Article

The Treatment of Depression using Oncology Nurses

Ms. Sagarika Goswami
Assistant Professor, School of Management and Commerce, Sanskriti University, Mathura, Uttar Pradesh, India, Email Id- sagrikag.somc@sanskriti.edu.in
Orchid Id- 0000-0002-6547-9126

Satish Swankar
Assistant Professor
Department of Management Studies, Vivekananda Global University, Jaipur
Email Id- satish.k@vgu.ac.in
Orchid Id- 0000-0003-4326-9854

Vipin Jain
Professor
Teerthanker Mahaveer Institute of Management and Technology, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India
Email Id- vipin555@rediffmail.com, Orchid Id- 0000-0001-5519-5704

Dr Kunal Rawal
Assistant Professor
SGT University, Gurugram, Haryana, India, Email Id- kunal.fcm@sgtuniversity.org
Orchid Id- 0000-0002-9798-1823

Received: 16/01/2025, Accepted: 17/03/2025, Published: 08/05/2025
doi: 10.56334/sei/8.3.66

Abstract

Depression is an issue that affects all medically unwell people. The frequency of serious depression in cancer patients has been reported to be as high as 50%. Patients with concurrent major depressive illness who seek treatment in general practice or medical centers are more likely than not to get proper treatment. Therefore, more efficient ways for identifying and treating cancer patients as well as those suffering from depression are urgently required. The paper highlights study that examines if oncology nurses could be educated to have a more active part in the treatment of patients who are suffering from major depression. A properly trained oncology nurse can give an intervention that researchers created and piloted. It necessitates a broadening of the scope of specialized nurses' duties and skills. The difficulties that nurses face in this capacity are explored. Researchers believe they need a diversified work schedule that isn't only focused on

Citation. Ms. Sagarika G., Satish S., Vipin J., Dr Kunal R. (2025). The Treatment of Depression using Oncology Nurses. *Science, Education and Innovations in the Context of Modern Problems*, 8(3), 1079-1091. doi: 10.56352/sei/8.3.66. https://imcra-az.org/archive/358-science-education-and-innovations-in-the-context-of-modern-problems-issue-3-volviii-2025.html

depression management that they need enough peer support, and so they are usually effective when they collaborate with other members of a heterogeneous psycho-oncology department.

Keywords: Cancer Patients, Depression, Oncology Nurses, Primary Care, Therapy.

1. INTRODUCTION

When it comes to medically unwell people, depression is a widespread concern. Comorbid depression is a term used to describe depression that develops in a person who is simultaneously suffering from another medical disease, such as cancer. The so-called major depressive disorder (MDD) is a severe form of depression that psychiatrists consider to be clinically important. Increased somatic symptoms, higher impairment, worse quality of life, and poorer medical results have all been linked to it, according to recent research. The rise in the burden imposed on patients' cares, as well as the growth in the usage of hospital facilities, are also associated with this phenomenon. For their part, many patients having comorbid major melancholy illness who take medication in primary care or clinical outpatient clinics may not get adequate treatment. Two most common reasons for this, as per researchers, were just as follows: first, depression is commonly underdiagnosed; and second, yet when depression is suspected, the level of service provided is commonly inadequate because only a small proportion of patients are taking medication at therapeutic doses as well as referred for any scientific proof psychotherapy. The intervention presented in this research is focused specifically on addressing these concerns [1].

Major depression has been recorded in patients with cancer at rates ranging from 10 percent to 50 percent, with the exact proportion varying depending on the patient sample analyzed. Study after study has shown that the highest rates of incidence have been seen among in-patients who are suffering from more serious conditions and are near the end of their illness. Everyone who has cancer and simultaneously suffers from substantial depression should, in a perfect world, have quick access to specialist mental health therapy. It is true that in the Great Britain, the provision of counseling psychology including liaison psychiatric treatments to oncology departments remains insufficient in order to meet the expectations of the profession. Aside from that, recommendations to basic mental health care that are not integrated within the oncology program may be perceived as "stigmatizing" and hence refused by several cancer patients taking treatment. It is necessary to develop effective routine screening tools for the mental health diagnosis, and to train present oncology nurses mostly in requisite skills such that they would play an active part in the administration of depression treatment. This may be of assistance in addressing the scarcity of expertise in this field. It is also possible that a system of integrated delivery of services may assist to minimize the risk associated with referring patients to psychological health therapy, which may be harmful in certain cases [2]. Figure 1 shows Oncology Nurse & Patient Navigators (AONN+) overarching domains of care.

