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Lymphoedema management during the COVID-19 pandemic

Abstract

Medical care for patients with oedema in the Polish health care system is fragmented and rarely ensures continuity of therapy. During the COVID-19 pandemic, the availability of traditional forms is even more difficult, which forces the search for alternative, remote forms enabling early diagnosis and implementation of proper management. Thus article presents a model of management in patients at risk of developing edema and with advanced disease in the pandemic days in the light of the current recommendations. In the lymphedema clinic, a method of questionnaire preliminary qualification of patients reported by phone or e-mail which facilitates distinguishing urgent cases (swelling that is advanced, rapidly increasing, especially despite compression therapy, complicated by skin damage, occurring in children < 12 years old or associated with advanced cancer) was introduced.

Between June 2020 and March 2021, 160 patients usually needing the adjustment of another compression garment continued the therapy, and 94 persons required complex decongestive therapy and then prescribing of compression product to be worn during a day were admitted for the first time. A narrative review of the literature between 2011–2021 including prophylactic recommendations and conservative management of edema in terms of its realistic applicability under the existing restrictions, was carried out. Despite the limitations in the implementation of physiotherapy, the availability of therapy based on education and compression therapy in connection with individually selected, aerobic exercise was maintained in the clinic.

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Key words: lymphedema, edema, lymphatic therapy, COVID-19

Introduction

Lymphoedema is defined as a consequence of lymphatic system failure, leading to a distortion in the balance between the amount of produced tissue fluid and the ability of the lymphatic vessels to efficiently drain it. At the beginning, the pathology is limited to the lymphatic system. With time, however, as a con-

sequence of inflammatory processes and secondary tissue remodelling, it begins to involve the adjacent tissues and organs [1]. Regardless of the above pathomechanism, in each case of chronic oedema of different aetiology (venous, cardiac, renal, hepatic, inflammatory) we observe functional overload of the lymphatic system. In patients with advanced diseases, oedemas most often stem from several coexisting

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causes, including debilitation and immobilization, failure of several organs and the administered medications [2].

As Canadian data show, patients with lymphoedema constitute approx. 2.8% of the general population [3], and are a significant burden and challenge for the health care system. In advanced oedema, regardless of its cause, there is a need for early implementation of physiotherapeutic treatment, based mainly on compression therapy, provided that there are no contraindications specific for a given clinical condition. The incurable nature of the disease usually necessitates constant supervision of the conducted prevention and therapeutic management, which should be continued long-term, in most cases for the rest of the patient's life. Unfortunately, medical care for patients with oedema in Poland is dispersed and continuity of treatment, which is necessary in the case of chronic and incurable diseases, is rarely ensured [4]. The availability of traditional forms of consultations and physiotherapy as well as hospitalization is limited in the era of the COVID-19 pandemic, which forces patients to seek remote forms enabling early diagnosis, proper classification and individual therapeutic management [5]. This article presents the clinic's own model of managing patients at risk of and with advanced disease under the epidemic-related restrictions.

Patients and methods

Before the pandemic, the lymphoedema clinic was treating approx. 1,000 patients and providing around 4,000 consultation and therapeutic sessions annually. In recent years, the activity of the clinic has been financed entirely from the clinic's own funds, and the services provided to its patients, even though not financed by the National Health Fund, have been and still are free of charge. Women with a history of oncological procedures constitute the majority of the clinic's patients (two-thirds of the total number of patients); other patients were diagnosed with oedema of venous, post-traumatic, postinflammatory aetiology and congenital oedema (3%). Patients with oedema of mixed aetiology associated with advanced cancer constituted a specific group of patients. The staff of the clinic was composed of 3 physiotherapists rendering free physical therapy services for 7.5 hours a day, 5 days a week, with access to lymphological medical consultations. Significant limitations in the provision of health services resulted in a reduction in the clinic's operation. During this period, within the framework of the received grant ("Provision of physiotherapy services by the Lymphoedema Management Clinic at the time of limited direct operation"),

the clinic developed policies that enabled it to work under the imposed restrictions. Personal registration was abandoned in favour of registration via telephone or email. A survey that enabled pre-qualification of patients who contacted the clinic via telephone was also developed. For patients, who contacted the clinic for the first time, the survey included:

