Secondary lymphoedema (SL) most commonly occurs following surgical excision and/or radiation treatment of regional lymph nodes for treatment of cancer (Medical Services Advisory Committee, 2006; Honnor, 2008). Patients with the condition experience a wide range of physical, psychological and social problems (Farncombe et al, 1994; Sitza et al, 1998; Warren et al, 2007; Honnor, 2008). As there is no cure for SL (Sitza and Sorbrido, 1997), intervention consists of education on how to reduce the risk of SL and treatment to reduce and control swelling in order to maximise quality of life.

In Australia, the number of new cases of cancer in males is expected to rise by 1,916 cases per year (Australian Institute of Health and Welfare [AIHW] and Australasian Association of Cancer Registries [AACR], 2008) with men having a one-in-three lifetime risk of developing cancer compared to women who have a one-in-four lifetime risk (AIHW and AACR, 2007).

Reported rates of SL after urogenital cancer and melanoma are similar to breast cancer-related lymphoedema (BCRL) (National Breast and Ovarian Cancer Centre [NBOCC], 2008). Further evidence indicates that SL following inguinal node surgery is at least as common as the incidence of BCRL (NBOCC, 2008). Hence, the risk of males developing SL is not insignificant and warrants further investigation, which should be informed by current evidence and information regarding SL in males and management of males and epidemiological data regarding incidence and prevalence among the male population.

**Objectives**

A literature review was undertaken to determine:

- The prevalence and incidence of SL in males following treatment for cancer
- Current strategies for the provision of education regarding risk, identification and management of SL
- Alterations in quality of life in those males who develop SL

**Methods**

**Search strategies**

The following databases were searched; Cumulative Index for Nursing and Allied Health Literature (CINAHL), Medline, Pubmed, Cochrane register of controlled trials, Psych Info, Cochrane database of systematic reviews, Physiotherapy Evidence Database (PEDro), OT seeker, Joanna Briggs Research Institute and OVID. Reference lists of obtained articles were hand searched in an attempt to identify literature that may not have been captured in the search strategy. Grey literature was not searched.

**Search terms**

All electronic databases were searched using a predetermined search strategy of key words in an attempt to capture relevant materials. General terms used for the search included:

- Male, men
- Lymphoedema, lymphedema, secondary lymphoedema, secondary lymphedema, oedema, edema, chronic oedema
- Education, awareness, knowledge
- Prevalence, incidence
- Quality of life, social adjustment,

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**Key words**

- Men
- Prevalence
- Quality of life
- Secondary lymphoedema
- Gender specific
adjustment, impact, implications, patient attitudes, compliance, patient education, health-related quality of life (HRQoL).

Exclusion criteria
Non-English literature was excluded. The population of interest was males diagnosed with SL from cancer treatment. Mixed gender studies which did not present male-specific data were excluded. Due to the overall lack of literature, no exclusions were based on level of evidence.

Search results
This search strategy identified a total of 69 publications. A large number of the publications that were excluded focused on women with BCRL. A total of 16 relevant studies were included for review. Table 1 lists those publications reviewed, grouped according to specific themes and the quality rating and level of evidence for each publication.

A total of 21 articles on HRQoL were excluded. Four studies investigated females only, eight studies did not mention SL as a side-effect for investigation and nine studies did not separate male data for analysis.

Twenty-five publications investigating prevalence and incidence of SL were excluded. Sixteen articles were excluded as male-specific data was not separated for analysis; three studies were excluded as they analysed non-cancer related lymphoedema; one study investigated females only; two studies did not include rates of SL; one article was unable to be obtained for review; one article was unable to be obtained in English; and one was excluded due to repetition of data already reviewed.

One study investigating education and awareness of SL in males was included with seven excluded. Four studies investigated BCRL and three studies did not mention SL as a measure of interest.

Quantitative studies were rated according to the Oxford Centre for Evidence-based Medicine levels of evidence (Phillips et al, 1998). Studies were rated according to levels (1–5), with a low score indicating studies of high quality design. Qualitative studies were assigned ratings according to the McMaster Tool (Law et al, 1998). Low rating studies denote poor methodological design. The critical review form utilised for qualitative appraisal is outlined in Table 2.

Analysis
Due to varying methods of assessing and classifying lymphoedema within incidence and prevalence data, only a narrative of these studies is presented.