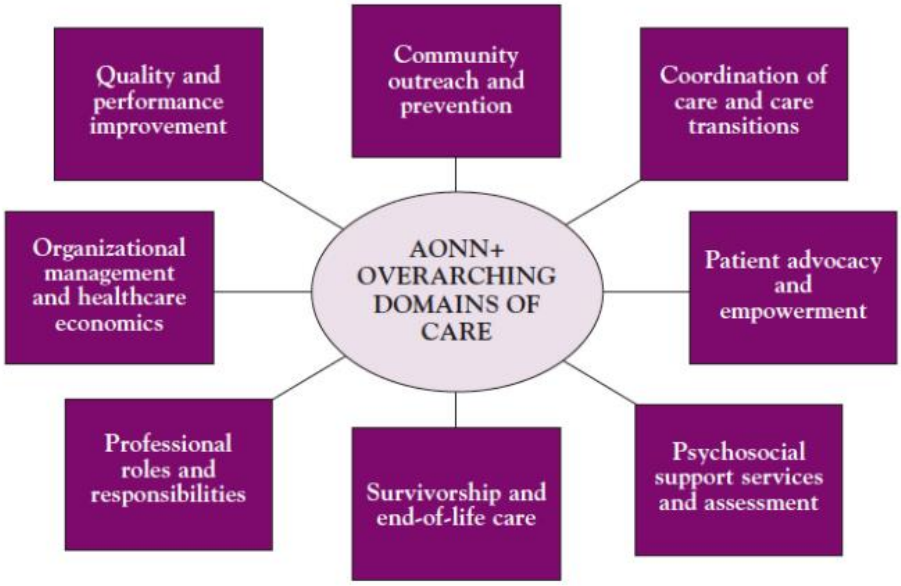

Figure 1: Illustrates Oncology Nurse & Patient Navigators (AONN+) overarching domains of care. According to the AONN+, oncology nurses must show competence in numerous broad areas of care to offer high-quality patient-centered care [JONS].

Few previous research has examined the difficulties that arise due to non-psychiatric nurses being actively involved in the care of mental trauma in cancer patients after completing their training. This is a significant gap in the literature. It was discovered by researchers in important early studies that the use of expert nurses to monitor patients' development was associated with considerable advantages. In spite of the fact that professional nurse counselling tried to prevent psychological illness in these trials, a larger percentage of patients were classified as being in mental trauma and were therefore assigned to a psychotherapist for further evaluation and treatment. Nurses, on the other hand, did not play a significant role in the delivery of depression therapy in these trials. Other writers have explored the function of liaison psychiatric nurses in the treatment of cancer patients who are experiencing distress. Although the authors are unaware of any documented evaluations examining the participation of certified oncology nurses with in administration of depression medications, they believe that such reviews should be conducted [3].

Because of this, researchers attempted to examine the practicality of a specially trained cancer nurse assuming the primary role in the management of major depression amongst outpatients who were attending a cancer center. As a result of her experiences, which were recorded in her "experience journal" and supervisory records, this study focuses on the nurse who gave the intervention, and it addresses the concerns that developed for nursing practice and the health care system as a whole. Nurses are required to examine a patient's physiological and mental state, prior health history, health habits, and both patient's as well as the family's understanding of the condition and its treatment. When discussing the treatment plan with the oncologist, making sure

that the oncologist is informed of expected outcomes and issues, and checking the patient's general physical and mental well-being on their own, the oncology nurse plays an important role. It is vital to get a complete nursing history, which should include a physical examination. All pertinent laboratory, pathology, as well as imaging tests should be known to an oncology nurse, as well as their general implications. To alleviate anxiety and formulate a care plan, it is essential to assess the patient's comprehension of the condition and suggested therapy. Obtaining this data will assist in avoiding miscommunication and ambiguous expectations. Patient preparedness promotes adherence to treatment regimens and may influence treatment results. About specific requirements discovered during the evaluation, a skilled nursing plan is created. This plan encourages:

