

Appendix 1.

Below are the search details:

COCHRANE search

#1 (“breast cancer”) AND (“lymphoedema”) AND (“mastectomies”) OR (“lymph node sampling”) AND (“risk factor”) with Publication Year from 2011 to present, in Trials (word variations have been searched) 182

#2 (“breast neoplasm”) AND (“lymphoedema”) AND (“breast-conserving surgery”) OR (“axillary node dissection”) AND (“preventative measures”) with Publication Year from 2011 to present, in Trials (word variations have been searched) 9

#3 (“breast malignancy”) AND (“breast cancer-related lymphoedema”) AND (“modified mastectomy”) OR (“axillary node dissection”) AND (“recommendations”) (word variations have been searched) with Publication Year from 2011 to present, in Trials 9

#4 #1 OR #2 OR #3 with Publication Year from 2011 to present, in Trials (word variations have been searched) 190

Supplementary Table 1. Critical appraisal tool [Joanna Briggs Institute (JBI) checklist]

1	Was the sample frame appropriate, similar, and comparable to address the target population?
2	Was randomization used for assignment of participants
3	Was blinding carried out
4	Were study participants sampled and exposures measured in an appropriate way?
5	Were confounding factors identified and appropriate strategies stated
6	Were the groups/participants free of the outcome at the start of the study (or now of exposure)
7	Were the study subjects and the setting described in detail?
8	Was the data analysis conducted with sufficient coverage of the identified sample
9	Were the outcomes measured in a valid and reliable way?
10	Was the follow up time reported and sufficient to be long enough for outcomes to occur?
11	Was follow up complete, and if not, were the reasons to loss to follow up described and explored
12	Was there appropriate statistical analysis?
13	Overall appraisal

Supplementary Table 2. Descriptive summary of the included studies

References	Aim	Study type	Patient demographics	Risk factor assessed	Method	Outcome measures	Main finding(s)	Conclusion
Hayes et al. [76]	To compare baseline lymphedema prevalence in the physical activity and lymphedema (PAL) trial cohort and to subsequently compare the effect of the weight-lifting intervention on lymphedema, according to four standard diagnostic methods	Randomized controlled intervention study	295 patients Mean age: 55 and 57 years respectively for intervention and control groups 141 patients in the cohort have lymphoedema	Weight lifting	Patients were randomly allocated to either the weightlifting or the control group. Intervention group had twice weekly progressive weight lifting for 12 months	Interlimb volume difference through water displacement, (ii) interlimb size difference through sum of arm circumferences, (iii) interlimb impedance ratio using bioimpedance spectroscopy, and (iv) a validated self-report survey	There was no significant difference between the two groups in the proportion of women who had a change in interlimb swelling, interlimb size, interlimb ratio or survey score. This result did not change when stratified for women with and without lymphedema according to the separate diagnostic criteria There was also no difference in the proportions of women who experienced clinically significant declines in their interlimb volume difference, size, ratio or survey score	The variation in proportions of women within the PAL trial considered to have lymphoedema at baseline highlights the potential impact of the diagnostic criteria on population surveillance regarding prevalence of this common morbidity of treatment. Importantly though, progressive weight lifting was shown to be safe for women following breast cancer, even for those at risk or with lymphedema, irrespective of the diagnostic criteria used
Olsha et al.	To evaluate the effect		3 patients	Venipuncture	Patients had	Patient's subjective feeling	No patient developed	Autogenous hemodialysis access

[62]	of ipsilateral native arteriovenous fistulas for hemodialysis access on producing or exacerbating lymphedema in patients with axillary lymph node dissection		with a history of axillary lymph node dissection (ALND) and kidney failure Age: 56–76 years Time from ALND: 4–10 years		ipsilateral native arteriovenous fistulas for hemodialysis access with continual cannulation thrice weekly Post-operative advice was given to carry out progressive hand exercises	and by the physician's observation, without displacement tests or direct measurement of arm circumference	significant lymphedema at two, 20 and 76 months respectively after access construction, with cannulation for dialysis occurring three times a week	construction does not seem to contribute to lymphedema development after ALND
Showalter et al. [65]	To quantify the association between common exposures thought to be potential risk factors, and the occurrence of incident arm swelling, among breast cancer survivors with or at-risk for BCRL To estimate the frequency of common exposures hypothesized to be associated with	Prospective sub-analysis	295 patients were recruited Age: 36–80 years, mean 56 years	Fever Vigorous exercise in hot weather Travel to hot/humid place Sunburn Pet scratch Bug bite Cut Hang nail Manicure	Participants reported their exposure to 30 different potential risk-factors at three-month intervals for one year	Inter-limb water volume difference	Over the 12-month study period, 27 participants had incident arm swelling while in the study. Participants who experienced incident arm swelling differed statistically from participants without incident arm swelling with respect to race, number of lymph nodes removed and treatment with radiation Sauna use was the only exposure significantly	This study supports the recommendation that breast cancer patients who have had axillary surgery should avoid sauna use. The results do not confirm the need for other restrictions that may interfere with the quality of life in women with breast cancer

	incident arm swelling as well as the frequency of incident arm swelling in a one year period in our patient cohort			Blister Hot tube use Travel by airplane Acupuncture Bruise Change of breast prosthesis Blood you draw Bra too tight Blood pressure cuff Constriction Lying on affected arm Surgery Travel to different altitude Heavy lifting Overuse from chores Menstrual			associated with increased risk of incident arm swelling	
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				<p>changes</p> <p>Sauna use</p> <p>Infection</p> <p>Sport injury</p> <p>Skin burn</p> <p>More alcohol intake than usual</p>				
Kilbreath et al. [77]	To determine whether an exercise program, commencing 4–6 weeks post-operatively, reduces upper limb impairments without causing lymphoedema in women treated for early breast cancer	Randomised controlled study	<p>160 patients</p> <p>Mean age: 53.5 and 51.5 years</p> <p>141 patients in the cohort have lymphoedema</p>	Lifting weights	<p>Women were randomized to either an 8-week exercise program or to a control group following stratification for axillary surgery. The exercise program comprised a weekly session and home program of passive stretching and progressive resistance training for shoulder muscles. The control group</p>	<p>The primary outcome was self-reported arm symptoms derived from the EORTC breast cancer-specific questionnaire (BR23), scored out of 100 with a low score indicative of fewer symptoms. The secondary outcomes included physical measures of shoulder range of motion, strength, and swelling (i.e., lymphedema). Women were assessed immediately following the intervention and at 6 months post-intervention</p>	<p>The change in symptoms from baseline was not significantly different between groups immediately following the intervention or at 6 months post-intervention</p> <p>However, the change in range of motion for flexion and abduction was significantly greater in the exercise group immediately following the intervention, as was change in shoulder abductor strength</p>	<p>A supervised exercise program provided some, albeit small, additional benefit at 6 months post-intervention to women who had been provided with written information and reminders to use their arms</p> <p>Notably, resistance training in the post-operative period did not precipitate lymphedema</p>