Results
Incidence and prevalence
A number of sources suggest that

### Table 1

#### Quality rating and level of evidence of reviewed studies

<table>
<thead>
<tr>
<th>Topic</th>
<th>Appraisal tool</th>
<th>Level of evidence</th>
<th>Study type/description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education/awareness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>France 2000</td>
<td>McMaster</td>
<td>Level 5</td>
<td>Phenomenological approach using in depth interviews</td>
</tr>
<tr>
<td>Incidence/prevalence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amdur et al, 1990</td>
<td>OCEM Levels of Evidence</td>
<td>Level 4</td>
<td>Retrospective case series</td>
</tr>
<tr>
<td>Papachristou et al, 1977</td>
<td>OCEM Levels of Evidence</td>
<td>Level 4</td>
<td>Case series</td>
</tr>
<tr>
<td>Karakousis and Driscoll, 1994</td>
<td>OCEM Levels of Evidence</td>
<td>Level 4</td>
<td>Case series</td>
</tr>
<tr>
<td>Karakousis et al, 1983</td>
<td>OCEM Levels of Evidence</td>
<td>Level 4</td>
<td>Case series</td>
</tr>
<tr>
<td>Anscher et al, 1987</td>
<td>OCEM Levels of Evidence</td>
<td>Level 4</td>
<td>Retrospective case series</td>
</tr>
<tr>
<td>Ravi, 1993</td>
<td>OCEM Levels of Evidence</td>
<td>Level 4</td>
<td>Case series</td>
</tr>
<tr>
<td>Ornellas et al, 1991</td>
<td>OCEM Levels of Evidence</td>
<td>Level 4</td>
<td>Case series</td>
</tr>
<tr>
<td>Greskovitch et al, 1991</td>
<td>OCEM Levels of Evidence</td>
<td>Level 4</td>
<td>Case series</td>
</tr>
<tr>
<td>Lieskovsky et al, 1980</td>
<td>OCEM Levels of Evidence</td>
<td>Level 4</td>
<td>Case series</td>
</tr>
<tr>
<td>Catalona, 1988</td>
<td>OCEM Levels of Evidence</td>
<td>Level 4</td>
<td>Case series</td>
</tr>
<tr>
<td>Cabanas, 1977</td>
<td>OCEM Levels of Evidence</td>
<td>Level 4</td>
<td>Case series</td>
</tr>
<tr>
<td>Pilepich et al, 1987</td>
<td>OCEM Levels of Evidence</td>
<td>Level 4</td>
<td>Prospective case series</td>
</tr>
<tr>
<td>Boileau et al, 1987</td>
<td>OCEM Levels of Evidence</td>
<td>Level 4</td>
<td>Retrospective case series</td>
</tr>
<tr>
<td>Quality of life</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Borbasi, 2004</td>
<td>McMaster</td>
<td>Level 5</td>
<td>Descriptive exploratory study</td>
</tr>
<tr>
<td>Towers 2008</td>
<td>McMaster</td>
<td>Level 5</td>
<td>Phenomenological design</td>
</tr>
</tbody>
</table>
Clinical REVIEW

refers to the rate of occurrence of new cases of a disease within a specified period of time, whereas prevalence is the number of people affected in a population at one point in time (Logan, 1995). Barker and Rose (1990) report that when examining a chronic condition it is advantageous to use prevalence rates, as this represents those who are developing the condition as well as those who are surviving with the disease. However, the lack of standardised diagnostic criteria and a gold standard method for assessment of lymphoedema pose challenges for the collection and reporting of this data (Logan 1995; Woods, 1995). These issues are a significant obstacle for future prevalence and incidence research and limit the ability to perform comparisons of existing data. Prevalence and incidence reports for SL are reviewed below according to the type of cancer. Studies reporting incidence and prevalence data are predominantly of case series style (level 4).

Prostate cancer
Six studies which reported the prevalence of SL related to prostate cancer are described in Table 3. Reported prevalence of SL following treatment for prostate cancer varied from <1% to 20%. Lowest reported rates (<1%) by Amdur et al (1990) may be contributed to sampling bias, with only 16/225 subjects undergoing radiation and surgery for treatment of prostate cancer which has higher associated morbidity, compared to the majority of the sample who received surgery alone (n=209/225).

Other reported variances in the rate of SL after prostate cancer may be due to differences in extent of surgical treatment used in included studies. Non-standardised definitions of SL used within the selected literature, and varying methods of measurement and classification of severity employed may also contribute to the differences in reported rates of SL. Longer follow-up periods did not demonstrate a trend towards increasing rates of SL.