- The patient's comprehension of therapeutic objectives, treatment schedules, and potential adverse effects of therapy;
- Physically and psychologically preparedness for therapy;
- Physically and psychologically comfort; and
- Adherence.

1.1 Nurse-Delivered Intervention:

According to the study, the feasibility and prospective efficacy of a nurse-delivered treatment for clinical depression among cancer patients were studied. The results were promising. A complete ethical approval for the experiment was obtained, and patients gave written agreement to take part in the study. The findings of the research have been published elsewhere. Educating patients and encouraging them to fully participate in their own treatment were the objectives of this protocol-based intervention, that attempted to encourage patients to actively involved in their own treatment for depression. They were instructed to consider depression to be a real medical illness within itself, deserving of treatment irrespective of whether it's a direct effect of the cancerous tumor in question [4]. A variety of therapeutic tactics were used by the nurse, including:

- Information related to depression;
- Reinforcement to get involve in active problem-solving method to their circumstance;
- Requests to weigh the merits and drawbacks of taking treatment with antidepressant medication;
- Patients' treatment is coordinated by discussing along with General Practitioners (GPs) as well as other oncology specialists regarding their depression and how to cope up with it.

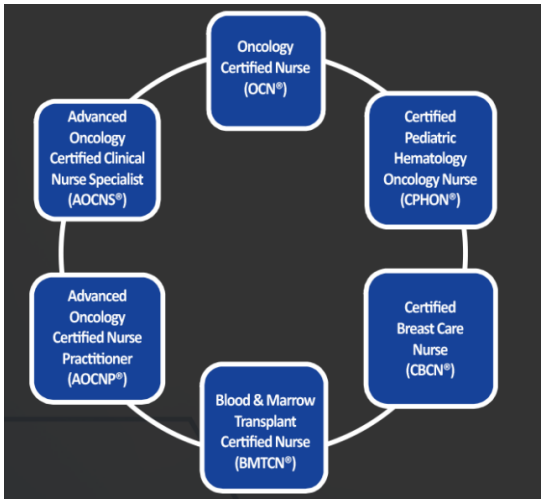

Figure 2: Explores the practices involved in oncology. It is the responsibility of oncology nurses to be well-versed in all elements of the oncology profession as well as to use their knowledge in daily practice [ONCOLOGYNURSE].

Individual sessions (of roughly 40 minutes long) with patients were held up to ten times throughout three months. During her treatment, she had regular supervision as from specialist liaison mental health professional, who was also available for consultation throughout all moments of every day and night. Similarly, to other specialty nurses, the nurse was individually liable for her practice, and the supervising psychiatrist was ultimately responsible for the patients he/she was responsible for [5]. Figure 2 explores the practices involved in oncology.

1.2 Selection of Nurse:

The purpose of this research is to investigate whether or not that is possible to educate an oncology nursing who has never had psychological support to provide an intervention while maintaining an adequate level of quality of care for patients. In order to accomplish this, a nurse having extensive experience in cancer care as well as a strong interest in psychiatric illnesses was sought. It was noted that not every oncology nurses would really want to or be capable of engaging in this activity, and this was addressed as well. The expertise of the psychological issues which cancer patients face, the ability to interact with cancer patients regarding these concerns, as well as the identification of the need for patients part of individual to play an active role in handling these issues were all clear and specific selection criteria for this position. However, despite the fact that a person nominated (VS) having extensive experience in medical oncology nursing, she had received no additional specialist mental health instruction beyond what was offered as part of the standard United Kingdom nurse education program [6].

