

REVIEW PAPER

The Role of Nurses in Therapeutic Plasma Exchange Procedure

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Abstract

Introduction: Therapeutic plasma exchange procedure is the treatment of choice for haematological, neurological, kidney and immunological diseases and also as a second choice for other diseases in which the effectiveness has to be established.

Aim: The aim of this literature review was to explore the role of nurse in therapeutic plasma exchange procedure.

Methodology: Literature review based on studies and reviews derived from international (Medline, PubMed, Cinahl, Scopus) and Greek (Iatrotek) data bases concerning the nursing responsibilities in patients undergoing plasmapheresis. The collection of data conducted from January to July 2014. Also, were used some keywords *apheresis, plasmapheresis, clinical responsibilities, education, plasma exchange procedure, role of nurse*, as well as articles by the National Documentation Centre, which provided valid and documented data from global research and epidemiology.

Results: The role of modern nurse in patients undergoing plasmapheresis is multiple and is distinguished in clinical, educational, inquiring and advisory. The apheresis nurse coordinates care in collaboration with other care providers and acts as a patient guide and advocate, assisting the patient in seeking information, assuring that the patient has the opportunity for informed consent for treatment decisions and promoting the maximal level of patient-desired independence. The nephrology - haematology nurse may function in the role as a nurse manager to assure plasmapheresis patient's safety and the delivery of appropriate care within the framework of the nursing process. Also, the plasmapheresis nurse uses assessment findings to prioritize problems according to patient's needs and actively participates in professional role development activities including continuing education, quality assessment and improvement and clinical application of research findings.

Conclusions: The nurse's role in the process of plasmapheresis is very important as the nurse is the one who will direct the patient, coordinate, train, advice, propose changes in care and participate in clinical research.

Key Words: apheresis, plasma exchange procedure, role of nurse, clinical responsibilities, education, research.

Introduction

Therapeutic plasma exchange procedure is the treatment of choice for haematological, neurological, kidney and immunological diseases and also as a second choice for other diseases in which the effectiveness has to be established.

Therapeutic Plasmapheresis

Plasmapheresis or Therapeutic Plasma Exchange (TPE) refers to an extracorporeal procedure where one or more plasma volumes are removed from a patient and replaced with, albumin solution plus crystalloids or fresh frozen plasma (Balta, 2009). This therapeutic method aims at removing pathogens (chemicals, antibodies and immune complexes, antigens, toxins) from the body of patients with pathologies associated with metabolic and immunological diseases (Gerogianni et al., 2010; Moschidis, 2009; Shehata, 2007; Ismail et al., 2001; Grapsa and Digenis, 1996).

Clinical Applications of Plasmapheresis

Plasmapheresis is the treatment of choice for haematological, neurological, kidney and immunological diseases and in diseases in which the effectiveness has to be established. The process of plasmapheresis is performed mainly within the renal or hematological units of hospitals or in Apheresis unit, an appropriate designed place for the patients (Gerogianni et al., 2010; Panagiotou et al., 2009; Szczepiorkowski et al., 2007; Shehata, 2007; Koutra, 2005; Grapsa and Digenis, 1996).

Procedure

The separation of blood components is achieved with the plasmapheresis machines, which are based on two basic principles: centrifugation or filtration of blood through a dialyzer filter. Both methods require vascular access and also a system of lines to transfer the blood from the patient to the appropriate machine and for its return to circulation (Panagiotou et al., 2009; Andre and Kaplan, 2008; Reinan and Mason, 1990).

The Role of Nurse

The role of the modern nurse in the process of plasmapheresis is multiple and is distinguished in clinical, educational, inquiring and advisory. The nurse is the patient's tutor, the primary care provider, the consultant, the educator, the researcher, the administrator, the instructor, the lawyer, the mentor and the ombudsman. Nurse's main duties are maintaining and improving standards of nursing care, effective use of resources and improvement in quality both in the life of the individuals undergoing plasmapheresis and the delivery of health services (Chapman, 2014; Ran et al., 1999; Gomez, 2011).

Clinical Practice

The role of the clinical nurse is to provide personalized, humanistic and comprehensive nursing care to plasmapheresis patients.