					attended fortnightly assessments but no exercises were provided			
Rebegea et al. [106]	To identify the risk factors in arm lymphedema occurrence in breast cancer patients who performed radical/conservatory surgery, chemotherapy and radiotherapy	Retrospective study	305 patients Ages (Median): 29–82 (59) years		305 breast cancer patients who underwent treatment in the „Sf. Ap. Andrei” Emergency Clinical Hospital, Galati, Radiotherapy and Oncology Department, between the 1 st of January 2010 and 31 st of December 2012 were retrospectively analysed Risk factors for arm lymphedema development after treatment of breast cancer were explored: the association of adjuvant radiotherapy with	Clinical notes	The study evidences that the association of adjuvant radiotherapy, including the lymph node regions, with radical or conservatory surgery with lymph node dissection represents a statistically significant risk factor, with relative risk The number of removed lymph nodes was found to be a risk factor with statistical significance. For more than 25 removed lymph nodes, the relative risk for arm lymphedema development was RR = 1.95 and for 16–25 removed lymph nodes the relative risk, RR = 1.78 Other analysed risk factors, which did not influence lymphedema development,	The development of arm lymphedema is an unpredictable occurrence that can happen years after axillary surgery Breast and arm oedema continue to be late reactions that can be reduced by use of biopsy sentinel technique with avoiding of axillary lymph node dissection, when the sentinel lymph node is negative, knowing that lymphedema risk after sentinel lymph node is 5% comparative with lymphedema risk after axillary lymph node dissection which is 16%, by avoiding obesity, and performing modern therapy techniques

					surgery, chemotherapy, hormonal therapy, number of removed lymph nodes, and number of lymph nodes with metastases, the co-morbid illnesses (obesity, diabetes mellitus and high blood pressure)		were: associated chemotherapy or hormonal therapy, presence of co-morbid illnesses	
Kilbreath et al. [57]	To identify women at increased risk for lymphoedema (LE) based on axillary surgery	Prospective study	450 patients followed up till 18 months Mean age: 61 years Mean body weight: 74.4 ± 15.4 kg	Demographic Lifestyle Breast cancer treatment-related Arm swelling-related Post-surgical activities	Risk factors were recorded at the time of assessments, extracted from medical records, or determined from post-surgical events extracted from weekly diaries Women completed the diary either through an online survey, over the phone at a specified day and time of their choosing or using a	Bio impedance spectroscopy Assessments were done pre- operatively and then within four, six, twelve, and eighteen months post-surgery	At the 18-months assessment, 46 participants overall presented with LE, comprising 8 participants with < 5 nodes removed and 38 with 5 nodes removed (18.2%) The interlimb BIS and volume ratios for those with surgery on the dominant side were 1.311 (0.321) and 1.19 (0.14)% respectively, and 1.165 (0.124) and 1.118 (0.111)% for those with surgery on the	For women with ≥ 5 nodes removed, arm swelling in the first year poses a very strong risk for presence of LE at 18-months

					paper diary		nondominant side Sixty-three percent (n = 15) of those with < 5 nodes removed and 79% (n = 30) with 5 nodes removed presented with arm swelling at least on one other occasion in the first year	
Anderson et al. [79]	To determine the effect of a moderate, tailored exercise program on health-related quality of life, physical function, and arm volume in women receiving treatment for nonmetastatic breast cancer	Randomised controlled single blind study	104 patients Age range (Mean): 32–82 (53.6) years	Centre based exercise and lymphedema education	Eligible participants were randomized to either a comprehensive program consisting of tailored exercise, lymphedema prevention, patient and diet education, and counseling or to usual care (patient education) approximately 4–12 weeks post-surgery	Functional Assessment of Cancer Therapy-Breast Cancer (FACT-B), 6-min walk, and arm volume (by water displacement) were performed at 3-month intervals through 18 months	The intervention resulted in an average increase of 34.3 mL (SD = 12.8) versus patient education (p = 0.01). Changes in FACT-B scores and arm volumes were not significantly different	With this early exercise intervention after breast cancer diagnosis, a significant improvement was achieved in physical function, with no decline in health-related quality of life or detrimental effect on arm volume
Cormie et al. [82]	To examine the acute impact of upper body resistance exercise on the amount of	Crossover experimental	17 patients Mean Age: 61 +/- 9 years	Upper body resistance exercises	Participants completed a high load (6-8 repetition maximum) and low	Bioimpedance spectroscopy Dual-energy x-ray absorptiometry	No changes in the extent of swelling or the severity of symptoms were observed between pre-exercise and	Upper body resistance exercise does not acutely increase swelling or feelings of discomfort/pain, heaviness tightness in the affected limb of

	swelling and severity of symptoms in women with BCRL and to compare these effects between resistance exercise involving high and low loads (heavier vs. lighter weights)	design			load (15–20 repetition maximum) exercise session consisting of 2 sets of 5 upper body resistance exercises in a randomized order separated by a 10- to 12-day wash-out period	Arm circumference measurements Measurements were taken pre-exercise, immediately post-exercise, 24 hours post-exercise, and 72 hours post-exercise	immediately post-exercise, 24 hours post-exercise, or 72 hours post-exercise. No differences in the response to the high or low load exercise were observed	BCRL patients when performed at either high or low loads
Simonavice et al. [81]	To assess the effects of resistance training (RT) on arm lymphedema in Breast Cancer Survivors (BCS)	Pre-experimental study	27 participants Age: 64 +/- 7 years	Resistance training	Upon completion of baseline assessments, each participant was scheduled for supervised resistance exercise training sessions twice a week for the duration of the 6-month study	Circumference measurement Assessment every 2 weeks	No significant changes in percent difference of arm circumferences at any assessment point (pre, 1.31 ± 6.21%; post, 0.62 ± 6.55%), nor were there any adverse lymphedema-related events reported during the study	RT can be a safe activity for women with or at risk for breast cancer-related lymphedema
Paiva et al. [71]	To verify the incidence of lymphedema in mastectomized women with overweight and	A descriptive, observational, transvers	100 patients Mean age: 52.5 years	Overweight and Obesity	100 patients who had undergone mastectomy and were under physiotherapy treatment were	Perimetry of morbidity rate of upper limb	The risk of lymphedema in women with overweight and obesity was four times greater. The higher the body mass index, the higher was the probability	The analysis of significance indexes, probability and epidemiological indexes of the sample and the predictive factors (overweight and obesity) showed strong interaction between overweight and obesity and

	obesity	al study			recruited and assessed		of lymphedema, with increase in the relative risk of 40% for obesity II	the presence of lymphedema
Bloomquist et al. [83]	To estimate the prevalence of BCRL in participants, and identify associations between progressive resistance training with heavy loads, and the development of BCRL	Descriptive study	149 patients Mean age: 47.7 years	Heavy load exercises	149 patients breast cancer patients with at least one dose of chemotherapy were included for the review which involved checking electronic medical records and structured telephone interview	Self-report of being diagnosed and then circumferential measurements taken	No statistically significant association between strength gains during the exercise intervention, and the development of BCRL was observed, nor was self-reported participation in progressive resistance training with heavy loads up to three months post-intervention	There appears to be no association between performing heavy resistance training during adjuvant treatment (chemotherapy/radiotherapy), and the development of BCRL. However randomized controlled trials should be performed to confirm this observation
Ferguson et al. [55]	To investigate the association between blood draws, injections, blood pressure readings, trauma, cellulitis in the at-risk arm, and air travel and increases in arm volume in a cohort of patients treated for breast cancer and screened for lymphedema		632 patients. Age (median): 25–72 (52) years BMI (median): 16–59 (26) lb/in'	Ipsilateral blood draws or Injections Blood pressure readings Trauma events Air travel BMI	At each measurement, patients reported via a survey, the number of blood draws, injections, blood pressure measurements, trauma to the at-risk arm(s), and number of flights taken since their last measurement and use of compression	Bilateral arm volume measurements using a Perometer Performed preoperatively and postoperatively. after chemotherapy and/or radiotherapy, and at regular follow-up intervals corresponding with oncology visits. Regular follow-up intervals correspond to time periods of between 3 and 7 months.	There was no significant association between relative volume change or weight-adjusted change increase and undergoing one or more blood draws, injections, number of flights or duration of flights By multivariate analysis, factors significantly associated with increases in arm volume included	Although cellulitis increases risk of lymphedema, ipsilateral blood draws, injections, blood pressure readings, and air travel may not be associated with arm volume increases

