauma in a diabetic patient).

Early nursing management combined with the acquisition of skills,⁷ turns out to be a winning combination for the care and treatment of these patients, contributing to a reduction in complications and wound healing times.

Observation and context

In our dialysis center, there are each year about 110 patients on hemodialysis. Most of these patients are elderly and not self-sufficient. This subgroup of dialysis patients is at high risk of developing skin wounds, with subsequent impact on the quality of life. Moreover these patients have also difficulties in going to dedicated clinics to carry out check-ups and diagnostic tests (including preventive purpose).

The study population mean age is 67 years, with a slightly prevalence of male sex (61%). The prevalence of diabetic patients is 42.5% and of arterial diseases 32%.

Objective of the study

The three-year project (2016-18) aimed to improve the nursing care of dialysis patients suffering from skin

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wounds, to simplify access to dedicated services and to ensure a better quality of services provided. Prevention, together with patients' education, plays a primary role, since the recognition of early signs and symptoms of possible complications, determines the anticipation of treatments and the reduction of advanced wounds incidence.

MATERIALS AND METHODS

Phase 1 (December 2015)

In the first phase, the problem of "severe wounds" was analyzed in multidisciplinary group meetings. A new figure was introduced, the nurse expert in wound care, conceived as a leading figure for the patient and for other health care professionals. This figure had the task of improving the quality of wound care provided. In addition, training events were organized to improve the knowledge of the medical and nursing staff on the management of advanced skin lesions and medication aids.

Phase 2 (December 2015)

Upgrade of the medical equipment in the clinic, with the introduction of advanced dressings according to the characteristics of the patient's lesions and in accordance with the most recent guidelines⁸. In addition, an archive has been established and data on advanced wounds have been collected and catalogued according to the type of injury and year of onset.

Phase 3 (January 2016)

Creation of a "medication report sheet", adapted to the characteristics of the single patient, with the aim to ensure better continuity of care. Introduction of a questionnaire to assess the degree of patient's satisfaction with the assistance received in treating injuries.

Phase 4 (November 2016 - September 2018)

Creation of clinical pathways dedicated to the two types of most disabling lesions in these patients: the diabetic foot ulcer and the vascular ischemic ulcer. The purpose of these pathways was to facilitate the care of these types of patient, ensuring faster access to dedicated clinics, speeding up care and improving the prognosis.

Phase 5 (March 2017 - January 2019)

Start of the educational program and creation of a brochure for the patients considered at high risk of developing severe wounds, in particular diabetic and vasculopathic patients, in order to prevent their onset.

Phase 6 (April 2018 - May 2018)

Staff training through residential course concerning the prevention and treatment of skin wounds of the patient with renal insufficiency.

Phase 7 (2019) data analysis and study conclusion

The data of the three-year study period have been analyzed and compared in order to evaluate: i) incidence of skin wounds; ii) Incidence of specific skin wounds (diabetic, vasculopathic and skin tears lesions); iii) Healing times at 90 days; iv) Lesions not cured; v) User satisfaction questionnaire results; vi) Use of advanced medication aids.

DATA ANALYSIS

Wounds observed during year 2016

Of the 115 patients attending our center, 40 patients (46%) have diabetes and 30 have a vascular disease (34%). 68 skin wounds have been registered during the year 2016 (Table 1).

Pressure ulcers: 9% of the total lesions (6 lesions), localized for 33% (2 lesions) to the sacrum/buttocks and for 67% (4 lesions) to the lower limbs; 83% of the wounds healed after 1 month (5 lesions), 17% (1 lesion) at 3 months.

Surgical lesions: 4.5% of the total lesions (3 lesions) localized to the abdomen for 33% (1 lesion) and to the lower limbs for 67% (2 lesions). One wound healed after 1 month (33.3%), 2 wounds at 3 months (66.7%).

Traumatic lesions: 20.5% of total injuries (14 injuries) localized for 50% (7 injuries) to the upper limbs and

Table 1. Wounds observed during year 2016.

| Year 2016 | | | | |
|-----------------|-----------------------|-------------------------------------|------------------------|----------------|
| Total patients | Diabetic patients (%) | Patients with vascular problems (%) | | |
| 115 | 40 (46) | 30 (34) | | |
| Type of lesions | Total N. (%) | Healing at 1 month (%) | Healing at 3 month (%) | Don't heal (%) |
| Decubitus | 6 (9) | 5 (83) | 1 (17) | |
| Surgical | 3 (4,5) | 1(33,3) | 2 (66,7) | |
| Traumatic | 14 (20,5) | 12 (86) | 2 (14) | |
| Vascular | 20 (29) | | 16 (80) | 4 (20) |
| Diabetic | 25 (37) | 9 (36) | 7 (28) | 6 (24) |
| Total lesions | 68 | | | |

50% to the lower limbs (7 injuries). Twelve injuries healed after 1 month (86%) and 2 injuries at 3 months (14%).