**Table 2**

Critical review form for qualitative studies (Law et al, 1998)

<table>
<thead>
<tr>
<th>Critical review components</th>
<th>Study purpose</th>
<th>Literature</th>
<th>Design</th>
<th>Sampling</th>
<th>Data analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Was the purpose clearly stated?</td>
<td>Was relevant background literature reviewed?</td>
<td>Was the process of purposeful selection described?</td>
<td>Was sampling done until redundancy in data reached?</td>
<td>Descriptive clarity: Was there a clear and concise description of site, participants, role of researcher and relationship with participants, and credentials of researcher?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Does it justify the need for the study being reported?</td>
<td>Was a theoretical perspective identified?</td>
<td>Was informed consent obtained?</td>
<td>Analytical rigour: Were findings consistent and reflective of data?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>What methods were used to answer the question?</td>
<td></td>
<td>Procedural rigour: Did a meaningful picture of the phenomenon under study emerge?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Theoretical connections: Were concepts clarified, refined and relationships made clear?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Overall rigour: Was there evidence of the four components of trustworthiness (credibility, transferability, dependability and confirmability)?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Conclusions and complications: Was the conclusion appropriate given the study findings?</td>
</tr>
</tbody>
</table>

the true incidence and prevalence of SL following cancer treatment is underestimated (Medical Services Advisory Committee, 2006; Rockson and Rivera, 2008; NBOCC, 2008) and is frequently under recognised or misdiagnosed (Woods, 1995; Rockson and Rivera, 2008). Incidence

Table 3

Included studies for incidence and prevalence of lymphoedema after prostate cancer

<table>
<thead>
<tr>
<th>Study</th>
<th>Interventions</th>
<th>Participants</th>
<th>Methods of assessment</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilepech et al., 1984</td>
<td>Patients with prostate cancer without pelvic node involvement treated with radiation and/or lymphadenectomy</td>
<td>526 patients recruited between 1976 and 1980. Follow-up minimum 18 months and maximum 72 months. Included those with stage C tumours</td>
<td>Treatment-related complications including SL, cystitis, diarrhoea, proctitis, melena, urethral stricture, haematuria were rated according to grades 1–5: 1 = minor symptoms, no treatment required 2 = symptoms responding to outpatient management, lifestyle and performance status not affected 3 = distressing symptoms altering lifestyle, hospitalisation or minor surgical intervention may be required 4 = major surgical intervention or prolonged hospitalisation required 5 = Fatal complications</td>
<td>Only those who underwent staging lymphadenectomy before radiation 25/526 (4.8%) developed SL. 13/25 patients with SL had grade 2 rating of severity (52%). SL appeared during the first year post treatment. In the majority of cases SL appeared in the first year post treatment. Those who develop SL after the first year post treatment were found to have congestive heart failure, recurrent tumour or thrombophlebitis</td>
</tr>
<tr>
<td>Amdur et al, 1990</td>
<td>Retrospective analysis of patients with prostate cancer treated with radiation</td>
<td>225 patients treated between 1964 and 1982. Follow-up for five years. Follow-up period calculated from first day of irradiation. 68 participants (30%) eligible for 10-year follow-up. Excluded those with evidence of regional or distant metastasis</td>
<td>Mild complications were those that resulted in minor discomfort for more than three months, but resolved with minimal medical intervention. Authors note that mild complications are not often documented in charts and so are not presented in the study. Moderate: minor surgical procedure or significant medical management. Severe: major surgical procedure or causing significant disability. No details were provided regarding assessment methods for oedema</td>
<td>Moderate SL occurred in 2/225 patients (&lt;1%). No severe cases identified. Oedema was influenced by surgical disruption of pelvic lymphatics with 2/16 patients (13%) who had pre-irradiation staging pelvic lymphadenectomy developing moderate oedema, compared to 0/209 patients who did not have pelvic lymphadenectomy. 83/225 (37%) developed recurrence during the trial, however none of these participants had SL</td>
</tr>
<tr>
<td>Anscher and Prosnitz, 1987</td>
<td>Retrospective case review of patients with prostate cancer treated with radiation</td>
<td>159 patients diagnosed and treated for cancer of the prostate with positive surgical margins, seminal vesicle involvement and or capsular penetration. Excluded those with invasion into the capsule. 46/159 postoperative radiation and surgery. Mean follow up 58 months.</td>
<td>Complications of treatment rated as mild, moderate or severe. Mild = may or may not require medical treatment. Moderate = symptoms of greater severity that may or may not require medical therapy, but did not require an operation and did not resolve completely.</td>
<td>Postoperative irradiation increased frequency of SL and occurred in 9% of those who had radiation (4/46) compared to 2% (2/113) with surgery alone. SL increased in frequency in those who had irradiation and surgery. SL occurred in 0–3% of those with irradiation alone.</td>
</tr>
</tbody>
</table>
Table 3