1.3 Nurse Education and Training:

Based on the nurse education and training protocol, it was determined that more training was required. Three fundamental abilities were identified:

- Effective communication skills and the ability to identify and address patients' issues:

Attendance in the course taught by Professor Peter Maguire at the Christie Hospital in Manchester, United Kingdom, gave training in these competencies. This course on communication skills in cancer care has been around for a long time and has been professionally recognized. In order to teach these qualities to nurses and doctors who work inside the cancer sector, this course was developed. Over three months, the supervising psychiatrist (MS) conducted weekly audio and video evaluation of competence, providing relevant comments to the participants.

- Determination and treatment of depressive disorders involving the use of anti-depressant medications and the control of the risk of self-harm:

To do this, the overseeing psychiatrist delivered and assessed this element of the program on a one-to-one situation with each trainee, using printed documents, role-playing, and monitored assessment of patients. Physicians in the primary care setting prescribed antidepressants to the patients. Neither the nurse nor anyone else was under any obligation to prescribe or take responsibility for assessing excessive suicidality in the instance of a patient. To effectively explain antidepressant medicine to patients, however, she would need an in-depth grasp of the drug itself. Also taught were the principles of assessing suicidality but once it was necessary to seek support and direction from the monitoring psychiatrist, among other things [7].

- Cognitive-behavioral treatment (CBT):

It began with a 2-day intense training led by an experienced instructor in problem-solving psychotherapy who doubled as a nursing advisor. This was then put into practice under the supervision and comments of the supervising psychiatrist and psychologist, before being evaluated.

1.4 Identifying Fundamental Abilities:

A total of 18 patients having a variety of cancer treatments and illnesses were treated by the nurse over the course of four months. These patients also met the criteria for substantial depression. The treatment was administered following the draught protocol and under observation. Trainers used a sample of six different audio and video tapes of treatment sessions taken at random throughout the practice period to assess their formal competence after completing the formal competency assessment process. After the training outlined, the nurse demonstrated a basic level of competency in implementing the intervention.

1.5 Modifications to the Involvement Programme:

The intervention approach was then modified in order to address two concerns that were identified throughout the training process: a lack of social connection and the possibility of dying before one's time. It was a big source of worry for the initial batch of cancer patients who were treated because they didn't have the necessary social support from their families and friends. Since the therapy was intended to be brief and of limited duration, it was critical to address patients' needs for ongoing care as early as possible in the treatment to prevent the nurse acquiring the

patient's major source of support. In order to ensure that by meeting 3, support had already been taken into consideration inside the problem-solving paradigm and that remedies had been generated by individuals, patient-produced alternatives were employed. Throughout the course of the therapy, these remedies were implemented in stages to ensure that patients created social connections that they might draw on after the course of the treatment was through [8].

The second significant problem that emerged as potentially difficult was patients' unwillingness to accept the implications of having a limited life span as a result of their mortality, which was discussed in detail in the previous section. In light of the alterations made to their involvement, they were inspired to be realistic about the amount of impact they could reasonably expect to have something on current problem after their deaths choosing remedies that were viable in light of their prognosis when making decisions about their final arrangements. Following the modification, a later trial treated a group of 30 people with cancer who also had considerable depression at the time of the modification [9]. Figure 3 shows the challenges, solutions, and future strategies of the Oncology nursing workforce.