In clinical practice, plasmapheresis nurse has to be an effective practitioner able to establish and maintain high quality evidence based nursing services and to work with the multi-disciplinary team to ensure that patients receiving plasma exchange have access to specialist care, knowledge and expertise. Also, the apheresis nurse has to ensure patients that have an understanding of their disease, treatment options and support services in conjunction with the responsible doctors (Haematologists, Nephrologists or others) and provide effective co-ordination for patients undergoing plasma exchange within the hospital. In that way, specialist nurse in plasma exchange procedure facilitates effective communication between the multidisciplinary team, the patients and their families but also creates and promotes open communication and healthy working relationships between the renal and neurology team and other areas of the hospital (Gerogianni and Panagiotou, 2014; Apheresis manual, 2012).

Before the beginning of therapeutic plasmapheresis, the nurse is in charge for the confirmation of the identity of the patient, the patient's informed consent to perform the treatment, taking a full patient history, the preparation of plasmapheresis machine, liquids of substitution and set of venipuncture but also the effective use of

plasmapheresis equipment. Also, before the first session, the plasmapheresis nurse is responsible for taking blood sample for testing haematocrit, biochemical indicators, viral infections and antibodies and checking for an appropriate vascular access. Before the first plasmapheresis procedure, the nurse has to inform the patient about the process of plasmapheresis, the need to secure one or two peripheral veins and in their absence the replacement of central venous line. In addition, the nephrology – haematology nurse teaches the patient to obtain a light meal before the treatment, reduces his anxiety solving any patients' question about the therapy and tries to ensure a hot environment, heating the replacement fluids, especially in winter months (Gerogianni and Panagiotou, 2014; Nursing care, 2014; Apheresis manual, 2012; Carey and Seale, 2011; Greek Blood Use Manual, 2010; Bielefeldt, 2009).

After the connection of the patient to the plasmapheresis machine, the nurse's role is the immediate intervention in case of febrile reaction, hypotensive episode or allergic - haemolytic reactions (Nursing Care, 2014; Apheresis manual, 2012; Carey and Seale, 2011; Russi and Marson, 2011; Bielefeldt, 2009; Passow et al., 1984).

During the healing process, the role of nurse is focused in monitoring of the patient and the plasmapheresis machine with regular intake of vital signs, updates of the patient's care sheet (vital signs, side effects, medication administered, blood flow, blood pump, amounts of ingested and secreted substitution, replacement fluids and anticoagulants used) and appropriately correspondence to any complications of the treatment (Gerogianni and Panagiotou, 2014).

Patient's monitoring includes a series of repetitive or continuous observations concerning any symptoms such as flushing, itching, nausea, vomiting, diarrhea, fever, chills, headache, back pain, fall in blood pressure, bleeding, hypocalcemia, hypokalemia or signs of infection, bleeding or hematoma at sites of venipuncture and documentation of the physiological state of

the patient in plasmapheresis. The device monitoring is continuous and includes the following parameters: pressure monitor limits, air detector, blood leak, fluid replacement, plasma volume removed, amount of anticoagulant used and the session time remaining. The nurse is accountable for monitoring and recording of the above parameters and measurement of vital signs every hour or more frequently if the patient is hemodynamically unstable (Corea et al., 2003; Carey et Ceale, 2011, Gomez, 2011; Greek Blood Use Manual, 2010; Passow et al., 1984).

Also, the clinical responsibilities of nurse include prevention of infections in plasmapheresis unit with careful antisepsis in the entry point of the needle or the catheter, early identification of risk factors and adherence to quality assurance criteria with the goal of providing high quality healthcare services. At the same time, promoting a quiet and safe environment to both patients, staff and visitors, providing psychological support to the patient, information and education about the process of plasmapheresis and collaboration with the interdisciplinary team providing specialized care to the patient, is included to the nursing role. In addition, performing at expert level of vascular access for plasmapheresis procedure, compliance with the guidelines and nursing protocols, safe keeping of patients' records and ensuring medical confidentiality are of high importance nursing responsibilities (Kritikaki, 2012; Carey and Seale, 2011; Nursing care, 2014; Greek Blood Use Manual, 2010; Kostenidou, 2001; Nephrology nurse profile, 2000; Corea et al., 2003; Kokkinidi, 2011; Passow et al., 1984).

In addition, it should be noted that a very important parameter is the continuous evaluation of the patient that determines the operations that should be done by the nurse to achieve the objectives of plasmapheresis. The evaluation of plasmapheresis includes physical examination, analysis and interpretation of the results of laboratory tests, evaluation before the first plasmapheresis session, assessment of each session (before, after and during it) and assessment by the interdisciplinary team

based in the guidelines of therapeutic plasmapheresis. The assessment of patient's condition includes body weight, temperature, blood pressure, pulses, respiratory status, cardiac rhythm – rate, level of consciousness and assessment of intravascular and extravascular volume status (Corea et al., 2003, Gomez, 2011; Bielefeldt, 2009; Greek Blood Use Manual, 2010; Passow et al., 1984).