<table>
<thead>
<tr>
<th>Study</th>
<th>Interventions</th>
<th>Participants</th>
<th>Methods of assessment</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anscher and Prosnitz 1987</td>
<td>Interventions</td>
<td>113/159 surgery alone. Mean follow-up period 72 months. Included those with stage A–D cancer. Both groups were comparable regarding age, stage and type of prostatectomy</td>
<td>Severe = operation for correction, death of the patient or required use of an external drainage device</td>
<td>10% of patients with lymphadenectomy and increased to 10–55% of those who underwent lymphadenectomy and radiation. Those with surgery alone were followed up for longer duration. Those who were irradiated underwent lymph node dissection more frequently and had more positive nodes.</td>
</tr>
<tr>
<td>Boileau et al, 1987</td>
<td>Interventions</td>
<td>65 patients with pelvic lymphadenectomy and gold grains treated with radiation. Included those with stage C disease. Follow-up period of 90 months (mean 34 months)</td>
<td>Complications of treatment recorded. No details provided on method of classification of lymphoedema</td>
<td>7.7% of patients had extremity lymphoedema. Six patients had significant oedema of the genitals or extremities. Oedema persisted beyond three months in only one patient.</td>
</tr>
<tr>
<td>Greskovich et al, 1991</td>
<td>Interventions</td>
<td>289 patients. 65 underwent pelvic staging lymphadenectomy before radiation. All others treated with radiation only. Average follow-up was 34 months</td>
<td>Classification according to radiation therapy oncology group criteria. Mild = self-limited, trivial complications requiring no treatment or simple outpatient management. Significant = requiring diagnostic or therapeutic intervention, were persistent, requiring long-term medication for symptom control. Severe = major surgical intervention or prolonged hospitalisation</td>
<td>14.5% patients had complications. 2/65 (3.1%) of those with pelvic lymphadenectomy and radiotherapy had mild SL. Both cases resolved within nine months. No patient treated without lymphadenectomy developed SL.</td>
</tr>
<tr>
<td>Lieskovsky et al, 1980</td>
<td>Interventions</td>
<td>82 patients with bilateral lymphadenectomy. 65/82 with additional radical prostatectomy. Excluded those with metastatic disease. Follow-up period was not reported</td>
<td>Complications after both treatment regimens were recorded. No details included regarding how SL was defined, classified or assessed</td>
<td>Chronic SL recorded in 41% of those with radiation and lymphadenectomy (7/17). Of these, one had SL and recurrence. Of the seven patients, six (83%) had positive nodes and five of these patients received para aortic, pelvic and prostate region boost fields. This demonstrated an increased risk with radiation to these areas. Chronic SL occurred in 3/15 of those with lymphadenectomy, prostatectomy and radiation (20%). 10% (5/48) undergoing lymphadenectomy and radical prostatectomy alone had signs of chronic SL.</td>
</tr>
</tbody>
</table>
Amdur et al (1990) with a follow-up period of five years, demonstrated SL in 2/225 patients (<1%) compared to Boileau et al (1987) with 34 months' follow-up and a 7.7% rate of SL. Higher rates seen in the study by Boileau et al (1987) may be explained by all participants undergoing radiation and lymphadenectomy, as all studies noted an increase in cases of SL following surgical lymphadenectomy and radiation treatment, both of which are established risk factors for development of LC (NBOCC, 2008; Rockson and Rivera, 2008).

The association between disease recurrence and SL is not conclusive from the identified literature. Pilepich et al (1984) reported 4.8% of participants developed SL and of these, all were found to have congestive heart failure, recurrent tumour or thrombophlebitis. The authors do not differentiate rates of SL between diagnoses. In contrast, Amdur (1989) reported 37% of study participants developed recurrence, however none of these experienced SL. Lieskovsky (1980) reports 83% (6/7) of those with SL were found to have positive lymph nodes. Table 3 summarises findings on SL and prostate cancer.

Penile cancer

In the treatment of penile cancer where inguinal and ilio-inguinal lymphadenectomy are common, the incidence of SL was reported between 9% and 100%. Table 4 lists articles included for review. Of note, Catalona (1987) includes six study participants, one of whom is female with squamous cell carcinoma (SCC) of the urethra. Reported data sets for Catalona (1987) are separated between genders and therefore the study was included in the review. Large variation in reported prevalence of included studies may be due to varying surgical techniques utilised.