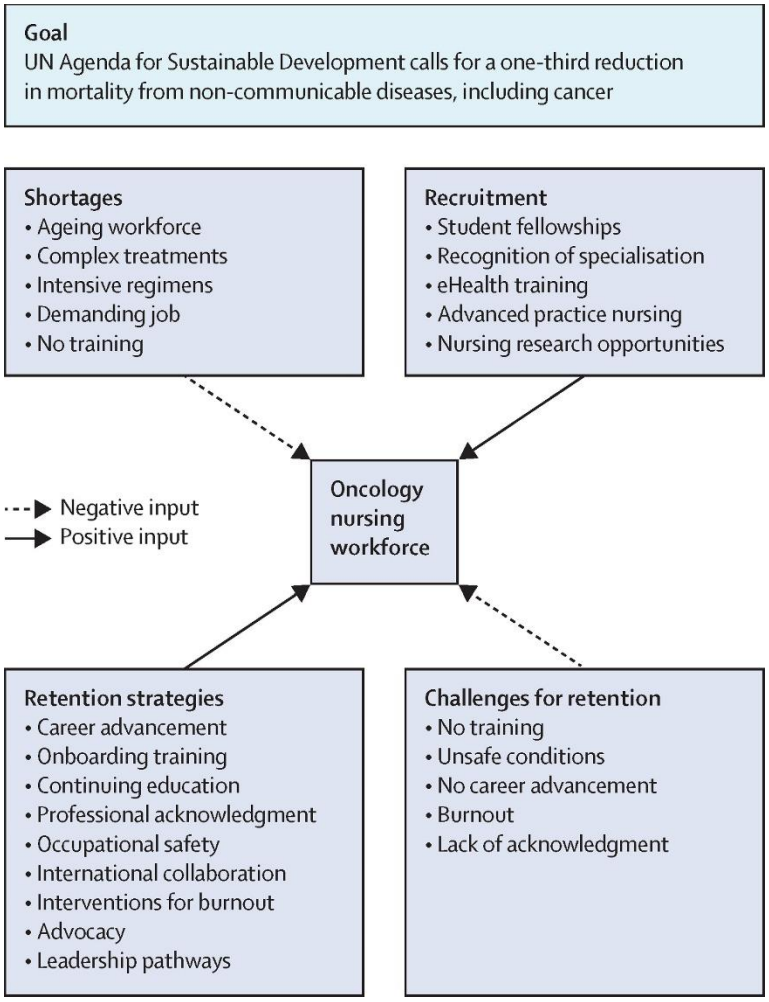

Figure 3: Illustrates the challenges, solutions, and future strategies of the Oncology nursing workforce. Developing a worldwide oncology nurse workforce is critical to fulfilling the United Nations Sustainable Development Goals [LANCET].

1.6 Concerns Arising:

1.6.1 Difficulties in Providing the Intervention:

The most significant difficulties that the nurse found might be divided into three categories: Managing patient rejection including poor compliance to treatment; preventing and reducing suicide risk; and achieving good coordination between descriptive and inferential care are all issues that need to be addressed.

1.6.2 Failure to Comply with And Inadequate Adherence to Therapy:

The refusal rate among individuals who were tested and given treatment was 53 percent (34 out of 64). This high rejection percentage was most likely caused in part by a change in the recruitment approach, which had been altered for the purpose of efficiency in the first place. In contrast to being recommended by their attending physician or another healthcare practitioner,

patients were discovered via screening. An investigator then called them and inquired whether they would be interested in taking part in the research. On the other hand, a face-to-face technique accompanied by a recommendation from their oncologist, would almost certainly have been more successful in gaining approval for the treatment plan [10]. The absence of participation in treatment sessions and/or the failure to participate actively in the problem-solving component are both considered as poor adherence in this context. Once patients had decided to participate, they were largely compliant with the intervention's requirements. There were three people, though, who did not stick to the rules. Unfavorable views expressed to the patient from their family physician or even a person on the diagnosis of major depression, the effectiveness of medication, or the job of a caregiver in the delivering of treatments seems to have been associated with this.