After the completion of the plasma exchange session and the removal of the needles, great care must be paid to the management of venous access or of the central venous catheter and periodic inspection for any bleeding. The patient is informed about the feeling of tiredness for one or two days, he is recommended to rest and avoid tedious activities and he is informed to avoid crowding and close contact with people who are sick (Russi and Marson, 2011).

Education

Patient education is a key component of all nurses' roles that must be provided to patients about the basic principles of plasma exchange procedure. Continuous patient's education will help them overcome the negative aspects of their treatment, deal with their disease with maturity, actively participate in a plan of care and promote the maximum level of rehabilitation. Also, training courses may reduce the psychological stress of the plasmapheresis patients, increase their responsibility and their knowledge about the treatment of this therapeutic method and assure patient safety and the delivery of appropriate care (Chapman, 2014; Gomez, 2011, Stoner, 2003).

Effective education is achieved by continuous training courses, distributing leaflets, effective methods of communication, individualized assessment and evaluation of each patient, attentive listening to the patient without criticism, creating supportive relationship with the patient, working with the other members of the interdisciplinary team, update - family support and cooperation between hospital and community (Kritikaki, 2012; Kelly, 2007; Stoner, 2003).

However, the role of nurse as educator extends to teaching and informing patients undergoing plasmapheresis and their families on the management of their condition and coping strategies of psychosocial issues that concern them. The training of this group of patients is focused on immediate and long-term complications of treatment with the aim of physical, mental and social rehabilitation. Also, apheresis nurse must be aware of continuing developments in fields of nursing technical or medical care, relevant to the total needs of the person with a haematological, neurological or renal disease (Chapman, 2014; Nephrology nurse profile, 2000; Stoner, 2003; Kyrimidou, 2000).

Also, education of health professionals with collaborating clinics and hospitals, regular participation in comprehensive educational and scientific programs and continuous update on new techniques of nursing and medical care should enhance professional's knowledge about basic principles of plasmapheresis treatment (Kritikaki, 2012).

Psychological Support

The role of nurse in psychological support of patients undergoing therapeutic plasma exchange is very important. That is because the specialist nurse contributes to their psychological - emotional support through interpersonal communication, individualized care, development of mutual trust, reliable information and counseling (Loukopoulou and Antoniadou, 2008). The nurse is the patient's mentor who encourages him to develop a positive perception of life and helps him to create a supportive network. Also, the nurse helps the patient to be adapted to plasmapheresis, to adjust plasmapheresis treatment in his features and to gain motivation and quality of life. However, the most important for the health practitioner is to distinguish individuals at high risk for psychosocial functioning, as these individuals should early join in vocational counseling and psychotherapy (Hersh - Rifkin and Stoner, 2003).

Research

The role of nurse working in plasmapheresis unit is equally important in research. The research nurse is accountable for the

coordination of research programs relating to the conduct of plasmapheresis in the hospital. Also, he is the link between nurses and researchers regarding new findings in the field of therapeutic apheresis (Kontouli, 2000).

The key, however, is the need to exploit research results into practice and be judged by it, in order a new investigation to be started. As part of this effort, the research nurse is responsible for the dissemination of research results in the areas where nurses work, through seminars - workshops. To achieve the above are required training of nurses in order to recognize the importance of research on upgrading of care in the field of plasmapheresis, incentives for nurses, a department of nursing research and enrichment of libraries with scientific journals and textbooks (Kontouli, 2000).

Hygiene Standards

The nurse is in charge for the highest standard of hygiene that must be maintained in the plasmapheresis unit at all times. All nursing staff members are responsible for ensuring compliance with the Hospitals requirements and standards with regard to hygiene and having a fundamental understanding of their individual responsibility in maintaining departmental and site hygiene standards. In relation to the prevention of the spread of infection, it is the responsibility of all nursing staff to use a meticulous aseptic technique in all invasive procedures, to wash their hands in contact with other people, areas or surfaces and to use mask and gloves in case of contact with biological fluids or blood. Also, clinical nursing staff should teach the plasmapheresis patients to maintain hygiene and avoid contact with people who have infections of the upper respiratory track. As far as the use of plasmapheresis catheters, they should be used strictly for plasmapheresis and not for administration to other medication, blood derivatives or blood sampling. In addition, nursing staff is required to identify and report any signs of infection to the infection control team and upon receipt of their advice (Kokkinidi, 2011; Velimvasaki et al., 2008; Randolph and Peacock, 2003).

