

## Review Article

# Advanced Nursing Practice in Orthogeriatrics

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In the last few decades, all the countries aim to combine the improvement of the quality of health care with the reduction of health costs. In order to harmonize the above-mentioned contradictory goals, newly enhanced roles, as in the case of Advanced Nursing Practice, have been introduced, initially in the private sector and more recently in the public hospital setting. The orthogeriatric advanced nursing practitioners' role is valuable for providing pain relief, diagnosing and treating postoperative delirium, deep vein thrombosis, and secondary infections, preventing subsequent injuries and pressure sores, helping patients deal with postoperative constipation, and assist them in early mobilizing. After patients' discharge from the hospital, their role is essential for ensuring the patients are adhering to their osteoporotic treatment and have the adequate skills to prevent falls. Their role is significant for older adults living in nursing homes or long-term care facilities. Their care is cost-effective compared to regular care.

**Keywords:** Advanced nursing practice, Fracture, Older adults, Orthogeriatric

**Introduction****The Advanced Nursing Practice**

In almost every country, the efforts for the assessment of better ways to provide care to the sick people are taking place in the context of tight fiscal government constraints and concerns: In fact, all the countries aim to combine the improvement of the quality of the health care with simultaneously reducing health costs. Therefore, in order to harmonize the above-mentioned contradictory goals, and in addition develop interdisciplinary cooperation and education through implemented health care policies, protocols, and procedures, those countries which have developed efficient health systems try to promote the reviewing of the traditional roles of health professionals with new enhanced roles, as in the case of Advanced Nursing Practice (ANP).

The institution of ANP exists in the U.S.A and Canada for many years, initially in the private sector and more recently in the public hospital setting; ANPs are not a different kind of nurses, but operate under a new enhanced nursing role, both autonomously and as equal members of the interdisciplinary team, with the following five important roles which they have attained from their specialized education and training: The clinical expert, the trainer, the managing director, the health policy advisor and the researcher<sup>1</sup>. Clinical decision making, diagnostic access, coordination of care, and enhanced collegiality and communication within the interdisciplinary

team, as well as ongoing communication with the patients and their environment, are all included in the basic characteristics of the role of ANP.

The advanced nursing practitioners undertake an extensive range of activities on a daily basis, providing adequately, as the result of their clinical expertise, direct and indirect in complex clinical cases, which involve multiple pathophysiological mechanisms. In addition, they advise and educate the patients and their environment, taking an active part in the prevention of diseases and promoting health. Performing administrative duties in parallel, they are responsible for the development and coordination of various procedures and programs that aim to improve the quality of health services, reduce their cost, and enhance the patient's satisfaction. According to the current literature, ANP's care seems to excel at prevention of various diseases, lowering

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Study	Basic parameters	Main results of the study
Santy-Tomlison et al. 2018 <sup>7</sup>	Review	Advanced Nursing practice plays a very important role for the rehabilitation of elderly patients which have sustained a hip fracture.
Taylor et al. 2012 <sup>9</sup>	Systematic Literature Review	ANP function in an advanced clinical role, performing a variety of tasks, in direct patient's care, indirect care and various service-related activities.
McCleery et al. 2014 <sup>10</sup>	Systematic Literature Review (10 studies included).	There are indications that the introduction of ANP produces improvement in the four outcome measures studied: Quality of life, health status, hospitalizations and mortality.
Henderson et al. 2017 <sup>11</sup>	Prospective study (552 fragility hip fractures).	There was a statistically significant difference in the reduction of the mortality rate, the hospitalization period and the post-discharge function status of the patients, in favour of the orthogeriatric group.
Kaasalainen et al. 2015 <sup>12</sup>	Qualitative study (interviews with 12 nurse practitioners).	Most of the nurse practitioners have an active role in the patient's (residents in long term care) follow-up, after sustaining a fragility fracture.
Judge et al. 2016 <sup>13</sup>	Qualitative, multicentre study (11 Hospital, 43 APN).	Nurse-Led fracture liaison services are reducing mortality and are cost effective; there is no evidence for secondary hip fracture prevention.
Leal et al. 2017 <sup>14</sup>	Retrospective multicentre study	A nurse – led fracture liaison treatment model for the care of patients after a hip fracture is cost – effective, when compared to usual care.