- the location and duration of the swelling;
- its advancement and concomitant symptoms;
- history of and ongoing physiotherapeutic treatment;
- comorbidities and ongoing pharmacological treatment;
- potential causes for the occurrence and deterioration of the oedema;
- previously performed diagnostic examinations;
- performance status according to the Palliative Performance Scale [6];
- the possibility of receiving treatment on an outpatient basis;
- willingness to implement bandaging and cover the cost of compression materials;
- the possibility of educating the carer about compression therapy.

In the case of persons continuing their treatment, the checklist included the following:

- current physiotherapeutic management of the oedema;
- assessment of adherence to recommendations;
- an attempt to determine the factor that triggered the development of the oedema, or the intensity of disease symptoms (inflammations, traumas, wear of the compression product).

Based on their history, patients were divided into two groups: the first one - urgent cases - included patients:

- with advanced, progressive cancer;
- with large oedemas deforming the limb;
- with oedemas rapidly growing over the period of recent weeks;
- with oedemas complicated by the presence of lymphorrhoea;
- under the age of 12 in whom compression therapy has not been applied before;
- receiving anticancer treatment worsening lymphatic drainage, for example after lymphadenectomy and before radiotherapy;
- with sudden deterioration of the oedema despite compression therapy;
- reporting wear of their compression product.

Other patients, who were admitted later, constituted stable cases. The authors conducted an analysis of the prevention and therapeutic methods applied in the group of patients at an increased risk of oedema and pa-

tients with advanced oedema, unrelated and related to advanced cancer. They also conducted a narrative review of literature from Google Scholar and PubMed, from the period between 2011–2021, covering recommendations regarding prevention and conservative management of oedema, in view of the actual possibility of applying the recommendations during the restrictions. The following classification of recommendations and scientific data was adopted (Table 1).

Elements of descriptive statistics and the Shapiro-Wilk test have been used for the assessment of data distribution. The diagnostic value of the telephone interview was assessed using the McNemary test,

Table 1. Classification of recommendations and scientific data

Strength of recommendation:	
I	Recommended management (data/opinions indicate that it is beneficial, useful, and effective)
IIa	Should be considered (data/evidence support usefulness/effectiveness of treatment)
IIb	Can be considered (usefulness/effectiveness is not as well confirmed by data/opinions)
III	Not recommended (data/opinions indicate that the procedure is not useful or effective, and in some cases may be harmful)
Data reliability level:	
A	Data have been obtained from numerous randomized trials or meta-analyses
B	Data have been obtained from a single randomized trial or large non-randomized trials
C	Agreed expert opinion or data from small studies, retrospective studies or registries

and the waiting time for admission in the groups of urgent and stable cases was compared using the Mann-Whitney test. The value of $p < 0.05$ was considered to be statistically significant. Due to non-experimental, observational nature of the study, the approval of the Bioethics Committee was not required.

Results

Out of 446 patients that contacted the clinic in the period from June 2020 to March 2021, 160 individuals were patients who had been admitted before and required intensification of the applied chronic compression therapy. Ninety-four out of 286 patients who came to the clinic for the first time were included in the analysis (Fig. 1).

The mean age of the patients was 62.4 years (standard deviation 15.7), and there were 77 women in the study group (81.9%) in whom the onset of oedema occurred on average 18 months before (quartile range 36 months). The location, causes and severity of oedema according to the International Society of Lymphology (ISL) are presented in Table 2 [1].