					sleeve while flying. Self-reported trauma ranged from bruising to arm fractures	Occasionally patients are measured more frequently at their request	body mass index, axillary lymph node dissection, regional lymph node irradiation and cellulitis	
Gunnoo et al. [63]	To ascertain the impact of carpal tunnel syndrome surgery on breast cancer-related lymphedema volume		32 patients with upper limb lymphoedema Median age: 49 years BMI: 28.1 kg/m ²	Surgery	Patients with lymphoedema suffering from carpal tunnel syndrome were included based on symptom assessment Same surgeons perform the surgery on all patients lasting < 10 min No post-operative prophylactic anaesthesia was given and patients were asked to start early mobilization	Truncated cone formula for lymphoedema assessment Records taken before and after carpal tunnel syndrome surgery, and at each follow-up visit	Median lymphoedema volume increased significantly after carpal tunnel surgery After a median 33 months post-op the volume reduced to 447 mL (non-significant to pre-op measurements)	Carpal tunnel syndrome can be treated successfully with surgery There were no complications, especially delayed wound healing, infection or lymph oozing, or lymphedema worsening, even though its volume increased transiently
Gaston et al. [107]	To evaluate the rate of lymphedema and peri-operative complications in	A prospective multicenter	44 patients recruited Mean age: 61 years	Surgery Tourniquet use	Procedures were varied and ranged from trigger finger release to metastatic	Volumetric limb measurement Measured pre-operatively, post-operatively and at 3	There were no cases of lymphedema at 3 month and 6 month follow up. One patient, in the no	Elective hand surgery appears safe in patients having undergone previous ipsilateral surgery for breast cancer with lymph node dissection including

	patients undergoing elective hand surgery with a history of breast cancer and ipsilateral lymph node dissection	ter study			cancer excision from the brachial plexus. 24 had surgery with a tourniquet and 20 without a tourniquet	months and 6 months after	tourniquet group, had lymphedema at the 2 week follow up visit only. There were no complications noted in any patients Procedures using a tourniquet were on average twice as long as those that were not, yet no difference in the incidence of lymphedema or complications was noted	those with previous radiation and history of lymphedema The use of a tourniquet does not appear to increase the risks of lymphedema or complications in this patient population
Czerniec et al. [69]	To determine the extent to which breast cancer-related lymphedema (BCRL) fluctuated over a 6-month period and the influence of temperature, humidity, and barometric pressure		43 patients were recruited Mean age of 62.5 and 52.6 years	Temperature Humidity Barometric pressure	Daily weather data were obtained for analysis of effects on lymphedema	Self reported arm swelling, arm volume, and extracellular fluid Measured 9 times in 6 months	Neither arm volume nor extracellular fluid varied significantly for women with lymphedema Women without lymphedema had even less fluctuation Correlation of weather and lymphedema data showed that temperature was the only aspect of the weather to have any effect on BCRL, with the maximum temperature on the day before measurement	Established BCRL is relatively stable over a 6-month period. Temperature was the only aspect of the weather found to impact lymphedema

							slightly affecting ECF, arm volume and self-reported swelling. For women without lymphedema, the weather did not affect any measure	
Asdourian et al. [56]	To examine the lifestyle and clinical risk factors for lymphedema in a cohort of patients who underwent bilateral breast cancer surgery	A prospective study	327 (654 arms) patients who U/W BA surgery for breast cancer Median age (range): 47 (25 to 72). years BMI: Median 25 kg/m ²	Ipsilateral blood draws or injections Blood pressure readings Trauma events Air travel BMI	Between 2013 and 2016, 327 patients who underwent bilateral breast cancer surgery were prospectively screened for arm lymphedema as quantified by the weight-adjusted volume change (WAC) formula At the time of each measurement, patients completed a risk assessment survey that reported the number of blood draws, injections, blood pressure readings, trauma to the at-risk arm, and	Arm perometry Subjective data	Of the 654 arms, 83 developed lymphedema, defined as a WAC \geq 10% relative to baseline On multivariable analysis, none of the lifestyle risk factors examined through the risk assessment survey were significantly associated with increased WAC Multivariable analysis demonstrated that having a body mass index \geq 25 kg/m ² at the time of breast cancer diagnosis (p = .0404), having undergone axillary lymph node dissection (p = .0464), and receipt of adjuvant chemotherapy (p = .0161)	Blood pressure readings, blood draws, injections, and number or duration of flights were not significantly associated with increases in arm volume in this cohort

					<p>number of flights since the previous measurement</p> <p>Generalized estimating equations were applied to ascertain the association among arm volume changes, clinical factors, and risk exposures</p>		were significantly associated with increased arm volume	
Baltzer et al. [60]	To evaluate the risk of developing lymphedema after elective hand surgery among patients that underwent ipsilateral axillary lymph node dissection (ALND), sentinel lymph node biopsy (SLNB), and/or radiation therapy (RT)	Retrospective Cohort study	<p>103 patients were recruited</p> <p>Age: 61–64 (SD = 10)</p> <p>BMI: 28.9–33.6 [SD 10.7–9)</p>	<p>Elective hand surgery</p> <p>Tourniquet use</p>	<p>Institutional visits with oncologist and/or hand surgeon to patients with breast cancer from 1997–2012 patients who had elective hand surgery with no prior history of lymphoedema</p>	<p>Clinical assessment of signs and symptoms compatible with lymphedema</p> <p>Circumference measure and/or limb. volume measurements</p> <p>Measurements: taken post operatively on follow up visits by surgeon or the physician</p>	<p>4/103 patients had documented lymphoedema, no statistical significance was seen with respect to BMI, tourniquet use</p> <p>All lymphoedema was detected early within 4 weeks, resolved by 3 months</p>	Lymphedema is uncommon after elective hand surgery among survivors and was not associated with tourniquet use. The combination of adjuvant therapies and axillary procedures and a short temporal relationship of these to hand surgery may increase lymphedema risk
Li et al. [84]	To investigate the effects of far infrared rays (FIR) on the	Pre-experimental	<p>32 patients</p> <p>11 patients had upper</p>	Exposure to far infrared radiation	<p>Patients were treated with FIR, 2 hours per day, 5 days a</p>	<p>Bio impedance</p> <p>Limb circumference</p>	<p>There was significant decrease of limb circumference</p>	FIR therapy could be considered both an alternate monotherapy and a valuable addition to conservative or