**Table 1.** Summary of the published studies presented in this review.

mortality, reducing hospital infections and bedsores, the adaptation of the patients to their morbid condition, managing their stress, adhering to their treatment, and finally, reducing the number of the visits in the Emergency Departments, the re-examinations and improving the patients' overall satisfaction with the quality of care they receive. For all the above reasons, we can easily understand the characterization, which is often given to the Advanced Practice Nurse: the Doctor of Nursing Practice<sup>2</sup>.

### Orthogeriatrics

The medical specialty of Orthogeriatrics is, in fact, a sub-speciality of Orthopaedics, which has developed due to the complex clinical, social, and economic needs of older adults suffering from fragility fractures, and of course, especially those who have sustained a hip fracture. This particular kind of fracture presents one of the main health problems in the elderly. There were an estimated 1.3 million hip fractures worldwide in 1990. According to the epidemiologic projections, this worldwide annual number will rise to more than 6 million by 2050<sup>3</sup>. Most of those fractures involve men and women older than 70 years (their mean age being 79 years) and occur from a fall from their standing height. The mortality rate during hospitalization is in the area of 10% and increases to 30% just twelve months after the injury; no more than 50% of the patients manage to return to their pre-injury functional level, and unfortunately, more than 25% of the patients, who were independent before the fracture, will ultimately lose such a significant degree of functionality, that they will be forced to live for the rest of their lives in a residential care homes<sup>4</sup>. The socio-economic problem

caused from those fractures is also severe, with the estimated cost representing the 0.1% of the worldwide global health care costs, going up to 1.4% in the developed countries.

The most appropriate treatment for this type of fracture is operative: open reduction and internal fixation, or arthroplasty (total hip arthroplasty of hip or hemiarthroplasty). The time of the surgical treatment ideally should be within the first 24 hours after the injury, and this time affects in a great degree both the final functional result and the survival of the patient. The postoperative care of those patients covers various issues, such as the provision of adequate pain relief, mobilization as soon as possible, correction of the anemia which occurs after the majority of the surgeries, proper nutrition of the patients, and evaluation of their neurological condition<sup>5</sup>. In conclusion, several characteristic features of orthogeriatric can be recognized as particularly beneficial in the treatment of the elderly patient suffered from hip fracture:

- Understanding geriatric fragility syndrome (frailty); it is a pathophysiological syndrome utterly distinct from the fragility condition that concerns bone mechanics.
- A holistic view of the elderly patients' health, assessing the interactions between the various systems, but also their physical, mental, and social dimensions.
- A realistic view of the therapeutic goals recognizes what is possible in the context of the patient's general health and whether therapeutic intervention is cost-effective.
- Familiarity with the available resource network for the elderly patients and the necessary interactions with it, especially useful when planning the discharge from the fracture ward in a reasonable amount of time.

- Capacity and experience in coordinating interdisciplinary rehabilitation teams specialized for the elderly patients.

All the above tasks can only be accomplished by the close cooperation of a well-trained team. This team should include not only the orthopaedic surgeon and the geriatrician; advanced nursing practitioners, having experience in treating elderly patients and especially treating their post-fracture needs, are valuable members of this team, capable of multiplying the contribution of the orthogeriatric interdisciplinary team<sup>6</sup>.

## Methods

The aim of this narrative review was to investigate the complex role of the advanced nursing in the orthogeriatric. The databases used to locate the most relevant bibliographic data were: *PubMed*, *Web of Science*, *Cochrane Library of Systematic Reviews*, *Scopus*, and *Embase*. The keywords (MeSH terms) used in this literature search were: *Orthogeriatrics*, *Advanced Nursing Practice*, *Hip Fracture*, *Elderly*.