Studies completed by Catalona (1987) and Cabanas (1977) found the highest rates of SL, 100% and 50% respectively. Use of femorolocrural incision and modified inguinal lymphadenectomy may have contributed to the high morbidity due to the extensive nature of the surgery. More recent studies demonstrated lower rates of SL with use of surgical techniques aimed at reducing morbidity following groin dissection through less invasive treatment techniques. Ornellas (1991) reported the lowest rates of SL, comparing three alternative surgical incisions in a retrospective study. Only one study provided details regarding classification of SL (Ravi, 1993). Findings from Ravi (1993) report the greatest incidence of SL (30% 43/144), and severe cases of SL (n=22) occurring in those with ilioinguinal lymphadenectomy. No studies were comparable regarding rates of SL due to differences in surgical technique utilised. The length of follow-up since surgery was inconclusive regarding the development of SL. Two of the reviewed studies did not provide details regarding length of follow-up since surgery. Catalona (1987) followed up subjects between eight and 26 months, with Cabanas (1977) conducting follow-up at two years.

Melanoma

Three studies including both male and female-specific data but which provided separate analysis of male data were identified (Table 5). A total of eleven studies investigating SL after treatment and surgery for melanoma were excluded from the review due to lack of gender-specific separation of results. Highest rates of SL were reported by Papachristou and Fortner (1977) who found SL in 80% of patients followed up at five years, compared to 20% reported by Karakousis and Driscoll (1994) and Karakousis et al (1983), which had an average 27.5 month follow-up period. The large variance seen between authors may be indicative of the long latency period associated with SL. The site of primary tumour was

Furthermore, variances identified within the literature may be contributed to differences in surgical techniques utilised, with more recent reviews utilising less invasive procedures to minimise associated morbidity. Radical groin dissection was cited by two publications (Karakousis et al, 1983; Karakousis and Driscoll, 1994) to be associated with increased reports of SL. Of note, Karakousis et al (1983) utilised prophylactic use of custom-made compression garments for six months postoperatively. Compliance with the regimen was significant in preventing SL, with 7% of those who complied developing SL compared to 45.8% in the non-compliant group.

The site of primary tumour was also a significant predictor in the development of SL, with 5.8% of patients with a primary trunk tumour developing SL compared to 26% with tumour in the leg which authors contribute to wider surgical excision. Gender was not a significant predictor or contributor to the development of SL in any of the included studies. Results should be interpreted with caution due to differences in surgical interventions, definition of SL, measurement methods and classification of SL.

Breast cancer

Male breast cancer (MBC) incidence is reported to account for 1% of all breast cancers (Agrawal et al, 2007). No literature was identified reporting rates of SL in males with breast cancer. However, the surgical treatment for MBC involves a simple or radical mastectomy with sentinel node biopsy (SNB) or axillary clearance and adjuvant radiation. Therefore, the clinical management is comparable with the treatment of women with breast cancer; suggesting that there is the same associated risk of developing BCRL. Current reviews report an incidence of BCRL between 6–80% (Medical Services Advisory Committee, 2006).

Head and neck cancer

The lack of research into head and neck lymphoedema including epidemiologic studies is noted in a
### Table 4