	major components of lymphatic tissue. To explore the effectiveness and safety of FIR as a promising treatment modality of lymphedema	study	extremity lymphoedema		week for 4 weeks Patients were also advised to strengthen self-nursing skills, such as extremity hygiene, prevention of skin damage, and avoidance of dermatophytosis following international guidelines	Thickness of skin Measured 1–2 days before and after FIR treatment	measurements and improving of quality of life was registered Laboratory examination showed the treatment can also decrease the deposition of fluid, fat, hyaluronan, and protein, improving the swelling condition	surgical lymphoedema treatment The real and significant biological effects of FIR represent possible future applications in wide range of the medical field
Nguyen et al. [72]	To assess BCRL incidence and risk factors in a large population-based cohort		1794 patients: unilateral and 30 bilateral Mean age: 60.8 years	Obesity	Using the Olmsted County Rochester Epidemiology Project Breast Cancer Cohort, a population-based sample of all incident breast cancer cases diagnosed in Olmsted County, MN residents in 1990–2010 was explored. Trained nurse abstractors	Clinical notes	The cumulative incidence of BCRL diagnosis within 5 years was 9.1%. No BCRL events occurred among patients without axillary surgery. In the axillary surgery subset (n = 1512), the 5-year incidence of BCRL was 5.3% in sentinel lymph node (SLN) surgery and 15.9% in axillary dissection patients (ALND). In patients treated with surgery only, BCRL rates were not	BCRL is a sequelae of multimodal breast cancer treatment and risk is multifactorial. BCRL rates are higher in patients receiving chemotherapy, radiation, ALND, more advanced disease stage, and higher body mass index

					<p>performed a comprehensive search of medical records and noted occurrences of the key words “edema”, “heaviness”, “lymphedema”, “puffiness”, and “swelling” affecting the upper extremities. All available clinical notes were examined including those from surgery, oncology, primary care, physical therapy, and lymphedema clinic providers. All cases with definite or probable lymphedema were included as BCRL</p>		<p>different between ALND versus SLN. Addition of breast or chest wall radiation more than doubled the BCRL rate in ALND patients. The groups with highest risk (> 25% at 5 years) all involved ALND with nodal RT and/or anthracycline/cytoxan + taxane chemotherapy. In multivariable analysis of patients with any axillary surgery factors significantly associated with BCRL were ALND, chemotherapy, radiation, and obesity</p>	
Tsai et al. [108]	To examine the association between the development of		522 patients Average age:	Obesity Radiation	A total of 522 breast cancer patients were included in the	A reported physician-diagnosis	Arm lymphedema was identified in 102 of 522 participants	Surgical methods, cancer characteristics and obesity were found to contribute to the development of

	arm lymphedema and both treatment and personal (eg, obesity) risk factors		63 years	therapy Chemotherapy Hormone therapy Arm infections Chronic conditions diagnosed prior to breast cancer Airplane trips Heavy lifting Physical therapy	study via the Iowa Cancer Registry Physicians of the patients were contacted before recruitment into the study Participants were contacted via phone calls and interviewed via computer assisted telephone interviewing	Arm circumference Multiple self-reported arm symptoms	Participants treated by both axillary dissection and radiation therapy were more likely to have arm lymphedema than treated by either alone Women with advanced cancer stage, positive nodes, and larger tumors along with a body mass index > 40 were also more likely to develop lymphedema Arm activity level was not associated with lymphedema	arm lymphedema Vigorous arm activity post-surgery was not found to increase the risk of arm lymphedema
Ammitzbol et al. [80]	To determine the preventive effect of progressive resistance training (PRT) on arm lymphedema	Randomized controlled trial	158 patients Age (Mean): 18–75 (52 years)	Progressive resistance training	Participants were allocated to intervention or usual care by computer randomization. The intervention consisted of PRT 3 times per week: in the first 20 weeks as a supervised group exercise and in the	Volumetric assessment Baseline assessment and 12 months	Among the 158 randomized women, no mean group difference was found in arm volume or lymphedema incidence	This study provides no evidence that PRT can prevent arm lymphedema in the first year after BC, but the results corroborate the importance and safety of resistance training for patients, including women at high risk for lymphedema

					last 30 weeks as a self-administered exercise either at home(with dumbbells and resistance bands provided) or at a chosen exercise facility. Phase 1: 17–20 RM by the end. Phase two: 10-12 RM by the end. CG: usual care-No intervention			
Armer et al. [75]	To examine factors associated with lymphedema after neoadjuvant chemotherapy (NAC) and axillary lymph node dissection in women with node-positive breast cancer	Cohort study	486 patients Mean age: 50.1 +/- 10.8 years		All participants received NAC, breast operation, and axillary lymph node dissection. Participants underwent prospective arm measurements and symptom assessment after NAC completion and at 6-month intervals to 36	Self-reported arm heaviness or swelling (lymphedema symptoms) or an arm volume increase of 10% or more (V10) or 20% or more (V20)	Increasing body mass index and neoadjuvant chemotherapy duration of 144 days or longer were associated with lymphedema symptoms, neoadjuvant chemotherapy duration of 144 days or longer was associated with a 20% limb volume increase, and removal of 30 nodes or more and higher number of positive nodes were associated with	Longer NAC duration and obesity were associated with increased lymphedema incidence, suggesting that patients in these groups may benefit from enhanced prospective lymphedema surveillance

					months postoperatively		a 10% limb volume increase	
Kilbreath et al. [78]	Effect of an exercise program on breast lymphoedema symptoms compared to a non-exercise control group	A single blind randomized controlled trial	88 patients with stable lymphoedema Mean age: 53.7 +/- 10.4 and 59.5 +/- 8.0 in exercise and intervention groups respectively	Combined resistance and aerobic exercise training program	Participants were randomized into an exercise or control group. The intervention comprised a 12-week combined aerobic and resistance training program lasting 1hr per session, thrice weekly and supervised by an accredited exercise physiologist	Bio impedance spectroscopy Self-reported weekly symptoms diary European Organization for Research and Treatment of Cancer (EORTC) Breast Cancer (BR23) and Lymphoedema Symptom Intensity and Distress questionnaires Assessed monthly	The exercise group reported a greater reduction in breast-related symptoms than the control group, assessed by the EORTC BR23 breast symptom questions. Measures of extracellular fluid, assessed with bioimpedance spectroscopy ratio, decreased in the exercise group compared to the control group. No significant difference was detected in dermal thickness in the breast, assessed by ultrasound. Session attendance in the exercise sessions was high, with two musculoskeletal adverse events reported, but no exacerbations of lymphoedema observed	Combined resistance and aerobic exercise training is safe for women living with breast lymphoedema. Preliminary data suggest exercise training can reduce breast lymphoedema symptoms to a greater extent than usual care
Leray et al.	Analyze the factors associated with severe	Retrospective	74 patients		Characteristics of patients and factors	Volume difference	Thirty-five patients had a mastectomy and 72 an	Tumor characteristics and cancer-related treatments had no influence on