The calculated sensitivity with which the survey enabled appropriate assigning of the patients to the category of urgent cases was 39.4%, specificity 62.3%. The reliability of testing by telephone interview was 54.3%. There were no significant differences between the groups pre-qualified via telephone and finally assessed on admission ($p = 0.76$; likelihood ratio 0.870 (95% confidence interval 0.453–1.656)). The median waiting time for the qualified urgent patients was 3 months (quartile range 2), and for the stable patients it was 4 months (quartile range 2), $p = 0.004$.

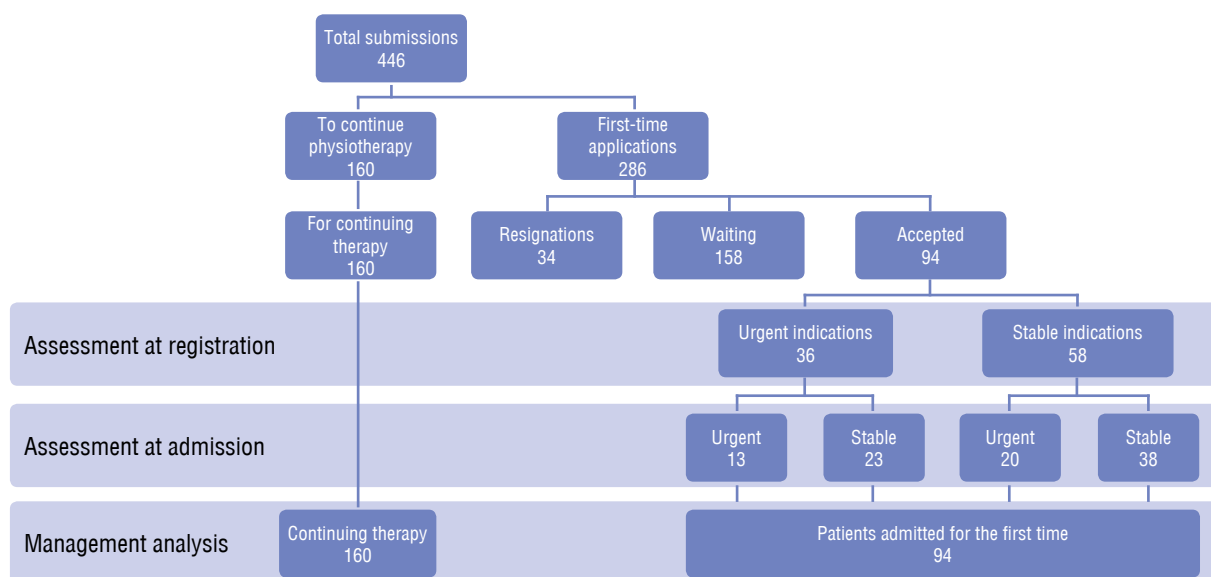


Figure 1. Number of patients reported and treated

The implemented management comprised education, preventive measures and treatment. Education on oedema prevention included principles of skin care, avoiding traumas, performing simplified lymphatic drainage, exercise and maintaining a healthy body weight. Simplified lymphatic drainage, demonstrated and subsequently performed by patients on their own, consisted in a gentle massage of the parts of the torso not afflicted by oedema (neck, chest and abdomen), followed by a massage of the limb at risk or afflicted by oedema. All patients well instructed to include 15 to 30 minutes of moderate-intensity aerobic training in their daily routine. In the case of stage 0–1 oedema according to ISL, compression therapy was initiated by fitting a ready-made (in standard sizes) or tailor-made compression product.

Patients were instructed to wear it during the day. In the case of a more severe oedema, compression therapy began with bandaging, replaced with compression products, usually tailor-made, after obtaining improvement (resolution of oedema plasticity). For multi-layer bandaging applied 24/7, the specialists used cotton gloves (Peha crepp, Hartmann) for the fingers, as well as a cotton sleeve, compressed cotton wool and sponge, as well as 2–3 layers of short-pull bandages (Rosidal k, Lohmann) per limb. In the case of more severe oedemas, patients usually required additional, single outpatient consultations aimed at correcting or reminding them of the principles of proper management. Patients with more severe oedemas usually required more precise limb measurements, immediately after earlier bandaging, in order to select flat-knit tailor-made products in a higher compression class. Procedures performed in each group of patients are presented in Table 3.