1.6.3 The Relationship Between Personal Responsibility and The Risk of Suicide:

There are extra considerations when assessing suicide risk in advanced cancer since many people with terminal illnesses worry a great lot about death, even if they are not depressed. Some people see suicide as a means of gaining control over the latter phases of their lives. As a result, when depression and cancer are present, it may be difficult to determine if someone has suicidal thoughts. One-quarter of the individuals in the study were taking antidepressants, and four of them had expressed thoughts that indicated a considerable risk of suicide. People who disagree with this viewpoint believe that such individuals might have benefited from being sent to more qualified and experienced mental health specialists. The incidents were adequately managed within the constraints of the methodology, although at the price of additional monitoring time and more contact with other institutions. The procedure was successfully implemented. The creation of practice guidelines, supervised retraining in the care and prognosis of suicide ideation, simple access to professional assistance, and the accessibility of a psychologist for combination consultations would all be helpful in addressing this problem. The results of the research also stress the importance of working as a member of a psycho-oncology collaboration rather than working alone in this field [11].

1.6.4 Complicated Coordination of Intervention with Primary Care Services:

Patients have reported that they're being advised against taking psychiatric medication by their general practitioner, despite the fact that continuum of care is a critical therapeutic objective and that major efforts were made to communicate clearly with primary care workers. Some patients voiced apprehension about receiving antidepressant around the same period as undergoing cancer treatment, a worry that was frequently reaffirmed by their general practitioner. Eight of the thirty patients treated reported having differences of opinion regarding how to manage their depression. Several problems arose, including disagreement with the diagnosis of MDD, refusal to accept nursing advice, and giving patients advice that was in contrast with that offered by the nurse. This may have been due to the fact that perhaps the program was always in its infancy

and also that the nursing hasn't had sufficient time to establish reputation with the GPs involved. As a persistent and essential component of diseases' cancer therapy, this service would have been made available, it may have resulted in enhanced coordination and patient acceptability [12].

2. DISCUSSION

According to the experience of a nurse who participated in the related study, there are several difficulties that nurses who take on this expanded responsibility should be aware of. In certain cases, taking on a viewpoint that differed from that of physician's other oncology nursing coworkers may leave the nurse experiencing alone and unsupported, especially if the nurse is new to the field. Because of the burden of having to listen to the misery of sad cancer patient's day in and day out, this emotion was heightened. As a result, the nurse experienced emotional exhaustion and, in some circumstances, stressful situations. Because the therapy program had a limited length, when the 'glimmer of hope of the cave' finally showed, there was a sigh of relief on everyone's faces. Normal service delivery, nevertheless, would not take place in this manner, and as a consequence, the nurse may develop a state of "burnout." Indeed, as per literature, a nurse who finds herself in this circumstance is at risk of losing her job. The researchers discovered that dealing with difficult patients face-to-face, and also taking personal accountability with their well and security, were major risk factor for 'burnout' in caregivers [13].

Because of this, it is essential to restrict the personal demands imposed on nurses who execute these therapies and to offer enough support for their integration into daily clinical practice in this area. On the basis of their expertise as clinical nurses who assisted in a study on dyspnea, researchers discuss the impact on nurses of working with patients suffering substantial degrees of pain. During the experiment, a group of at least 3 medical professionals was created to assist these nurses. Furthermore, we feel that single nurse roles of this sort are not viable in the long term. ' As an option, a part-time role for the nurse might be considered. Additionally, the nurse might be incorporated into an oncology service with a multidisciplinary approach to provide rapid access to counselling and regular monitoring [14].

For this research, on a weekly basis, the nursing student would meet with a supervising psychiatrists to discuss her clinical experiences and how they were affecting her as a nurse. Direct monitoring was provided in situations when patients were deemed to be at high risk of suicide, according to the assessment. The operation was carried out by the psychiatrist and the nurse during one of the subsequent treatment sessions. At any given time of day or night, psychiatrist were available by phone to provide advice. To provide the nurse, the assurance she needed to handle suicidality and communicate effectively with other professionals, this degree of surveillance was crucial [15].

As previously stated, a tiny proportion of general practitioners (GPs) were unwilling to accept treatment advice from a nurse about assessment or prescription. As frequently as she tried, the

nurse was frustrated by her inability to effectively communicate her concerns about a patient who had been identified as being at risk of committing suicide by the person's own hand. A number of factors might be at play here, including the fact that nurses are generally less powerful than doctors, the inexperience of local physicians with this particular position for nurses, or the contrasts in management culture between hospital and public care services. According to the research, researchers believe that this issue will be remedied to some extent if patients and GPs have a positive perception of service quality and the function that nurses play within it [16,17-21].