[74]	lymphedema (LE) across a specific population of patients with BCRL	study	with BRCL Age (Median): 30–82 (56) years		related to severe BCRL were retrospectively assessed. Details regarding age, weight, height, body mass index (BMI) (kg/m ²), weight fluctuations and delay between surgery and onset of LE, cardiovascular disease, occlusive disease of the artery, deep vein thrombosis, erysipelas, and osteoarticular disorders of the upper limb were collected		axillary lymphadenectomy. Among patients treated with radiation therapy (n = 72), 76.3% received lymphatic nodes irradiation. Fifty-five patients received chemotherapy and 52 a hormonal suppression therapy A high proportion of patients had severe (> 400 mL, 64.9%) and premature LE, with a median time of 13 months since onset of surgery Weight gain between surgery and LE management was more prevalent in obese patients. Body mass index (BMI) at BCRL diagnosis was the only risk factor associated with severe LE. There was no significant association between LE severity and treatments received for	the severity of BCRL. Only BMI at BCRL diagnosis appears as a factor related to severe LE
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							breast cancer.	
Greene et al. [73]	To determine whether obesity influences the morbidity of lymphedema in patients who have the condition		67 patients Ages (median): 22–90 (38) and 29–81 (51) for groups 1 and 2 respectively	Obesity	Two cohorts of patients were compared: group 1, normal weight (body mass index \leq 25 kg/m ²); and group 2, obese (body mass index \geq 30 kg/m ²). Inclusion criteria were patients aged 21 years or older with lymphedema confirmed by lymphoscintigraphy. Covariates included age, sex, lymphedema type (primary or secondary), location, comorbidities, lymph node dissection, radiation therapy, lymphoscintigram result, and disease	Limb volume difference	Multivariable logistic regression showed that obesity was an independent risk factor for infection, hospitalization, and moderate to severe limb overgrowth	Obesity negatively affects patients with established lymphedema. Obese individuals are more likely to have infections, hospitalizations, and larger extremities compared to subjects with a normal body mass index. Patients with lymphedema should be counseled about the negative effects of obesity on their condition

					duration. Outcome variables were infection, hospitalization, and degree of limb overgrowth			
Naranjo et al. [61]	To determine the risk for development of BCRL in ipsilateral arm IV placement compared to contralateral arm IV placement to prior breast cancer surgery	Retrospective study	3724 patients were analyzed Mean age: mean = 53 +/- 13 years	Venipuncture	Patients were retrospectively analyzed based on history of breast cancer surgery. patients who needed anesthesia and surgery were included complication rates in ipsilateral vs. contralateral arms were compared	Clinical signs and symptoms	Of 2743 IVs placed in the arm contralateral to prior breast cancer surgery, 2 had a complication, corresponding to an incidence of 7.3 per 10,000. Of 5153 IVs placed in the arm ipsilateral to prior breast cancer surgery, 2 IVs had a complication, for an incidence of 3.9 per 10,000. The frequency of complications was not found to differ significantly between the groups The complication rate is similar when only the first IV placed following breast cancer surgery is considered (overall 5.4 per	There were very few complications in patients who had an IV placed for surgery following a previous breast cancer surgery and no complications in those patients with IV placement ipsilateral with axillary node dissection. Avoidance of IV placement in the arm ipsilateral to breast cancer surgery is not necessary

							10,000, contralateral 7.0 per 10,000, ipsilateral 4.4 per 10,000	
Liu et al. [67]			866 patients were recruited 313 patients were below the age of 50 and 553 were above 50 years	Injections, venipunctures, trauma Blood pressure measurement Extreme temperatures Obesity Lift heavy objects	Data using paper and web-based survey was collected. Patients recruited were diagnosed with lymphoedema within the last 20 years. Patients were classified into mild, moderate lifestyle variables were analyzed	Norman questionnaire	49% patients had BCRL No significant association was found between different variable listed	High risk group should be screened along with promotion of physical activity in patients
Koelmeyer et al. [66]	To evaluate risk factors (treatment-related, comorbidities, and lifestyle) for breast cancer–related lymphedema (BCRL) within the context of a Prospective Surveillance and Early Intervention (PSEI) model of care for	Randomized controlled trial	963 patients were randomized Median age: 58.4 years	BMI Hypertension Diabetes Area of residence Seroma Smoking Mastectomy Axillary lymph	The patients were randomized on recruitment into either tape measurement (TM) group or bio impedance spectroscopy (BIS) group. self reporting and medical record review was conducted for risk	BIS and TM Measured at baseline, any time subclinical lymphedema was detected, and at the end of study participation regardless of reason Progression to chronic lymphedema was determined solely by TM for both groups	Factors associated with BCRL risk included axillary lymph node dissection (ALND) ($p < .001$), taxane-based chemotherapy ($p < .001$), regional nodal irradiation (RNI) ($p \leq .001$), body mass index >30 ($p = .002$), and rurality ($p = .037$). Mastectomy, age, hypertension, diabetes,	In the 3 years ALNO, taxane — based chemotherapy. BMI $\times 30$ and RNI increased lymphoedema risk, no effect of air travel was observed

	subclinical BCRL			node dissection Chemotherapy Air travel	factors. patients were assessed for development of lymphoedema		seroma, smoking, and air travel were not associated with BCRL risk	
Konishi et al. [100]	To assess risk factors for arm lymphedema following breast cancer surgery using a Japanese database	Retrospective study	84,022 patients Age: 50: 571;50 976		Female patients who underwent breast cancer surgery from April, 2016, to March, 2020, were identified from a Japanese nationwide database Multivariable survival analyses for 19 baseline factors (12 patient characteristics, four tumor characteristics, and three surgical procedures) were conducted to investigate risk factors associated with treatments for postoperative lymphedema (such as lymphatic bypass,	Lymphoedema assessment	Young age, obesity, smoking, collagen diseases, advanced cancer stage, total mastectomy, axillary dissection, postoperative bleeding, chemotherapy, and radiotherapy were identified as risk factors. Postoperative chemotherapy (hazard ratio, 3.78 [95% confidence interval, 3.35–4.26]) and axillary dissection (2.46 [1.95–3.11]) showed the highest odds ratio among the risk factors. The cumulative probabilities in high-risk patients reached approximately 3% at 1 year and 6% at 4 years after surgery	Clinicians should be prepared to provide lymphoedema treatment to high- risk patients over the long term

					<p>compositive drainage therapy, hospitalization, and Kampo use) with a multilevel model to adjust for within-hospital clustering</p> <p>Multivariable analysis was also conducted for five postoperative factors (two local complications and three postoperative therapies) with adjustment for 19 baseline factors</p>			
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Supplementary Table 3. Quality appraisal of the included studies

References	Type of Study	1	2	3	4	5	6	7	8	9	10	11	12	13	Level of evidence
Hayes et al. [76]	RCT	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Included	2b
Olsha et al. [62]	Observational study	Yes	No	No	Yes	No	Yes	Yes	No	No	Yes	Yes	No	Included	4
Showalter et al. [65]	Prospective study	Yes	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Included	1b
Kilbreath et al. [77]	RCT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Included	1b
Rebegea et al. [106]	Retrospective study	Yes	N/A	N/A	Yes	Yes	Yes	Yes	Yes	No	N/A	N/A	Yes	Included	2b
Kilbreath et al. [57]	Prospective study	Yes	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Included	1b
Anderson et al. [79]	RCT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Included	1b
Cormie et al. [82]	Randomized cross-over experimental study	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Included	1b
Simonavice et al. [81]	Observational study	Yes	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Included	2b
Paiva et al. [71]	Observational	Yes	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Included	2b