<table>
<thead>
<tr>
<th>Study</th>
<th>Interventions</th>
<th>Participants</th>
<th>Methods of assessment</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabanas, 1977</td>
<td>Sentinel lymph node biopsy (SNB) and inguino femoropelvic dissection for patients with penile carcinoma</td>
<td>100 patients (10 normal, 10 with benign inflammatory lesions of the penis and 80 with penile carcinoma)</td>
<td>No details provided regarding assessment, classification of methods of measurement for SL</td>
<td>Over two-year period chronic SL and elephantiasis of varying degrees of severity developed in 50% of those with penile carcinoma who had superficial or deep groin dissection. Of those with SL, 31% had metastases</td>
</tr>
<tr>
<td>Catalona, 1987</td>
<td>Patients treated with bilateral modified inguinal lymphadenectomy</td>
<td>Six patients with invasive carcinoma of the penis or distal urethra. Five patients had invasive SCC of the penis. One female participant had SCC of the urethra. Of male patients (n=5) 3/5 had inguinal node lymphadenectomy, 2/5 had ilioinguinal lymphadenectomy, two had positive lymph nodes. Follow-up ranged from eight to 26 months</td>
<td>No details provided regarding methods of classification of oedema or measurement. Authors note site of SL</td>
<td>All patients had mild to moderate SL. None had debilitating SL. Of the male patients, one resolved after six months</td>
</tr>
<tr>
<td>Ravi, 1993</td>
<td>Investigation into morbidity after ilioinguinal and inguinal lymphadenectomy or penile carcinoma after radiation</td>
<td>234 patients treated for penile cancer. 171 patients with bilateral dissection. 63 unilateral ilioinguinal dissection. 67 received preoperative radiation</td>
<td>Morbidity included wound infection, skin necrosis, seroma and SL. SL was assessed evaluating the mid-calf and mid-thigh circumference using a tape measure. Oedema was rated as mild when the difference was &lt;2cm, moderate when 2–4cm difference was observed and severe when the circumference of the limb exceeded 4cm when compared to the control side or preoperative measures</td>
<td>SL was present in 25% (58/231) of those with inguinal lymphadenectomy. 12 mild, 37 moderate, nine severe cases. 30% (43/144) in those with ilioinguinal lymphadenectomy, 10 mild, 11 moderate and 22 severe cases. 27% (8/30) in those with ilioinguinal lymphadenectomy with primary reconstruction of the groin: three mild, two moderate, three severe cases</td>
</tr>
<tr>
<td>Ornellas et al, 1991</td>
<td>Assessment of three alternative incisions for patients with SCC of the penis to minimise morbidity associated with extensive groin dissection</td>
<td>112 patients with SCC of the penis: 21 bi-iliac incision 47 S-shaped incision 44 Gibson incision</td>
<td>No details provided regarding method of measurement, definition of SL</td>
<td>Bi-iliac incisions resulted in 9% of patients developing SL. S-shaped incisions caused 32% of patients to develop SL. 16% developed SL using the Gibson method</td>
</tr>
</tbody>
</table>
number of reviews (Murphy et al, 2007; NBOCC, 2008). No studies with gender-specific data were identified.

**Sarcoma**
No studies were identified reporting male-specific rates of SL after treatment for sarcoma.

**Bladder cancer**
No studies were identified which reported male-only data for development of SL after treatment for bladder cancer.

**Quality of life and psychosocial impact**
While not life-threatening, SL has lifelong implications for patients and their families. Furthermore, it is a condition which requires long-term management by the health system. Survival rates following cancers associated with the development of SL are currently as high as 92% (NBOCC, 2008). Best estimates from available evidence conservatively report that at least 20% of survivors of breast, gynaecological, prostate cancer and melanoma will develop SL (NBOCC, 2008). Thus, there is a large population at risk of the potential lifelong effects of SL on health-related quality of life (HRQoL).

Twenty-two studies examining HRQoL were identified. Twenty were excluded with seven studies not citing SL as a side-effect of treatment. Eight studies did not separate results between genders. Four studies investigated females only and one study did not distinguish between primary and secondary lymphoedema in data analysis. Only two were included for appraisal (Table 6).

Advances in cancer treatment and reported increases in survival rates highlight the importance of preventing and managing morbidity resulting from treatment in order to maximise HRQoL for cancer survivors.

A small number of studies have emerged regarding HRQoL among those with SL. These highlight the considerable physical, psychological and economic burden of this unpleasant and distressing side-effect of cancer treatment (Woods, 1995).

A number of studies were found which included males and females. However, the findings did not distinguish between genders and were not useful for this review. Remaining studies had low numbers of male participants so may not be a true representation of male responses to HRQoL. Therefore, studies of low quality were included. All studies for HRQoL were appraised using the McMaster tool (Law et al, 1998).

Borbassi et al (2004) was the only study identified which exclusively examined males with lymphoedema. It should be noted that only one out of three participants had cancer-related SL (one primary, one after cellulitis, one after bladder cancer), and therefore the applicability of the themes identified for this review is limited. Specific comments from the cancer survivor included the need to adjust to wearing a compression stocking, having to slow down in daily life and the impact of SL on social activities and leisure due to symptoms of heaviness in the affected limb. Other comments indicated the impact on carers, including the need to adjust daily routine to fit in self-maintenance activities such as massage and regular circumferential measures. Also highlighted was the lack of information regarding risk of lymphoedema after cancer surgery. Scoring 18/27 according to the McMaster tool, the lack of patient numbers and heterogeneity raises questions regarding sampling and potential volunteer bias with the use of support group members who may be more motivated and concerned about their health, therefore, may not provide a true representation of the male population. Despite small numbers, the authors report that participants provided rich accounts of their experience.