The inclusion criteria for this review were: 1) Literature published as books and journal articles and 2) Papers that were published within the last 15 years. The exclusion criteria were as follows: 1) Duplicate studies 2) Papers in the form of abstracts or posters and 3) Papers not in English language.

## Results

There were twenty-six studies found based on the search methods and inclusion/exclusion criteria specified above. Seven relevant papers were chosen for presentation; Table 1 summarizes the data of the literature review.

### Orthogeriatric Nursing

According to Santy-Tomlison et al. (2018)<sup>7</sup>, one of the most important parameters for the positive development of the health of a patient who has sustained a fragility hip fracture is nursing: Nurses are the largest group of the whole orthogeriatric team which deals with the restoration of the patient's health, they are by his side 24 hours a day, every day, and are the first, in most of the cases, who are going to intervene, if something goes wrong with the patient's condition. The successful results of the care of those patients can be measured through various indicators, the most important in the elderly patients being:

- *Pain relief*, with minimization of the need for prescription of painkillers: Since the Non-Steroid Anti-Inflammatory drugs (NSAIDs) can cause a big number of side-effects (gastrointestinal ulcers, deregulation of the arterial blood pressure, cardiac arrhythmias, deterioration of the renal and the kidney function), and the opioids also carry various side effects (drowsiness, concentration disorders, constipation), the geriatric patients need to use as little of these medications as possible.
- *Delirium*: One of the most common complications after

a hip fracture is delirium (with the occurrence incidence in the area of 35%), especially in the elderly patients suffering from dementia. The advanced orthogeriatric nurse practitioner has to recognize the risk factors for the occurrence of this complication (past medical history of delirium, blood transfusion intra- and post-operatively, low hematocrit, living in an institution prior to the injury and not being functionally independent, and a high American Society of Anaesthesiology Score) and try to prevent it since after such an episode the risk of complications increases a lot<sup>8</sup>. The role of the ANP is very important as well, in the early diagnosis of the syndrome, the immediate information of the treating physician and in ensuring that the patient receives the appropriate medication.

- *Pressure ulcers and injuries*: Those complications can be important inhibitors for the patient's timely postoperative mobilization – which is crucial for the overall outcome after every operation for a hip fracture. The orthogeriatric ANP should be able to recognize the risk factors for those complications (irritated and red skin in patients who have sustained a hip fracture), and to ensure the optimal treatment: frequent changes of the patient's position, optimal hydration and nutrition, effective management of skin moisture, in relation, especially, to incontinence.
- *Hydration and Nutrition*: Elderly patients, especially in the immediate postoperative period, very often experience fluid and electrolyte disorders, which very often remain unnoticed since their manifestations are non-specific and most of the health practitioners do not suspect them; many times, the proper diagnosis is delayed or even missed, exposing the patients in a significant risk. The ANP should be able to recognize as soon as possible those disorders, which are not difficult to be treated if, of course, the diagnose is early.
- *Constipation*: A very annoying symptom, which can be a combination of many factors (opioid and other medication, immobilization, dehydration); if treated successfully, the quality of life of the patient during the postoperative period will improve a lot.
- *Venous Thromboembolism and Secondary infections prevention*: Both complications are severe and responsible for a significant proportion of the immediate postoperative period's mortality. The ANP, in cooperation with the treating physicians, has to ensure all the appropriate precautionary measures to minimize the occurrence of those complications.