Ammitzboll et al. [80]	RCT	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Included	1b
Armer et al. [75]	Prospective study	Yes	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Included	1b
Kilbreath et al. [78]	RCT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Included	1b
Leray et al. [74]	Retrospective study	Yes	N/A	N/A	Yes	Yes	Yes	Yes	Yes	No	N/A	N/A	Yes	Included	2b
Greene et al. [73]	Experimental study	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Included	2b
Naranjo et al. [61]	Retrospective study	Yes	N/A	N/A	Yes	Yes	Yes	Yes	Yes	No	N/A	N/A	Yes	Included	2b
Liu et al. [67]	Cross-sectional study	Yes	N/A	N/A	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Included	1b
Koelmeyer et al. [66]	Prospective study	Yes	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Included	1b
Konishi et al. [100]	Retrospective cohort study	Yes	N/A	N/A	Yes	Yes	No	Yes	Yes	No	N/A	N/A	Yes	Included	2b

Supplementary Table 4. Preventive measures that are commonly advised for post-operative patients — air travel

Author	Title	Results	Conclusion
Koelmeyer et al. [66]	Risk factors for breast cancer-related lymphoedema in patients undergoing 3 years of prospective surveillance with intervention	<p>No statistically significant association of simply flying (any air travel) was observed with the outcome ($p = .365$). However, if a patient did fly, the total number of flights (with or without prophylactic compression) was significantly associated with outcome. The direction of the effect, however, was not on increasing the likelihood of chronic lymphedema, rather it was in the direction of decreasing it ($p < .001$)</p> <p>A drill-down within the two groups of patients who met the criteria for subclinical lymphedema revealed no statistically significant differences between them either in the total number of flights or in number of flights without compression before intervention nor after intervention ($p > .10$)</p>	Within the study duration, there was no effect of air travel on lymphedema risk
Ferguson et al. [55]	Impact of Ipsilateral Blood Draws, Injections, Blood Pressure Measurements, and Air Travel on the Risk of Lymphoedema for Patients Treated for Breast Cancer	In 3,041 measurements, there was no significant association between relative volume change or weight-adjusted change increase and number of flights (one or two [$p = .77$] and three or more [$p = .91$] v none), or duration of flights (1 to 12 hours [$p = .43$] and 12 hours or more [$p = .54$] v none)	The study showed that air travel was not a significant factor for lymphoedema
Showalter et al. [65]	Lifestyle Risk Factors Associated with Arm Swelling Among Women with Breast Cancer	Air travel showed no significance to occurrence or exacerbation of arm lymphedema symptoms in Breast cancer patients	Air travel was not associated with incident arm swelling
Kilbreath et al. [57]	Risk factors for lymphoedema in women with breast cancer: A large prospective	The odds ratio for domestic flights were 0.9 with no significant association noted between air travels and development of arm	Domestic flights were not found a risk factor for the development of arm

	cohort	lymphedema p = 0.79	lymphedema
Tsai et al. [108]	Lymphedema following breast cancer: The importance of surgical methods and obesity	Air travel (RR = 0.98, 95% CI: 0.63–1.52) were not associated with lymphedema in this study	Air travel is not associated with increased risk of arm lymphedema within 5 years post breast cancer diagnosis
Asdourian et al. [56]	Association between precautionary behaviors and breast cancer–related lymphedema in patients undergoing bilateral surgery	By univariable analysis, no significant association was found between number (p = .2756) or duration (1 to 12 hours [p = .5223] and ≥ 12 hours [p = .2524]) of flights versus none	Number or duration of flights were not significantly associated with increases in arm volume in this cohort

Supplementary Table 5. Preventive measures that are commonly advised for post-operative patients — extreme temperatures

Author	Title	Results	Conclusion
Showalter et al. [65]	Lifestyle Risk Factors Associated with Arm Swelling Among Women with Breast Cancer	<p>In univariable mixed model analysis, sauna use (n = 13, OR = 5.77, CI = 1.00–33.82, p = 0.05) was the only exposure associated with incident arm swelling that reached statistical significance</p> <p>In multivariable analysis, sauna use remained significantly associated with incident arm swelling (OR = 6.67, 95% CI = 1.36–32.56, p = 0.01)</p> <p>But there was no significant association seen between travelling to hot/humid places, sunburns, or hot tub use</p>	This study supports the recommended that breast cancer patients who have had axillary surgery should avoid sauna use
Li et al. [84]	Efficacy and safety of far infrared radiation in lymphoedema treatment: clinical evaluation and laboratory analysis	<p>After therapy, a significant decrease of limb circumference measurements was noted and improving of quality of life was registered</p> <p>Laboratory examination showed the treatment can also decrease the deposition of fluid, fat, hyaluronan, and protein, improving the swelling condition</p>	FIR treatment could be considered as both an alternative monotherapy and a useful adjunctive to the conservative or surgical lymphedema procedure
Kilbreath et al. [57]	Risk factors for lymphoedema in women with breast cancer: A large prospective cohort	The odds ratio for exposure to extreme heat were 0.6 with no significant association noted between exposure and development of arm lymphedema p = 0.37	Exposure to extreme heat was not found a risk factor for the development of arm lymphedema
Liu et al. [67]	Prevalence and predictors of breast cancer-related arm lymphedema over 10 years in	Avoiding exposure to extreme cold and prolonged exposure to heat was shown to be insignificant (p = 0.967) to the development of arm lymphedema	Exposure to extreme temperatures was not found to increase the risk of developing arm lymphedema

	postoperative breast cancer patients: A cross-sectional study		
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Supplementary Table 6. Preventive measures that are commonly advised for post-operative patients — exercise, lifting weights, carrying heavy objects

Author	Title	Results	Conclusion
Hayes et al. [76]	Does the effect of weightlifting on lymphoedema following breast cancer differ by diagnostic method: results from a randomized controlled trial	<p>There was no significant difference between the two groups in the proportion of women who had a change in interlimb swelling, interlimb size, interlimb ratio, or survey score of ≥ 5, ≥ 5, $\geq 10\%$, and 1 unit, respectively</p> <p>This result did not change when stratified for women with and without lymphoedema</p> <p>There was also no difference in the proportions of women who experienced clinically significant declines in their interlimb volume difference, size, ratio, or survey score</p>	Irrespective of the lymphoedema diagnostic criteria used, weightlifting did not initiate nor exacerbate lymphoedema
Kilbreath et al. [77]	Upper limb progressive resistance training and stretching exercises	The changes in symptoms, derived from the EORTC BR23 survey, immediately following the intervention and at 6 months	An 8-week, weekly supervised, exercise program that targeted range and strength of muscles about