Table 2. Characteristics of oedema in 94 patients according to the International Society of Lymphology

Variable	n	%
Location of swelling		
Lower limb	56	59,6
Upper limb	37	39,4
Head and neck	1	1.1
Basic aetiology		
Oncology therapy	53	56.4
Chronic venous insufficiency (ICD-10: I83)	31	33.0
Advanced cancer (ICD-10: C50, C61, C53, C56, C20, C34)	12	12.8
Consequences of limb injuries (ICD-10: T92, T93)	10	10.6
Primary oedema (ICD-10: Q82.0)	5	5.3
Stages of progression according to ISL		
0 — preclinical, (≤ 5%)	10	10.6
1 — minor (> 5 and < 20%)	40	42.6
2 — medium-sized (20–40%)	22	23.4
3 — advanced (> 40%)	22	23.4

Discussion
Pre-qualification

In accordance with Art. 6 of the Act on Patient Rights and the Patient Ombudsman: “The patient has the right, in a situation of limited capacity to provide appropriate health services, to a transparent, objective procedure, based on medical criteria, determining the order of access to these services”. The pandemic poses a significant challenge to persons rendering physiotherapeutic services, forcing them to seek new organizational solutions. It was necessary to reconcile the expectations of patients already receiving care (sometimes for several years) and those reporting to the clinic for the first time. The distinguishing of the category of urgent cases, indicating a significant risk of rapid deterioration if treatment was deferred, made it possible to preliminarily select patients requiring priority admission. Even though the test was not very reliable, more than half of the patients were properly classified during the phone interview. The initial “triage” resulted in significant differences in the

Table 3. Management in specific groups of patients

	Risk group (n = 38)		Patients with oedema				Total (n = 104)	
	n	%	Without an advanced disease (n = 201)		With an advanced disease (n = 15)		n	%
Education concerning prevention of oedema	38	100.0	201	100.0	13	86.7	252	99.2
Bandaging and instructions Bandaging and physical exercise	0	0	56	27.9	7	46.7	63	24.8
Limb measurements aimed at compression product selection	28	73.7	192	95.5	8	53.3	228	89.8

waiting time for the admission to the clinic, however, the average waiting time for urgent patients, i.e. three months, seemed too long. However, thanks to organizational changes it was reduced and was only 3 weeks in March 2021.

The interview conducted earlier made it possible to discuss the optimal method of management and preparation for the first visit with the patient, including appropriate clothing, shoes, the cost of materials and compression products, as well as early involvement of their carer in learning about compression therapy. Participation of non-medical carers makes it much easier to continue the therapy in the home setting, especially in the case of elderly patients, patients with multiple diseases and advanced cancer (IIa/B) as well as enables rapid introduction of bandaging in the event of a sudden worsening of oedema, despite the use of compression products [7].

Prevention

Damage to the lymphatic system usually results in a significant reduction in the functional reserve in lymphatic drainage, initially imperceptible on physical examination, but confirmed by an imaging examination, for example lymphoscintigraphy. Patients who have undergone surgical treatment, especially one involving lymphadenectomy, chemotherapy and radiotherapy, should be systematically monitored to ensure that appropriate physiotherapeutic management is implemented after the onset of oedema (I/C) [8]. A 5% increase in limb volume may have a negative impact on daily activities, reducing the quality of life [9].