Clinical nurse specialists in oncology often express a sense of being underprepared to deal with patients' anguish and sadness, according to research. All parties involved may benefit greatly from providing adequate training and time to relieve the symptoms in their patients in order to decrease employee unhappiness and enhance patient care. In addition, nurses' work satisfaction may rise as a result of this patient-centered approach to treatment. In order to achieve the goal of providing holistic care for people with cancer, nursing staff must take a more active role with in depression treatment, even though it poses a substantial difficulty for nurses.

The nursing profession has experienced huge growth in the number of extended responsibilities during the last several years. It is expected that this trend will continue as nursing progresses toward recognition as a distinct profession. As a result, additional nurse specializations have emerged in a variety of areas of practice, which is a positive trend. For this research, researchers investigated whether specialized nurses' skills should be expanded to encompass 'hands-on' care of serious depression. This intervention is feasible and cost-effective for nurses. Nurse-delivered depression treatment requires an average of one hour of medical consultation time and ten hours of care time each patient, as established in this research. This intervention, according to the findings of our pilot research, may have the potential to provide advantages to patients above and above the standard level of care provided by the National Health Survey (NHS) in the United Kingdom, and the acceptance of the intervention was high after the patient became actively involved in the therapy. Randomized research to determine its formal efficacy is now being conducted.

3. CONCLUSION

The first issue found during the study was whether or not it was possible to educate cancer nurses in the treatment of depression. Oncology nurses may be trained in the treatment of substantial sadness in cancer patients, but it is not yet known whether this nurse-delivered treatment is useful for individuals who get it. A randomized study is required to answer this question. The researchers reach the following conclusion: it is possible to educate oncology nurses in the treatment of severe depression, and that by doing so, help cancer patients integrate the emotional and physical aspects of their therapy more effectively. The answer to the issue of

whether or not scholars should do so will be determined by more proof of efficacy from randomized assessments.

Researchers conclude that this expanded job for an oncology nurse is necessary, but it is also time-consuming and physically taxing. Not all nurses will be interested in this kind of employment. Individuals who are really interested in dealing with oncology patients, on the other hand, may find it too draining to devote their time and energy to this activity on a full-time situation. There are a variety of additional benefits to being a good nurse which were not restricted to the care of cancer patients. Adaptations of this method may be conducted in the future to manage comorbid depression in persons who also have additional chronic medical diseases, including such cardiovascular events. As a result, it has the ability to improve a wide range of specialized healthcare systems in the future.

REFERENCES

[1] R. A. Jarrad and S. Hammad, “Oncology nurses’ compassion fatigue, burn out and compassion satisfaction,” Ann. Gen. Psychiatry, 2020, doi: 10.1186/s12991-020-00272-9.

[2] V. L. Reiser and J. F. Z. Gonzalez, “Confronting compassion fatigue in oncology nurses,” Nursing (Lond)., 2020, doi: 10.1097/01.NURSE.0000659332.20270.6c.

[3] E. Ortega-Campos et al., “Compassion fatigue, compassion satisfaction, and burnout in oncology nurses: A systematic review and meta-analysis,” Sustain., 2020, doi: 10.3390/SU12010072.

[4] A. M. Al zoubi, A. R. Saifan, I. Alrimawi, and M. A. Aljabery, “Challenges facing oncology nurses in Jordan: A qualitative study,” Int. J. Health Plann. Manage., 2020, doi: 10.1002/hpm.2901.

[5] D. Wentzel, A. Collins, and P. Brysiewicz, “Describing compassion fatigue from the perspective of oncology nurses in durban, south africa,” Heal. SA Gesondheid, 2019, doi: 10.4102/hsag.v24i0.1279.