Vascular lesions: 29% of total lesions (20 lesions), localized to the lower limbs with arterial origin for 95% (19 lesions) and with venous origin for 5% (1 lesion). Sixteen lesions at 3 months (80%), 4 lesions did not heal (20%).

Diabetic lesions: 37% of total lesions (25 lesions). Of which 40% neuropathic (10 lesions), 48% ischemic (12 lesions), 12% mixed (3 lesions). Nine lesions healed at 1 month (36%), 7 lesions healed at 3 months (28%) and 6 lesions remained unhealed (24%).

Wounds observed during year 2017

Of the 110 hemodialyzed patients attending our center, 44% are diabetic (40 patients) and 33% have vascular problems. The skin wounds observed during 2017 (39 lesions) are shown in Table 2.

Pressure ulcers: 8% of total lesions (3 lesions), localized for 33% (1 lesion) to the sacrum/buttocks and 67% (2 lesions) to the lower limbs. One lesion healed after 1 month (33%), 2 lesions did not heal (66%).

Surgical lesions: we observed 1 lesion (3% of the total number observed), which healed at 1 month.

Traumatic injuries: 25.5% of total injuries (10 injuries) located 50% in the upper limbs (5 injuries), 30% in the lower limbs (3 injuries), 20% in the skull (2 injuries). Eight lesions healed at 1 month (80%), 2 lesions healed at 3 months (20%).

Table 2. Wounds observed during year 2017.

| Year 2017 | | | | |
|-----------------|-----------------------|-------------------------------------|------------------------|----------------|
| Total patients | Diabetic patients (%) | Patients with vascular problems (%) | | |
| 110 | 40 (44) | 30 (33) | | |
| Type of lesions | Total N. (%) | Healing at 1 month (%) | Healing at 3 month (%) | Don't heal (%) |
| Decubitus | 3(8) | 1 (33,3) | | 2(66,7) |
| Surgical | 1 (3) | 1 (100) | | |
| Traumatic | 10 (25,5) | 8 (80) | 2 (20) | |
| Vascular | 12 (30,5) | | 8 (66) | 2 (17) |
| Diabetic | 13 (33) | 5 (61) | 1 (8) | 2 (15,5) |
| Total lesions | 39 | | | |

Vascular lesions: 30.5% of the total lesions (12 lesions), located in the lower limbs 100% of arterial origin. Eight lesions healed at 3 months (66%) and 2 lesions did not heal (17%).

Diabetic lesions: 33% of total lesions (13 lesions): 38% neuropathic (5 lesions), 31% ischemic (4 lesions), 31% mixed (4 lesions). Five lesions healed at 1 month (61%), 1 lesion healed at 3 months (8%) and 2 lesions remained unhealed (15.5%).

Wounds observed during year 2018

Of the 105 patients in our center, 38% are diabetic (40 patients) and 30% have vascular problems (32 patients). We observed the onset of 37 advanced injuries during the year 2018 (Table 3).

Pressure ulcers: 11% of total lesions (4 lesions) 75% localized to the sacral region (3 lesions) and 25% to the lower limbs (1 lesion). 2 lesions healed at 1 month (50%) and 1 lesion remained unhealed (25%)

Surgical lesions: 3% of total lesions (1 lesion) localized to the upper limbs, that healed after 3 months.

Traumatic lesions: 24% of total injuries (9 injuries). 55% localized to the upper limbs (5 lesions), 12% to the sternum (1 lesion), 33% to the lower limbs (3 lesions). All of them healed after 3 months (9 lesions).

Vascular lesions: 30% of the total lesions (11 lesions) of arterial origin, located at lower limbs (leg) for 45% (5 injuries) and at lower limbs (foot) for 55% (6 injuries). Five lesions healed at 1 month (45%), 1 lesion healed at 3 months (9%) and 4 lesions did not heal (37%).

Table 3. Wounds observed during year 2018.

| Year 2018 | | | | |
|-----------------|-----------------------|-------------------------------------|------------------------|----------------|
| Total patients | Diabetic patients (%) | Patients with vascular problems (%) | | |
| 105 | 38 (40) | 30 (32) | | |
| Type of lesions | Total N. (%) | Healing at 1 month (%) | Healing at 3 month (%) | Don't heal (%) |
| Decubitus | 4 (11) | 2 (50) | | 1 (25) |
| Surgical | 1 (33) | | 1 (100) | |
| Traumatic | 9 (24) | | 9 (10) | |
| Vascular | 11 (30) | 5 (45) | 1 (9) | 4 (37) |
| Diabetic | 12 (32) | | 11 (92) | 1 (8) |
| Total lesions | 37 | | | |

Diabetic lesions: 32% of total lesions (12 lesions). Located at lower limbs (feet) for 83% (10 lesions), at lower limbs (leg) for 8.5% (1 lesion) and at upper limbs for 8.5% (1 lesion). Eleven lesions healed at 3 months (92%) and 1 lesion did not heal (8%).