	<p>following surgery for early breast cancer: a randomized controlled trial</p>	<p>post-intervention from baseline were not significantly different between groups. The unadjusted between-group difference in arm symptoms was 4 (95% CI -1 to 9) immediately following the intervention and 4 (-2 to 10) at 6 months post-intervention. The unadjusted between-group difference in breast symptoms immediately following the intervention was 2 (-4 to 7) and at 6 months post-intervention was 4 (-3 to 7)</p> <p>The number of women above the cut-off for lymphedema was not significantly different between the two groups immediately following the intervention and at 6 months post-intervention, regardless of whether BIS cut-offs or arm volume differences based on arm circumference measures were used</p>	<p>the shoulder did not reduce the self-reported impairments more than written instructions and a reminder to use their arm at 6 months post-surgery. However, the change from baseline in physical measures of range was significantly greater in the exercise group than the control group</p> <p>Resistance training in post operative period did not precipitate lymphoedema</p>
<p>Cormie et al. [82]</p>	<p>Neither Heavy nor Light Load Resistance Exercise Acutely Exacerbates Lymphoedema in Breast Cancer Survivor</p>	<p>No significant differences were observed in volume or circumference of the affected arm across most of the time points examined (i.e., pre-exercise, immediately post-exercise, 24 hours post-exercise, and 72 hours post-exercise. Arm circumference at 72 hours post-high load exercise was significantly lower than pre-exercise</p> <p>No significant differences were observed between the high load and low load exercise conditions across all of the time points examined. There were no clear trends in terms of the impact of the resistance exercise on the extent of swelling, with individual responses varying from no change to decreased and/or increased swelling</p>	<p>Upper body resistance exercise performed in a controlled setting (i.e., correct instruction and highly supervised) did not acutely increase the extent of swelling or the severity of symptoms in women with BCRL</p>

Anderson et al. [79]	A randomized trial of exercise on well-being and function following breast cancer surgery: the RESTORE trial	The intervention resulted in an average increase of 34.3 mL (SD = 12.8) versus patient education (p = 0.01) Changes in Functional Assessment of Cancer Therapy — Breast Cancer (FACT-B) scores and arm volumes were not significantly different	With this early exercise intervention after breast cancer diagnosis, a significant improvement was achieved in physical function, with no decline in health-related quality of life or detrimental effect on arm volume
Bloomquist et al. [83]	Heavy resistance training and lymphoedema: Prevalence of breast cancer-related lymphoedema in participants of an exercise intervention utilizing heavy load resistance training	No statistically significant association between strength gains during the exercise intervention, and the development of BCRL was observed, nor was self-reported participation in progressive resistance training with heavy loads up to three months post-intervention	There appears to be no association between performing heavy resistance training during adjuvant treatment (chemotherapy/radiotherapy), and the development of BCRL
Simonavice et al. [81]	Effects of resistance exercise in women with or at risk for breast cancer-related lymphoedema	No significant changes in percent difference of arm circumferences at any assessment point (pre, $1.31 \pm 6.21\%$; post, $0.62 \pm 6.55\%$), nor were there any adverse lymphedema-related events reported during the study	Resistance training can be a safe activity for women with or at risk for breast cancer-related lymphedema
Kilbreath et al. [78]	Reduction of breast lymphoedema secondary to breast cancer: A randomised controlled exercise trial	The exercise group reported a greater reduction in breast-related symptoms than the control group, assessed by the EORTC BR23 breast symptom questions Measures of extracellular fluid, assessed with bioimpedance spectroscopy ratio, decreased in the exercise group compared to the control group. No significant difference was detected in dermal thickness in the breast, assessed by ultrasound. Session attendance in the exercise sessions was high, with two musculoskeletal adverse events reported, but no exacerbations	Combined resistance and aerobic exercise training is safe for women living with breast lymphoedema. Preliminary data suggest exercise training can reduce breast lymphoedema symptoms to a greater extent than usual care

		of lymphoedema observed	
Ammitzboll et al. [80]	Progressive resistance training to prevent arm lymphoedema in the first year after breast cancer surgery: Results of a randomized controlled trial	Among the 158 randomized women, no mean group difference was found in arm volume (0.3%; 95% confidence interval, – 1.7% to 2.3%) or lymphedema incidence (adjusted odds ratio, 1.2; 95% confidence interval, 0.5–2.8). None of the participants exited the program because of adverse events	This study provides no evidence that progressive resistance training can prevent arm lymphedema in the first year after BC, but the results corroborate the importance and safety of resistance training for patients, including women at high risk for lymphedema
Liu et al. [67]	Prevalence and predictors of breast cancer-related arm lymphedema over a 10-year period in postoperative breast cancer patients: A cross-sectional study	Avoiding heavy weight lifting, exercising the affected arm and strenuous repetitive exercises were shown to be insignificant ($p = 0.689, 0.509$ and 0.573 respectively) to the development of breast cancer related arm lymphedema over a 10-year period Multivariate analysis however showed that exercising the affected arm (OR = 0.602, 95% CI: 0.439–0.827) and active physical activity (at least 2 days/week) (OR = 0.610, 95% CI: 0.429–0.866) were predictive factors for breast cancer related arm lymphedema as they reduced the risk of development	Heavy weight lifting with affected arm was not found to be a significant predictor of development of breast cancer related arm lymphedema however exercising the affected arm could help reduce the risk
Tsai et al. [108]	Lymphedema following breast cancer: The importance of surgical methods and obesity	No association was found between lymphedema and specific arm activities including weightlifting When analyses were restricted to participants who had the same level of arm activity before and after breast cancer diagnosis, no association between lymphedema and arm activity level was found	Vigorous arm activity post-surgery was not found to increase the risk of arm lymphedema
Showalter et al.	Lifestyle Risk Factors Associated with	Over the 12-month duration, heavy weight lifting had no	Heavy weight lifting was not significantly

[65]	Arm Swelling Among Women with Breast Cancer	significant association ($p = 0.22$) with the development or exacerbation of arm lymphedema symptoms among women with breast cancer	associated with development or exacerbation of arm lymphedema in women with breast cancer
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Supplementary Table 6. Preventive measures that are commonly advised for post-operative patients — obesity

References	Title	Results	Conclusion
Armer et al. [75]	Factors Associated with Lymphoedema in Women with Node-Positive Breast Cancer Treated With Neoadjuvant Chemotherapy and Axillary Dissection	Increasing body mass index (hazard ratio [HR], 1.04; 95% CI, 1.01–1.06) and NAC for 144 days or longer (HR, 1.48; 95% CI, 1.01–2.17) were associated with lymphedema symptoms On multivariable analysis, obesity was significantly associated with lymphedema symptoms (HR, 1.03; 95% CI, 1.01–1.06)	Obesity was associated with increased lymphedema incidence, suggesting that patients in these group may benefit from enhanced prospective lymphedema surveillance
Konishi et al. [100]	Risk factors for arm lymphoedema following breast cancer surgery: a Japanese nationwide database study of 84,022 patients	Whereas patients with BMI 18.5 kg/m ² had significantly low hazard ratio (0.75 [0.61–0.92]) with reference to those with normal BMI, patients with high BMI had significantly high hazard ratios (25.0–29.9 kg/m ² , 1.33 [1.18–1.50]; > 30.0 kg/m ² , 1.48 [1.24–1.78])	Obesity was identified a risk factor for postoperative lymphedema in breast cancer surgery
Leray et al. [74]	Body Mass Index as a Major Risk Factor for Severe Breast Cancer-Related Lymphoedema	Weight gain between surgery and LE management was more prevalent in obese patients (p = 0.0164). Body mass index (BMI) at BCRL diagnosis was the only risk factor associated with severe LE (p = 0.0132) There was no significant association between LE severity and treatments received for breast cancer	Only BMI at BCRL diagnosis appears as a factor related to severe LE
Greene et al. [73]	Body Mass Index and Lymphoedema Morbidity: Comparison of Obese versus Normal-Weight Patients	Obesity group was more likely to have an infection (59%), hospitalization (47%), and moderate or severe overgrowth (79%), compared to normal body weight group (18, 6, and 40%, respectively; p < 0.001)	Obesity negatively affects patients with established lymphedema