Towers et al (2008) examine the experience of patients and their spouses. The main themes identified were the feelings of being alone with this lifelong problem, the burden of living with a swollen limb, frustration with lack of financial support and the importance of support systems. Due to only one male participant, value of the data from this study is limited for this review, as themes emerging from this study may not be a true indication of issues faced by males. It was rated 20/27 according to the McMaster tool. Authors excluded patients with recurrence or end-stage disease to eliminate confounding factors. There were issues with sampling as participants were recruited from practicing therapists and a hospital, therefore all participants were receiving active treatment for SL and reported rates of distress and impact on HRQoL may be underestimated. Also, the high number of participants with BCRL within the study results limited representation of patients with SL associated with other cancer diagnoses.
Table 5

Included studies for incidence and prevalence of lymphoedema after melanoma

<table>
<thead>
<tr>
<th>Study</th>
<th>Interventions</th>
<th>Participants</th>
<th>Methods of assessment</th>
<th>Findings</th>
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<tr>
<td>Karakousis and Driscoll, 1994</td>
<td>Groin dissection for treatment of melanoma</td>
<td>205 patients with malignant melanoma (n=79 men, n=126 women). 94/205 (46%) superficial dissection. 111/205 (54%) radical groin dissection</td>
<td>SL was diagnosed according to circumferential measures taken at variable intervals. In the first 76 consecutive patients, leg measures were taken at variable intervals &gt;6 months after the procedure. No details were provided regarding definition of SL and its classification system used</td>
<td>Gender of the patient did not significantly effect the incidence of postoperative SL. SL most serious long-term complication. All patients had swelling in the anterio-medial thigh. 40% had swelling below the knee. Moderate to severe cases of SL occurred in 12% of patients. SL occurred in 43% of patients after radical groin dissection and 37% after superficial dissection</td>
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<td>Karakousis et al, 1983</td>
<td>Groin dissection for melanoma</td>
<td>76 patients underwent groin dissection; 40 superficial groin dissection; 27 therapeutic radical ilioinguinal groin dissection. Men n=29, women n=38. Follow-up period 27.5 months. Excluded those with adjuvant radiation. Anti-embolic compression stockings worn by each participant after surgery. Operated leg elevated to 30 degrees during hospitalisation</td>
<td>Measurements taken over calf after six months and then yearly. Slight SL was identified when the operated leg was larger in circumference by 1.5–2.5cm and moderate SL was identified when the difference was 3–4.5cm larger. Full length custom-made compression stockings worn continuously for six months and discontinued if no swelling occurred</td>
<td>No significant variance between genders regarding rate of SL. 10/38 or 26% women, 4/29 or 13% men or type of procedure. 20% of those with superficial groin dissection developed SL compared to 22% with radical groin dissection, with an overall occurrence rate of 20%. Of those who complied with prophylactic regimen (n=44), three (6.8%) manifested slight or moderate SL. Of the 23 who were non-compliant, 11 (47%) presented with SL (p&lt;.004). Overall, 7% of those who wore a stocking had SL compared to 45.8% of those who did not. SL and location of tumour was significant. 50 patients with melanoma of the leg, 13 (26%) had SL. 17 with tumours in other areas (5.8%) had SL (p&lt;.001). 26% with lower limb tumours developed SL compared to 5.8% with trunk lesion</td>
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<td>Papachristou and Fortner, 1977</td>
<td>Lymphoedema after incontinuity and discontinuity groin dissection</td>
<td>81 patients with primary melanoma distal thigh. 36 patients with groin dissection incontinuity. 45 with discontinuous groin dissection</td>
<td>Classifying mild SL as &lt;1 inch difference and significant SL as &gt;1 inch difference when measured at the ankle or midcalf</td>
<td>Overall rates for SL were 64% for those with incontinuity groin dissections and 69% with discontinuity groin dissection. 50% males (7/14) with incontinuity dissections and 75% (9/12) males in discontinuity group developed SL. Overall, males developed SL in 61% of cases and females 69%. Significant SL occurred in 30% of females and 26% of males. Incidence of SL increased as number of postoperative years increases. 80% SL reported after five years</td>
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Individuals cope with illness based upon their understanding of the experience. Inherent to this is the need for patients to have adequate information upon which to develop an understanding of health-related issues such as lymphoedema risk (Ridner, 2006). The risk of SL is increased by extent of surgery, lymph node removal and radiotherapy (NBOCC, 2008). There may be a long latent period but patients who have been exposed to these risk factors will have a lifelong ‘risk’ of developing lymphoedema. Failure by healthcare professionals to educate patients about this risk and methods to reduce it, such as avoiding infection and insect bites, may limit patients ability to understand and cope successfully with such a diagnosis (Ridner, 2006).