RESULTS

Diabetic lesions represent the most frequent wound in our dialysis Center, followed by vascular lesions of arterial origin and traumatic lesions. Pressure and surgical lesions represent minority of the total lesions treated.

During the three-year period, we observed a 46% reduction of wounds treated: 68 cases in 2016, 39 cases in 2017 and 37 cases in 2018.

Analyzing the individual type of lesions, it was observed a 21% reduction of vascular lesions (20 in 2016 to 11 in 2018), 26% reduction of diabetic lesions (25 in 2016 and 12 in 2018) and a 17% reduction of skin tears (14 in 2016 and 9 in 2018).

We also evaluated the healing of the three most recurrent types on lesion observed in our Center. We observed an improved degree of healing of diabetic lesions: in 2018, 92% of lesions healed at 3 months compared to 62% in 2016. Traumatic injuries showed a similar healing trend in the three years: at 3 months all wounds treated resulted in a complete healing. Also vascular lesions showed an improvement in healing, going from 16% in 2016 to 54% in 2018.

Finally, analyzing the data of non-healed lesions, we

observed a reduction of non-healed diabetic lesions from 24% in 2016 to 8% in 2018 and an increase of non-healed vascular lesions from 20% in 2016 to 37% in 2018. The latter observation may be explained by the fact that the reduction of overall vascular lesions determined the selection of more complex lesions, which required a longer healing time.

Results of the service satisfaction questionnaires

Annually, a questionnaire was distributed to assess the satisfaction of the patients regarding the prevention and the treatment of skin wounds. In particular, the following issues were assessed: assistance from the multidisciplinary team (1), quality of care provided (2), access to dedicated clinics and specialist visits (3), patient education (4) and awareness of the “problem” of complex wounds (5). For each item 4 questions have been provided, with a rating scale of 1 to 10, for a total of 20 questions.

The outcome considered was the achievement of a satisfaction percentage of $\geq 85\%$, with a minimum participation of $\geq 80\%$. The data are summarized in Table 4.

Results of implementation of advanced dressing devices

The use in the three-year period 2016-18 of three most used advanced medication aids (polyurethane foam, hydrogel and alginate) was analyzed. The implementation of knowledge through constant updates resulted in a better use of advanced medication aids, as shown in Table 5.

Table 4. User satisfaction questionnaire results.

| User satisfaction questionnaires | | | |
|----------------------------------|----------|----------|----------|
| Year | 2016 | 2017 | 2018 |
| Participation (%) | 101 (88) | 103 (94) | 102 (98) |
| Total user satisfaction (%) | 88 | 94 | 95 |
| Item 1 | 90 | 94 | 98 |
| Item 2 | 98 | 98 | 98 |
| Item 3 | 80 | 88 | 88 |
| Item 4 | 90 | 98 | 98 |
| Item 5 | 82 | 90 | 94 |

Table 5. Annual use of advanced medication aids.

| Year | Polyurethane foam | Hydrogel | Alginate |
|------|-------------------|----------|----------|
| 2016 | 174 | 59 | 10 |
| 2017 | 220 | 59 | 18 |
| 2018 | 312 | 78 | 38 |

CONCLUSIONS

This project has addressed a relevant issue in hemodialysis patients, showing that simple interventions may determine significant results, as the reduction of lesions observed, the improvement of healing times and a better satisfaction degree of the patients.

The key points to obtain these results were the greater awareness of “wound problem” by both health care team and patients, the adequate training of health care professionals and the improvement of the quality of wound care and devices utilization. The entire process was supported and facilitated by the creation of the role of nurse expert in wound care, which became the point of reference for this relevant medical problem for all the professionals involved in hemodialysis patients care.

It is also necessary to consider the role of therapeutic education, carried out through interviews with patients and family members and supported with brochures. This development played a fundamental role in prevention, since the majority of wounds may be prevented. Moreover patient education has a critical role in slowing the progression and facilitating the healing of wounds.

In conclusion, although this study as some limitations, we can say that simple improvements in wound care determined positive results in our dialysis center. The awareness of skin wound problem in hemodialysis patients brought to an implementation of the quality of wound care and of the involvement of the patients in the process. This resulted in a reduction of lesions observed and of healing times, together with a better perception of the care provided.

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