Systematic self-assessment is particularly important during periods of restricted access to regular outpatient clinic visits, and may consist in measuring the circumference of the limb with the use of a centimetre tape, for example the largest circumference of the forearm, lower leg, arm, and thigh, assessing symptoms (weight, discomfort and pain) and changes in skin appearance and texture as well as monitoring body weight on a regular basis. Preliminary results of studies indicate that it is possible for patients to measure the circumference of the limb at risk of oedema on their own after receiving an appropriate training and physiotherapist support. The assessment of volume calculated on the basis of circumference measurements is believed to be reliable and valid in early detection of oedemas [10, 11], as well as fairly easy to perform at home (IIa/B). Adhering to recommendations for the prevention of oedema makes it possible to detect the onset of the disease at its early stage [12] and increases the sense of self-efficacy in patients (IIa/B) [11].

A simplified version of manual lymphatic drainage is commonly used in individuals belonging to the risk group, but because of the lack of evidence confirming its effectiveness in oedema prevention, it should not be recommended (III/A) [13]. Clinical studies involving women at risk of oedema due to breast cancer and malignancies of the reproductive organs confirm that the incidence of limb lymphoedema is lower in patients using compression in the form of standard circular-knit sleeves [14] and low-compression stockings (18–21 mm Hg, class I according to RAL-GZG standard classification) that can be considered in the prevention of oedema together with physical training (IIb/B) [15, 16]. The protective effect of compression stems from preventing the accumulation of tissue fluid in the region of the compression-protected limb and improving lymphatic drainage by activating the muscle pump mechanism during exercises performed while wearing compression garments. Individually selected exercise (including walking for ≥ 30 minutes per day) performed while wearing a compression garment should be considered in each patient (IIa/B) [13]. Regular physical activity is safe and constitutes a protective factor preventing the development of oedema [17] as well as excess body weight and obesity [18], especially in individuals who work remotely and spend more time sitting (I/B) during the period of the pandemic.

More than 70% of the admitted patients from the risk group agreed to purchase and use low-pressure compression products during the day and during physical activity. Early division of patients based on the interview conducted via telephone made it possible to additionally protect them from the development of oedema, especially in the case of individuals immediately before planned radiotherapy and chemotherapy. The use of low-pressure compression during the day and physical activity turned out to be simple, and putting on as well as taking off low-compression products usually did not pose a problem.

Treatment of oedema

In patients with early oedema (revealed in recent weeks), which is usually transient and small in size, manual drainage should be considered (IIb/A) [19]. In ISL grade 2–3 oedema, manual drainage is not recommended (III/A) [19], and treatment usually begins with Complex Decongestive Therapy (CDT), which is widely recommended by ISL (I/C) [1]. The most important component of CDT is compression therapy implemented in the initial phase of treatment with multi-layer bandaging around the clock combined with aerobic exercise (I/A) [8], which after improvement is converted to wearing (usually daytime only) compression products at the second (23–32 mm Hg for ISL stage

I edema) or at higher compression above 33 mm Hg (in more advanced stages of the disease) (I/A) [20]. Attempts are being made to replace bandaging with Kinesio Taping, but due to its lower effectiveness, poorer tolerance, and paradoxically higher risk of skin complications, it is not currently recommended (IIIA) [21].

In the period of the pandemic, it is worth taking the opportunity to educate patients and carers about proper compression bandaging. Such management should be considered in the first phase of the treatment and during maintenance therapy, as an addition to the worn compression products, for example during exacerbations of the disease (IIa/B) [7, 22]. Patients with less severe oedema who have to replace the worn product with a new, ready-made (standard) product in the same size, can select the product on their own at a medical store or online, after teleconsultation at the clinic, if, in the opinion of the patient, the size of the limb has not changed recently.

In the analysed group of patients, even those with a more advanced disease (requiring flat-knit, tailor-made products) were educated to the extent that enabled them to bandage the limb at home and then precisely and individually select the compression product. Despite the limitations in the implementation of physiotherapy and monitoring the effects thereof, the availability of compression-based therapy along with exercise has been maintained with the use of a hybrid management model.