However, apart from the pure nursing duties that the ANPs have to provide to the geriatric patient, their role in the patient's training and education in order to promote and improve their health is very important. Most of the elderly patients cannot recognize the risk factors which will lead them to sustain a fall and a consequent hip fracture, and even if they get informed, they do not comply with the instructions given to them. For example, osteoporosis

is one of the main causes for hip fractures, and although there are several treatment options available in reducing fracture risk, the patient's compliance is poor. The first step in improving compliance to osteoporosis treatments is identifying the causes of poor compliance. Additional way to this direction is the communication with the patient, including discussion of osteoporosis medication benefits, and feedback of treatment effects.

In addition, the role of the ANP is crucial for the education of the elderly patients for proper and careful gait in order to avoid falls and injuries, which will eventually lead to a fracture of their hip. The nurse should also spend time and educate the family of the elderly patient about the causes and the prevention of the fragility fractures; and should always bear in mind that every fall of fracture should become the opportunity to prevent the next fall fracture.

### ***The effectiveness of Nurse Practitioners in Orthopaedic Service***

Taylor and Staruchowicz in 2012<sup>9</sup> published a comprehensive systematic review of the current literature regarding the effectiveness of the Advanced Nurse Practitioners in the Orthopaedic setting; according to them, fifty years ago, ANPs evolved, initially in U.S.A. in order to address the problem of the deficit of the physicians in the primary health sector. Some years after (1967), Canada followed, while in the U.K. and Australia, ANPs were introduced at the beginning of 1990's. All those years ANPs have an extensive range of duties in their responsibility: Treatment of patients sustained injuries accidents and musculoskeletal trauma, helping the patients deal with their chronic orthopaedic conditions, such as osteoarthritis and osteoporosis, and of course being an active and important member of the orthogeriatric team, treating the elderly patients after sustained a hip fracture for which they have been operated on. Their clinical role is advanced, performing a wide variety of clinical tasks in direct patient care, indirect patient care, and various other service-related activities.

McCleery et al. in 2014<sup>10</sup> published a systematic review of the current literature regarding the effectiveness and the quality of care that is being provided by the Advanced Practice Nurses. They included in total 10 studies (12 articles), and the outcome measures were the mortality rate of the patients under treatment, the length of their hospitalization, the improvement they had in their health status during the hospitalization, and the overall quality of life, which was achieved during their hospitalization period but also after their discharge from the hospital. The main questions which this review needed to answer were:

- What is the comparison between the quality of care provided to the patients by the APN and the physicians independently?
- Is there a difference between the quality of care provided by the APN according to the patients' type of care (specialized care or primary care)?

- Does the degree of autonomy granted to the APN affect the quality of care they provide to their patients in the end?

The results of the systematic literature review did not show any statistically significant difference in any of the above-mentioned outcome measures. However, there are some indications that the care provided by the APN was, to various extent helpful to all the examined outcome measures. The authors conclude that the role of the ANP is accepted and improves the target outcomes.

Henderson et al. in 2017<sup>11</sup> published a prospective study in order to investigate the benefits which a comprehensive orthogeriatric service (an essential and integral part of which is the advanced nursing practitioner) to various outcomes in elderly patients who sustained an osteoporotic – fragility hip fracture. Under the care of the specialized orthogeriatric team were treated 206 patients (Group A), whereas 248 patients were treated in the traditional way (group B). After the one year's follow-up period, the mortality rate of group A was statistically significantly lower ( $\chi^2=13.34$ ,  $p<0.001$ ), the length of the patients' hospitalization after the fracture was shorter ( $U=-3.77$ ,  $p<0.001$ ), and the post-discharge needs for specialized rehabilitation were much less ( $\chi^2=26.59$ ,  $p<0.001$ ). The patients' functional status in Group B was worse, requiring much more care from external caregivers ( $\chi^2=5.34$ ,  $p=0.021$ ). The authors' conclusions were that the specialized multidisciplinary orthogeriatric treatment of patients who have sustained a fragility hip fracture (including the services of the dedicated advanced specialized orthogeriatric nurse) improves most of the outcome measures of those patients, reducing the mortality, the hospitalization period and improving their functional condition and independence on their discharge from the hospital.