Communication

In the field of communication, the specialist nurse in plasmapheresis is accountable for receiving and providing patients and their families with sensitive and complex information, using developed empathy, reassurance and counseling skills. Toombs (1992) emphasizes the importance of listening to the patient's narrative and their families about their illness, something that takes time but can improve patient's mood (Michael, 1996). Through listening to patients, nurses and other health care professionals can also appreciate the challenges faced by plasmapheresis patients. Patients undergoing plasma exchange require ongoing review, providing the opportunity to assess psychosocial as well as physical needs and a secure environment in which patients feel comfortable to share their stories and concerns (Kelly, 2007).

Conclusions

In conclusion, the role of nurse in the plasmapheresis unit is important and occurs to be more creative, more enlarged and clearly charged with responsibilities related to nursing activities and their quality. That's because the nurse is the one who will direct, coordinate, train, advise, propose changes in care and participate in clinical research studies.

References

- Andre, A., Kaplan, M.D. (2008). Core curriculum in nephrology. Therapeutic Plasma Exchange: Core Curriculum. American Journal of Kidney Diseases, 52 (6): 1180-1196.
- Apheresis manual: policy and procedure. Therapeutic plasma exchange. (2012). Adult and Pediatric, 1-11. Available at: policy.nshealth.ca/.../document_render.asp. (13/03/14).
- Balta, A. (2009). Kinds of apheresis. Proceedings of the 2nd conference for nurses, technologists, biologists, physicians employed by the patient hematology, pp: 33-40.
- Bielefeldt, S. (2009). The rules of transfusion: best practices for blood product administration. American Nurse Today, 4(2): 27-30.
- Carey, B., Seale, A.G. (2011). Guidelines for therapeutic plasma exchange. Available at: <http://www.beaumont.ie/files/2010/docs/2011>