Management of patients with advanced disease

Due to the incurable nature of lymphoedema and its frequent coexistence with active or history of malignant cancer treatment, many palliative care units provide anti-oedema therapy [23]. By definition, palliative care is characterized by continuity, comprehensiveness, and a team-based, multi-professional approach, which fully satisfies the needs of patients with oedema. Approximately 11.1% of all rehabilitation interventions in palliative medicine units are related to the management of oedema [24]. In the analysed period, patients with advanced diseases constituted approx. 7% of individuals receiving treatment at the outpatient clinic, who required education on how to avoid factors that can exacerbate oedema and care for their skin, and required compression therapy (with a bandage or selected compression product - in 4 cases preceded by bandaging) more rarely than patients without advanced diseases.

In the case of patients whose life is at risk, the treatment team must particularly focus on improving their quality of life. Alleviating symptoms associated

with oedema and maintaining an optimal ability to perform basic activities despite the progression of the disease is usually more important in these patients than an objective reduction in the extent of oedema [25]. However, therapeutic management based on compression therapy is usually less intense due to the limited tolerance to compression. Manual lymphatic drainage, which is better tolerated in this group of patients, as well as Kinesio Taping that alleviates the sensation of distension and paresthesia, are frequently applied [26]. In some patients with more advanced oedema, we can additionally consider forcing diuresis and controlled subcutaneous drainage by puncturing the oedematous tissue (IIb/C) [27].

The lack of a separate diagnosis on the list of publicly funded cover guaranteed by the sickness insurance scheme (lymphatic insufficiency codes, according to ICD-10: I89.0, I97.2, Q82.0) constitutes a significant barrier to the provision of palliative care to some patients with oedema. In the opinion of the authors, it urgently needs to be changed. Currently, palliative medicine clinics frequently treat patients whose primary problem is oedema of a complex aetiology. Patients with advanced diseases usually require coordinated efforts of a physiotherapist, physician, nurse, and psychologist, which is possible in palliative medicine units (inpatient hospice) or at home hospices. More advanced oedema in patients at risk of excessive fluid load due to the implemented compression therapy constitutes an indication for close monitoring and adjustment of diuretic treatment in unit settings, and once improvement is achieved, it is possible to determine further management and education of the carer with regard to care and provide further treatment at home. Patients with less severe oedema could receive outpatient treatment at a palliative medicine outpatient clinic in collaboration with a lymphoedema outpatient clinic or a day care centre, provided that contracting of services is ensured [4].

Conclusions

The COVID-19 pandemic has significantly reduced the availability of outpatient care provided to patients with oedema. A modified registration system based on an assessment conducted via telephone facilitated proper pre-qualification of patients according to urgent indications for the beginning of care. Due to the modification of the prophylactic and therapeutic management, despite the restrictions, the accessibility to the health services in the field of physiotherapy was maintained. Patients receiving care constituted a heterogeneous group and required an individual approach, depending on the risk of the onset, advancement and

severity of their oedema and comorbidities. For optimal clinical outcome, systemic changes in health care are needed, especially the expansion of the basket of guaranteed services to include lymphatic insufficiency codes, allowing close cooperation between rehabilitation and palliative care units.

Declaration of conflict of interests

The authors declare that there is no conflict of interest.