### ***The long-term treatment of fragility fractures in the elderly and the role of the ANP***

As has already been mentioned earlier, hip fractures present one of the most difficult to treat problems in the elderly, being the cause for prolonged pain, disability, depression, and functional deterioration. Older adults living in long term care (LTC) are especially vulnerable to those complications after having sustained such a fragility fracture. Kaasalainen et al. (2015)<sup>12</sup> published their study regarding the role of the specialized nurse practitioners in the long-term treatment of this group of patients. It was a qualitative, two-stage study: in the first stage, 12 nurses (67% response rate) completed an online questionnaire, and in the second stage, 11 out of those twelve agreed to carry on with a semi-structured interview. There were three main questions under investigation:

1. Which were the tools that the nurse practitioners (NP) have been using in order to assess the resident's degree of osteoporosis and the consequent risk of a fragility hip fracture?
2. What was the treatment those NP were providing to the patients after sustaining a fragility hip fracture in order

to prevent the second one of these kinds of fractures in the future?

3. Which were the main problems and barriers that the NP had to confront in order to optimize their role in the treatment and in preventing fragility hip fractures in the elderly patients living in LTC?

The majority of the nurse practitioners described their role in the orthogeriatric care of those patients as a holistic one: They were aware of the complete medical history of the patients, the medications they were prescribed for their various pathologic conditions, and of course, their orthopaedic issues and history, regarding their osteoporosis status and the values of their Bone Mass Density (BMD) and the previous fragility/osteoporotic fractures that the patients had sustained.

The nurse practitioners were aware of the importance of the various strategies of minimizing the incidence of the falls in order to prevent fragility hip fractures: they have been using various methods and techniques, such as hip protectors, physiotherapy, and exercise in order to enhance the physical condition of the residents, careful assessment of their nutrition and hydration status (anemia and dehydration are well-known factors which significantly increase the possibility of falls and fractures in the elderly), their mental status (confusion is always a problem in the elderly) and the degree of the pain they had from various reasons – most of the NP agreed that if a resident was in pain, he had much more chances of sustaining a fall.

In case of a fracture and after returning from the hospital, the main concern of the specialized nurse practitioners was to ensure that the patients would mobilize as soon as possible, pain-free, and of course, prevent any further falls. The osteoporosis status was again re-examined, ensuring that they were covered with at least calcium and vitamin D supplements, and an assessment of their BMD was scheduled as soon as possible. The main barriers that the NP mentioned regarding the management of the fragility fractures of those elderly patients was the lack of their bone mass density testing (and the ignorance regarding their osteoporosis status), polypharmacy and the medications' side effects, the various comorbidities of the residents and of course the fact you cannot predict the fall which might lead to a hip fracture.

The authors' conclusions from their study were to emphasize the role of the specialized practitioner nurse in the orthogeriatric treatment of the elderly, not only in the context of the hospital environment, but in the long-term residencies as well; the role of the NP is significant for the prevention of the fragility fractures, the patient's treatment after having sustained such an injury, and for the secondary prevention of another one.

In the same context, the orthogeriatric treatment with emphasis to the role of the advanced nurse practitioner in the treatment of fragility hip fractures in the elderly and the secondary prevention of their role as well, Judge et al. (2016)<sup>13</sup> published their multicenter study in 11 Hospitals