- 1017035250_Plasma_guideline% 20final.pdf (20/04/14).
- Chapman, C. (2014). The role of the specialist nurse. Available at: www.rbch.nhs.uk/.../role.pdf. (07/07/14).
- Corea, A.L., Smolka-Hill, S., Christensen, L.S., Vogel, S.C. (2003). Monitoring and evaluation of the patient and the machine. In: Agraftiotis, T.C., Syrgkanis, L.D., Ziropiannis, H.N. Dialysis in clinical practice. The role of the healthcare team. 6th edition. Athens, 147-170.
- Nephrology Nurse Profile. (2000) EDTNA-ERCA. Available at: <http://www.edtnaerca.org/pdf/education/NephrologyNurseProfile.pdf>. 27/03/14).
- Gerogianni, S., Panagiotou, M. (2014). The role of health professionals in apheresis. Plasmapheresis. Proceeding of 5th congress of the Greek society of haemapheresis. Available at: <http://www.intexecutive.gr> (30/06/14).
- Gerogianni, S., Panagiotou, M., Grapsa, E. (2010). Plasmapheresis: treatment of choice for many diseases. Proceedings of the 9th Conference for nephrology nurses, 47.
- Gomez, N.J. (2011). Nephrology nursing. Scope of practice. In: Nephrology Nursing. Scope and standards of practice. 7th ed, 1-13. Available at: www.annanurse.org/.../store/P151_v11.pdf. (12/07/14).
- Grapsa, E.I., Digenis, G.E. (1996). The (plasma) pheresis today. *Medicine*, 70(5): 392-400.
- Greek Blood Use Manual. (2010). Optimal use of blood. Available at: <http://www.optimalblooduse.eu/node/25> (05/04/14).
- Hersh – Rifkin, M., Stoner, M.H. (2003). The psychosocial implications of dialysis. In: Agraftiotis, T.C., Syrganis, L.D., Ziropiannis, H.N. Dialysis in clinical practice. The role of the healthcare team. 6th edition. Athens, 339-349.
- Ismail, N., Kiprof, D.D., Hakim, R.M. (2001). Plasmapheresis. In: Handbook of dialysis. Daugirdas JT, Blake PG, Ing TS. 3rd ed, Philadelphia, 276-299.
- Kelly, M. (2007). The role of the haematology nurse in caring for patients with myeloma. *Nursing*, 1 (4): 20-21. Available at: www.slideshare.net/.../the-role-of-the-haem. (14/07/14).
- Kokkinidi, E. (2011). The prevention of infection as an indicator of quality in nephrology nursing. Proceedings of the 22nd renal Workshop entitled 'Implementation of quality criteria in nephrology nursing', 69-87.
- Kontouli, D. (2000). The role of research in the development of nursing practice. Problems and possibilities. Proceedings of the 4th congress for nephrology nurses, 150-156.
- Kostenidou, M. (2001). Education as the key to the success of peritoneal dialysis. In: Thanou, I., Kostenidou, M. Proceedings of the 11th renal workshop entitled: 'Nursing interventions addressing phasing patient in extracorporeal clearance', 101-111.
- Koutra, E. (2005). Plasmapheresis and neurological diseases. *Hospital Chronicles*, 67: (1-4), 20-23.
- Kritikaki, S. (2012). The necessity of implementing curriculum specialization renal nursing. Proceedings of the 23rd renal Workshop entitled 'organization and administration of dialysis units', 65-92.
- Kyrimlidou, A. (2000). Organization and functioning of artificial kidney unit. Proceedings of 4th congress for nephrology nurses, 121-127.
- Loukopoulou, H., Antoniadou, D. (2008). Hemophilia. Fundamentals providing nursing care to patients with haemophilia. *Nursing*, 47 (2): 181-192.
- Michael, S. (1996). Integrating chronic illness into one's life – A phenomenological inquiry. *Journal of Holistic Nursing*, 14 (3): 251-267.
- Moschidis, K.S. (2009). Nursing interventions in the process of blood transfusions and derivatives. Thesis, Available at: <http://eureka.lib.teithe.gr:8080/bitstream/handle/10184/1329/MOSXIDHS2.pdf?sequence=> (05/04/14).
- Nursing care of the client treated with plasmapheresis. (2014). Available at: <http://wps.prenhall.com/wps/media/objects/737/755395/plasmapheresis.pdf>. (16/01/14).
- Passow, J., Pineda, A.A., Burgstaler, E. (1984). Responsibilities of the registered nurse in the apheresis laboratory. *Journal of Clinical Apheresis*, 2 (1): 1-6.
- Panagiotou, M., Gerogianni, S., Grapsa, E. (2009). Therapeutic deductions. Plasmapheresis and leukapheresis. Proceedings of the 2nd conference for nurses, technologists, biologists, physicians employed by the patient hematology, 41-47.
- Ran, K.J., Hyde, C. (1999). Nephrology nursing practice: more than technical expertise. *EDTNA-ERCA J*, 25 (4): 4-7.
- Randolf, G., Peacock, E. (2003). Infection control and general precautions. In: Agraftiotis, T.C., Syrganis, L.D., Ziropiannis, H.N. Dialysis in clinical practice. The role of the healthcare team. 6th edition. Athens, 322-338.

- Reinan, P.M., Mason, P.D. (1990). Plasmapheresis: technique and complications. *Intens Care Med*, 16:3-10.
- Russi, G., Marson, P. (2011). Urgent plasma exchange: how, where and when. *Blood Transfus*, 9: 356-361.
- Shehata, N. (2007). Therapeutic apheresis. In: Stevenson H. *Clinical guide to transfusion. Canadian blood services*, pp: 140-145. Available at: www.transfusionmedicine.ca/sites/transfusionmedicine/.../CBS-CGT-BM. (14/06/14).
- Stoner, M.H. (2003). The dialysis group. In: Agraftotis, T.C., Syrganis, L.D., Ziogiannis, H.N. *Dialysis in clinical practice. The role of the healthcare team*. 6th edition. Athens, 15-25.
- Szczepiorkowski, Z.M., Shaz, B.H, Bandarenko, N., Winters, J. (2007). The new approach to assignment of ASFA. Categories – introduction to the fourth special issue: Clinical applications of therapeutic apheresis. *Journal of Clinical Apheresis*, 22 (3): 96-105.
- Toombs, S.K. (1992). The meaning of illness: a phenomenological account of the different perspectives of physician and patient. In: Engelhardt, H.T., Spicker, S., eds. *Philosophy and Medicine*. The Netherlands: Kluwer: 1-161.
- Velimvasaki, P., Galanaki, E., Tachmatzidou, K. (2008). Central venous catheters, infections and preventive measures. Thesis, Available at: <http://nefeli.lib.teicrete.gr/browse2/seyp/nos/2008/>. (16/01/2014).