[6] C. S. Phillips and D. L. Volker, “Riding the Roller Coaster: A Qualitative Study of Oncology Nurses’ Emotional Experience in Caring for Patients and Their Families,” Cancer Nurs., 2020, doi: 10.1097/NCC.0000000000000734.

[7] M. Nwanya and D. Rowberry, “The importance of understanding burnout: An oncology nurse perspective,” Br. J. Nurs., 2021, doi: 10.12968/bjon.2021.30.10.s8.

[8] L. A. Sharour, “Oncology nurses’ knowledge about exploring chemotherapy related - Extravasation care: A cross-sectional study,” Clin. Epidemiol. Glob. Heal., 2020, doi: 10.1016/j.cegh.2020.01.019.

[9] W. Xie et al., “The levels, prevalence and related factors of compassion fatigue among oncology nurses: a systematic review and meta-analysis,” Journal of Clinical Nursing. 2021, doi: 10.1111/jocn.15565.

[10] R. Piotrkowska, P. Jarzynkowski, J. Książek, and W. Mędrzycka-Dąbrowska,

"Satisfaction with life of oncology nurses in Poland," Int. Nurs. Rev., 2019, doi: 10.1111/inr.12521.

[11] Q. Guo and R. Zheng, "Assessing oncology nurses' attitudes towards death and the prevalence of burnout: A cross-sectional study," Eur. J. Oncol. Nurs., 2019, doi: 10.1016/j.ejon.2019.08.002.

[12] D. Y. Wazqar, "Oncology nurses' perceptions of work stress and its sources in a university-teaching hospital: A qualitative study," Nurs. Open, 2019, doi: 10.1002/nop2.192.

[13] E. Arimon-Pagès, J. Torres-Puig-Gros, P. Fernández-Ortega, and J. Canela-Soler, "Emotional impact and compassion fatigue in oncology nurses: Results of a multicentre study," Eur. J. Oncol. Nurs., 2019, doi: 10.1016/j.ejon.2019.09.007.

[14] R. N. Nukpezah, F. Khoshnavay Fomani, M. Hasanpour, and A. N. Nasrabadi, "A qualitative study of Ghanaian pediatric oncology nurses' care practice challenges," BMC Nurs., 2021, doi: 10.1186/s12912-021-00538-x.

[15] S. Moosavi, C. Rohani, F. Borhani, and M. E. Akbari, "Factors affecting spiritual care practices of oncology nurses: a qualitative study," Support. Care Cancer, 2019, doi: 10.1007/s00520-018-4378-8.

[16] E. Baysal, D. Sari, and H. Erdem, "Ethical decision-making levels of oncology nurses," Nurs. Ethics, 2019, doi: 10.1177/0969733018803662.

[17] Poongodi, M., Nguyen, T. N., Hamdi, M., & Cengiz, K. (2021). A Measurement Approach Using Smart-IoT Based Architecture for Detecting the COVID-19. Neural Processing Letters, 1-15.

[18] Poongodi, M., Malviya, M., Hamdi, M., Vijayakumar, V., Mohammed, M. A., Rauf, H. T., & Al-Dhlan, K. A. (2021). 5G based Blockchain network for authentic and ethical keyword search engine. IET Commun, 1-7.

[19] Poongodi, M., Malviya, M., Kumar, C., Hamdi, M., Vijayakumar, V., Nebhen, J., & Alyamani, H. (2021). New York City taxi trip duration prediction using MLP and XGBoost. International Journal of System Assurance Engineering and Management, 1-12.

[20] Rawal, B. S., Manogaran, G., Singh, R., Poongodi, M., & Hamdi, M. (2021, June). Network Augmentation by Dynamically Splitting the Switching Function in SDN. In 2021 IEEE International Conference on Communications Workshops (ICC Workshops) (pp. 1-6). IEEE.

[21] Poongodi, M., Malviya, M., Hamdi, M., Rauf, H. T., Kadry, S., & Thinnukool, O. (2021). The Recent Technologies to Curb the Second-Wave of COVID-19 Pandemic. Ieee Access, 9, 97906-97928.