of England: the design of this study was a qualitative one, involving interviews of 43 health professionals who all were actively involved in the treatment of fragility hip fractures of the elderly, and in the procedures of secondary fracture prevention in those individuals: orthogeriatricians, specialized fracture prevention nurses, orthogeriatric and trauma nurses along with orthopaedic surgeons. The study results showed that the nurse-led fracture liaison service model produced statistically significant improvements in reducing the mortality of the elderly patients having sustained a hip fracture one month and one year after their injury. In addition, this specific model of the direct involvement of the advanced trained orthogeriatric nurses in treating those patients proved to be cost-effective. On the other hand, a seemingly unexpected finding of this study was that this service did not have a statistically significant impact on actually preventing and reducing the risk of a second subsequent fragility fracture in those patients. The authors conclude that this failure reflects the complexity of the procedures needed to prevent the second fragility fracture, including: 1) Adherence of the patients to their osteoporotic medication: it seems that many of them did not follow the weekly or monthly bisphosphonate (alendronate/risedronate for the weekly treatment, ibandronate for the monthly one), a fact which might suggest treatment with the once/yearly zoledronic acid, 2) Adherence of the patients to the advice given to them for the prevention of falls after the first fracture and 3) Failure of the continuous monitoring and guidance by the ANPs of all the above prevention measurements.

### ***Cost-effectiveness of the orthogeriatric ADP services***

The last one of the studies which will be presented in this narrative review continues the findings of the current evidence just where the previous paper stopped: In 2017, Leal et al.<sup>14</sup> published a population-based retrospective multicenter study regarding the cost-effectiveness of the nurse-led orthogeriatric fracture liaison service models for the treatment of patients sustained a fragility hip fracture. The theoretical basis of the research was the Glasgow Fracture Liaison Service report, which stated in 2011, that "for every 1000 patients with a fragility fracture assessed from this FLS, 18 fragility fractures, including 11 hip fractures were prevented"<sup>15</sup>. The FLS model involves the appointment of a specialized nurse practitioner who is responsible for the follow-up of the patients who have sustained a fragility hip fracture: the nurse assesses the patient's clinical condition, advises him/ her regarding the prescribed medication and the fall – prevention mobilization protocol he has to adhere to prepares all the visits to the hospital clinics and provides all the relevant support and information for the patient's bone health.

The authors used the datasets of big UK Hospitals – 33.152 patients from a period of over 60 years who have been admitted to the hospital with a hip fracture diagnosis and used the Markov model to estimate the lifetime impact

of the various models of health care provided to those patients. This study showed that both the nurse-led FLS model and the orthogeriatrician – led model services were statistically significant cost-effective compared to the usual care, irrespective of the patients' sex, age, and comorbidities at the time of the first hip fracture. It seems that the main effect of this service was because of its impact on improving the patients' mortality rather than preventing a subsequent second fragility fracture. This finding is in line with the results of the previously mentioned study<sup>14</sup>.

## Conclusion

Elderly patients with fragility fractures of their hips present a very difficult to confront the challenge to every health system of our planet; this challenge is even more pronounced regarding the nursing part of their treatment since, on a global scale, the majority of the hospital's nursing departments are understaffed and underfunded. The nurses' role is significant for reducing the morbidity and mortality of the elderly patients, their timely mobilization after the surgical fracture treatment and their early mobilization, and the prevention of a second fragility fracture. Many orthogeriatric hospital departments have included in their holistic patient care the Advanced Nursing Practitioners for all the above reasons.

The narrative review of the current literature presented in this paper, showed that: 1) The role of the ANPs in the orthogeriatric departments is valuable for providing to the elderly patients who have just been operated adequate pain relief, making an early diagnosis and treatment of the postoperative delirium, a very common presenting and serious complication with many side-effects, preventing subsequent injuries and pressure sores, ensuring that the patients are having the appropriate medication for prevention of deep vein thrombosis, venous thromboembolism and secondary infections, helping them to deal with the postoperative constipation and of course assist them in mobilizing as soon as possible after the operation, 2) After the patients' discharge from the hospital the ANPs role is very important for ensuring the patients are adhering in their osteoporotic medication and have the adequate skills to prevent falls, which may lead to a second fracture, 3) The role of the ANPs is very important, not only in the hospital setting, but also for older adults living in long term care, 4) The care of the ANPs is cost effective in this group of patients in comparison to standard care.

### Disclaimer

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