		Multivariable logistic regression showed that obesity was an independent risk factor for infection (OR, 7.9; 95 percent CI, 2.5 to 26.3; $p < 0.001$), hospitalization (OR, 30.0; 95 % CI, 3.6 to 150.8; $p < 0.001$), and moderate to severe limb overgrowth (OR, 6.7; 95 % CI, 2.1 to 23.0; $p = 0.003$)	
Paiva et al. [71]	Prevalence of lymphoedema after breast cancer treatment in overweight patients	According to the logistic regression analysis, the chance of lymphoedema emergence in women with predictive factors (overweight and obesity) was approximately 4 times (OR = 3.887; $p < 0.05$), considering women that were submitted to the same surgical treatment, but did not present overweight or obesity The probability for the development of lymphoedema was 37.4% for women with a history of overweight and obesity, and 13.3% for those who did not have these risk factors	The higher the body mass index, the higher was the probability of lymphedema, with increase in the relative risk of 40% for obesity II
Rebegea et al. [106]	The Incidence and Risk Factors for occurrence of Arm Lymphoedema after Treatment of Breast Cancer	Obesity was not found to be a risk factor for development of arm lymphedema RR = 0.9 (95% CI = 0.41–1.85) In multivariate analysis, logistic regression showed that obesity did not represent a statistically significant risk factor for development of arm lymphedema	Obesity did not represent significant risk factor for arm lymphedema but should be avoided to reduce development of arm lymphedema
Nguyen et al. [72]	Breast Cancer-Related Lymphoedema Risk is Related to Multidisciplinary Treatment and Not Surgery Alone: Results from a Large Cohort Study	In univariate analysis, Rates of BCRL were higher in patients with BMI ≥ 25 vs. < 25 (14.3% vs. 8.0% at 5 years, $p = 0.002$). Those overweight (BMI 25–29.99) and class I obesity (BMI 30–34.99) had similar rates (14.4% and 13.0% at 5 years), while those morbidly obese (BMI ≥ 35) had a slightly higher rate at	The risk for developing breast cancer related lymphedema is multivariate and includes high BMI alongside other factors

		<p>17.1%</p> <p>In multivariate analysis, Patients with BMI ≥ 35 (HR 1.9, p = 0.03) or BMI 25–34.99 (HR 1.5, p = 0.006) had higher rates of BCRL than those with BMI < 25</p>	
Tsai et al. [108]	Lymphoedema following breast cancer: The importance of surgical methods and obesity	Participants with a BMI ≥ 30 (35.9%) were more likely to develop lymphedema (RR = 2.15, 95% CI: 1.35, 3.42) than those with a BMI < 30. An increasing trend in the RRs was observed as BMI increased over 30	Women with a high BMI were found to be at risk for developing lymphedema, suggesting that obesity may further promote inflammation which can lead to lymphatic impairment
Ferguson et al. [55]	Impact of Ipsilateral Blood Draws, Injections, Blood Pressure Measurements, and Air Travel on the Risk of Lymphoedema for Patients Treated for Breast Cancer	<p>Having BMI ≥ 25 was significantly associated (p = 0.0064) with arm volume increase</p> <p>In a subset of patients who underwent ALND, BMI ≥ 25 remained significantly associated (p = 0.0051)</p> <p>Multivariate analysis showed that BMI ≥ 25 was significantly associated with increased arm volume (p = 0.0236)</p>	Increasing BMI increases risk of arm lymphedema
Koelmeyer et al. [66]	Risk factors for breast cancer–related lymphoedema in patients undergoing 3years of prospective surveillance with intervention	Compared with the other outcome groups, the highest BMI values were in the group who progressed to chronic lymphedema without receiving the compression intervention (p = .002)	A BMI > 30 may place individuals at risk for very early development of chronic lymphedema
Asdourian et al. [56]	Association between precautionary behaviors and breast cancer–related lymphedema in patients undergoing bilateral surgery	<p>Univariable analysis showed that BMI ≥ 25 kg/m² compared with < 25 kg/m² (p = .0121) was significantly associated with increased WAC</p> <p>Multivariable analysis demonstrated that having a body mass</p>	BMI ≥ 25 kg/m ² at diagnosis was significantly associated with increased arm swelling

		index ≥ 25 kg/m ² at the time of breast cancer diagnosis (p = .0404), was significantly associated with increased arm volume	
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Supplementary Table 7. Preventive measures that are commonly advised for post-operative patients — blood pressure measurement and compression of limb

References	Title	Results	Conclusion
Ferguson et al. [55]	Impact of Ipsilateral Blood Draws, Injections, Blood Pressure Measurements, and Air Travel on the Risk of Lymphoedema for Patients Treated for Breast Cancer	Having blood pressure readings was significantly associated ($p = 0.034$) with arm volume increase When analysed at continuous variables, blood pressure readings was not associated ($p = 0.15$) with relative volume change or weight adjusted volume by univariate analysis. In a subset of patients who underwent ALND, blood pressure readings were still not associated ($p = 0.39$) By multivariate analysis, blood pressure readings were not associated with arm volume increase	Blood pressure readings may not be associated with arm volume increase
Baltzer et al. [60]	De Novo Upper Extremity Lymphoedema After Elective Hand Surgery in Breast Cancer Survivors	Tourniquet use was not associated with lymphedema, and the tourniquet time was significantly longer among women who did not develop lymphedema (22 minutes vs. 9 minutes, $p = 0.02$)	No association was found between tourniquet use and the development of arm lymphedema
Liu et al. [67]	Prevalence and predictors of breast cancer-related arm lymphedema over a 10-year period in postoperative breast cancer patients: a cross-sectional study	Avoiding blood pressure readings with the affected arm was shown to be insignificant ($p = 0.256$) to the development of breast cancer related arm lymphedema over a 10-year period	Blood pressure readings with affected arm was not found to be a significant predictor of development of breast cancer related arm lymphedema
Showalter et al. [65]	Lifestyle Risk Factors Associated with Arm Swelling Among Women with Breast Cancer	Blood pressure cuffs and constriction of the affected arm were shown to not be significantly associated ($p = 0.72$ and 0.81 respectively) with arm swelling	The results of this study do not support the recommendation to avoid blood pressure measurement

Gaston et al. [107]	Lymphedema Following Elective Hand and Wrist Surgery in Women who are Post Axillary Lymph Node Dissection: A Prospective, Cohort Study	Procedures using a tourniquet were on average twice as long as those that were not, yet no difference in the incidence of lymphedema or complications was noted	The use of a tourniquet does not appear to increase the risks of lymphedema or complications in this patient population
Asdourian et al. [56]	Association between precautionary behaviors and breast cancer-related lymphedema in patients undergoing bilateral surgery	Univariable analysis showed that having one or more blood pressure measurements versus none was significantly associated with decreased WAC ($p = .0109$; 95% CI, -1.26 to 0.03 ; Fig .1); this was no longer significant upon multivariable analysis	Blood pressure readings were not significantly associated with increases in arm volume in this cohort
Kilbreath et al. [57]	Risk factors for lymphoedema in women with breast cancer: a large prospective cohort	The odds ratio for blood pressure measurement was 1.3 with no significant association noted between blood pressure measurement and development of arm lymphedema $p = 0.6$.	Blood pressure measurement was not found a risk factor for the development of arm lymphedema