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References

1. Executive Committee of the International Society of Lymphology. The diagnosis and treatment of peripheral lymphedema: 2020 Consensus Document of the International Society of Lymphology. *Lymphology*. 2020; 53(1): 3–19, indexed in Pubmed: [32521126](#).
2. Gradalski T. Edema of Advanced Cancer: Prevalence, Etiology, and Conservative Management-A Single Hospice Cross-Sectional Study. *J Pain Symptom Manage*. 2019; 57(2): 311–318, doi: [10.1016/j.jpainsymman.2018.11.005](#), indexed in Pubmed: [30453053](#).
3. Keast DH, Moffatt C, Janmohammad A. Lymphedema Impact and Prevalence International Study: The Canadian Data. *Lymphat Res Biol*. 2019; 17(2): 178–186, doi: [10.1089/lrb.2019.0014](#), indexed in Pubmed: [30995190](#).
4. Grądalski T, Ochalek KW. stronę systemu opieki medycznej w zastoinowej niewydolności chłonnej – Głos w dyskusji. *Acta Angiol*. 2013; 19(1): 46–49.
5. Giusti R, Ravoni G, Porzio G, et al. Rapid Transition to Virtual Care during the COVID-19 Epidemic: Experience of a Supportive Care Clinic at a Tertiary Care Cancer Center. *J Palliat Med*. 2021 [Epub ahead of print], doi: [10.1089/jpm.2020.0737](#), indexed in Pubmed: [33535019](#).
6. Dzierżanowski T, Gradalski T, Kozłowski M. Palliative Performance Scale: cross cultural adaptation and psychometric validation for Polish hospice setting. *BMC Palliat Care*. 2020; 19(1): 52, doi: [10.1186/s12904-020-00563-8](#), indexed in Pubmed: [32321494](#).
7. Gradalski T, Ochalek K. Lay Caregivers Education in Multi-component Compression Bandaging in Obese Patients with Lower Limb Edema: A Case-Control Pilot Study. *Lymphat Res Biol*. 2020; 18(5): 428–432, doi: [10.1089/lrb.2019.0081](#), indexed in Pubmed: [32150495](#).
8. Davies C, Levenhagen K, Ryans K, et al. Interventions for Breast Cancer-Related Lymphedema: Clinical Practice Guideline From the Academy of Oncologic Physical Therapy of APTA. *Phys Ther*. 2020; 100(7): 1163–1179, doi: [10.1093/ptj/pzaa087](#), indexed in Pubmed: [32589208](#).
9. Park JH, Merriman J, Brody A, et al. Limb Volume Changes and Activities of Daily Living: A Prospective Study. *Lymphat Res Biol*. 2021; 19(3): 261–268, doi: [10.1089/lrb.2020.0077](#), indexed in Pubmed: [33185515](#).
10. Dylke ES, Schembri GP, Bailey DL, et al. Diagnosis of upper limb lymphedema: development of an evidence-based approach. *Acta Oncol*. 2016; 55(12): 1477–1483, doi: [10.1080/0284186X.2016.1191668](#), indexed in Pubmed: [27333213](#).
11. Rafn BS, McNeely ML, Camp PG, et al. Self-Measured Arm Circumference in Women With Breast Cancer Is Reliable and Valid. *Phys Ther*. 2019; 99(2): 240–253, doi: [10.1093/ptj/pzy117](#), indexed in Pubmed: [30289500](#).
12. Koelmeyer LA, Borotkanics RJ, Alcorso J, et al. Early surveillance is associated with less incidence and severity of breast cancer-related lymphedema compared with a traditional referral model of care. *Cancer*. 2019; 125(6): 854–862, doi: [10.1002/cncr.31873](#), indexed in Pubmed: [30521080](#).
13. Liang M, Chen Q, Peng K, et al. Manual lymphatic drainage for lymphedema in patients after breast cancer surgery: A systematic review and meta-analysis of randomized controlled trials. *Medicine (Baltimore)*. 2020; 99(49): e23192, doi: [10.1097/MD.00000000000023192](#), indexed in Pubmed: [33285693](#).
14. Ochalek K, Partsch H, Gradalski T, et al. Do Compression Sleeves Reduce the Incidence of Arm Lymphedema and Improve Quality of Life? Two-Year Results from a Prospective Randomized Trial in Breast Cancer Survivors. *Lymphat Res Biol*. 2019; 17(1): 70–77, doi: [10.1089/lrb.2018.0006](#), indexed in Pubmed: [30339481](#).
15. Sawan S, Mugnai R, Lopes Ad, et al. Lower-limb lymphedema and vulval cancer: feasibility of prophylactic compression garments and validation of leg volume measurement. *Int J Gynecol Cancer*. 2009; 19(9): 1649–1654, doi: [10.1111/IGC.0b013e3181a8446a](#), indexed in Pubmed: [19955953](#).
16. Shallwani SM, Towers A, Newman A, et al. Feasibility of a Pilot Randomized Controlled Trial Examining a Multi-dimensional Intervention in Women with Gynecological Cancer at Risk of Lymphedema. *Curr Oncol*. 2021; 28(1): 455–470, doi: [10.3390/currenol28010048](#), indexed in Pubmed: [33450972](#).
17. Baumann FT, Reike A, Hallek M, et al. Does Exercise Have a Preventive Effect on Secondary Lymphedema in Breast Cancer Patients Following Local Treatment? - A Systematic Review. *Breast Care (Basel)*. 2018; 13(5): 380–385, doi: [10.1159/000487428](#), indexed in Pubmed: [30498426](#).
18. Leray H, Malloizel-Delaunay J, Lusque A, et al. Body Mass Index as a Major Risk Factor for Severe Breast Cancer-Related Lymphedema. *Lymphat Res Biol*. 2020; 18(6): 510–516, doi: [10.1089/lrb.2019.0009](#), indexed in Pubmed: [32283042](#).
19. Thompson B, Gaitatzis K, Janse de Jonge X, et al. Manual lymphatic drainage treatment for lymphedema: a systematic review of the literature. *J Cancer Surviv*. 2021; 15(2): 244–258, doi: [10.1007/s11764-020-00928-1](#), indexed in Pubmed: [32803533](#).
20. Rabe E, Partsch H, Hafner J, et al. Indications for medical compression stockings in venous and lymphatic disorders: An evidence-based consensus statement. *Phlebology*. 2018; 33(3): 163–184, doi: [10.1177/0268355516689631](#), indexed in Pubmed: [28549402](#).
21. Gatt M, Willis S, Leuschner S. A meta-analysis of the effectiveness and safety of kinesiology taping in the management of cancer-related lymphoedema. *Eur J Cancer Care (Engl)*. 2017; 26(5), doi: [10.1111/ecc.12510](#), indexed in Pubmed: [27167144](#).
22. McNeely ML, Campbell KL, Webster M, et al. Efficacy of night-time compression for breast cancer related lymphedema (LYNC): protocol for a multi-centre, randomized controlled efficacy trial. *BMC Cancer*. 2016; 16: 601, doi: [10.1186/s12885-016-2648-8](#), indexed in Pubmed: [27491361](#).
23. Brown A, Nicholson C, Fearing A, et al. Lymphoedema management by independent hospices: a cohort study. *BMJ Support Palliat Care*. 2019; 9(4): 389–396, doi: [10.1136/bmjspcare-2019-001896](#), indexed in Pubmed: [31582383](#).

24. Lee CH, Kim JK, Jun HJ, et al. Rehabilitation of Advanced Cancer Patients in Palliative Care Unit. *Ann Rehabil Med*. 2018; 42(1): 166–174, doi: [10.5535/arm.2018.42.1.166](https://doi.org/10.5535/arm.2018.42.1.166), indexed in Pubmed: [29560337](https://pubmed.ncbi.nlm.nih.gov/29560337/).
25. Towers A, Hodgson P, Shay C, et al. Care of palliative patients with cancer-related lymphoedema. *J. Lymphoedema*. 2010; 5(1): 72–80.
26. Gradalski T. Obrzęk związany z zaawansowanymi schorzeniami – przyczyny, rozpoznanie i postępowanie lecznicze w opiece paliatywnej i hospicyjnej. *Palliative Med. Paliatywna Termedia*. 2019; 11(1): 1–8.
27. Landers A, Thomson M. Quantitative study of the subcutaneous needle drainage of lymphoedema in advanced malignancy. *J. Lymphoedema*. 2017; 12(1): 22–26.