Compliance with treatment recommendations is crucial to the successful management of SL. Effective self-management by the patient is not possible without understanding (Board and Harlow, 2002), which requires a high degree of information provision.

### Table 6

<table>
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<tr>
<th>Study</th>
<th>Interventions</th>
<th>Participants</th>
<th>Methods of assessment</th>
<th>Findings</th>
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<tr>
<td>Borbassi et al, 2004</td>
<td>Descriptive exploratory study with semi-structured interviews</td>
<td>Three men and their carers identified through the Lymphoedema Association Australia participated. Only one had SL from cancer treatment, one was primary in nature and the other resulted from cellulitis</td>
<td>The authors identified several emerging themes; uncertainty, vigilance, adjustment, cost, public perception and information. Specific responses from the cancer survivor related to adjustment of daily tasks and routine to allow for self-management techniques (massage), and the carer taking on additional roles and duties due to the patients’ restricted activities. Lack of provision of information regarding risk of development of SL after cancer surgery was reported by the participant with cancer-related SL. SL impacts on both the patient and carer/spouse.</td>
<td>The lack of awareness by both health professionals and the general public regarding SL adds to difficulties of those living with the condition. Health professionals need to ensure that they provide advice and education to both patient and spouse at every opportunity. Public awareness of SL needs to improve.</td>
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<td>Towers et al, 2008</td>
<td>Phenomenological approach was used to explore the psychological and social effects of cancer-induced SL in males and females</td>
<td>11 patients and eight spouses with SL from cancer recruited from a university hospital-based lymphoedema clinic and local lymphoedema therapists. One participant was male with SL following penile cancer with bilateral leg lymphoedema.</td>
<td>Reporting of data provided insight into only one specific response of the male participant who reported the impact of wearing compression garments in public, stating children make fun of him. Lack of financial support, perceived lack of knowledge or interest on the part of health professionals, lack of awareness within society were identified as a cause of great concern.</td>
<td>Authors recommend more research into SL for those treated for cancers other than breast cancer and in men, SL in palliative patients, those who have not accessed health care and investigate impact on intimacy and sexuality. Need to increase awareness of SL among health professionals, educators and policy makers regarding effects of such a diagnosis and unmet needs of this population.</td>
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**Education and awareness**

Individuals cope with illness based upon their understanding of the experience. Inherent to this is the need for patients to have adequate information upon which to develop an understanding of health-related issues such as lymphoedema risk (Ridner, 2006). The risk of SL is increased by extent of surgery, lymph node removal and radiotherapy (NBOCC, 2008). There may be a long latent period but patients who have been exposed to these risk factors will have a lifelong ‘risk’ of developing lymphoedema. Failure by healthcare professionals to educate patients about this risk and methods to reduce it, such as avoiding infection and insect bites, may limit patients ability to understand and cope successfully with such a diagnosis (Ridner, 2006).

Compliance with treatment recommendations is crucial to the successful management of SL. Effective self-management by the patient is not possible without understanding (Board and Harlow, 2002), which requires a high degree of information provision.
of patient education on rationale for treatment, likely outcome and anticipated problems.

Furthermore, the associated implications of a diagnosis of lymphoedema on HRQoL, associated health costs to the individual and healthcare system add to the undeniable need to ensure that adequate patient awareness is provided. However, there is evidence to suggest that patients’ information needs are not being catered for (Worth et al, 2000 cited in McCaughan and McKenna, 2007), and that patients are not satisfied with the information they receive (McPherson et al, 2001 cited in McCaughan and McKenna, 2007). The quality and content of information given can be poor and healthcare professionals do not fully understand the patients’ needs and how best to address them (Mills and Sullivan, 1999 cited in McCaughan and McKenna, 2007).

Prevalence and incidence reports are unreliable due to a number of well-documented issues, including the lack of a standard criteria and approach for the diagnosis and measurement of lymphoedema.

Although it is widely acknowledged that significant gender differences exist in the information and support needs of cancer patients (Potts et al, 1991; Krizek et al, 1999 both cited in Brain et al, 2006), the majority of studies addressing the information needs of cancer patients have been carried out on women with BCRL.

There is an obvious lack of research investigating the specific information and support needs of men and their awareness of their risk of developing SL. There have been some male-related cancer studies assessing information needs, which have focused primarily on male-only cancers such as testicular and prostate cancers (Davidson et al, 1995; Quinn and Kelly, 2000 both cited in McCaughan and McKenna, 2007). However, they focused on the long-term side-effects of cancer treatment on sexuality such as impotence and incontinence, which may be perceived as warranting more attention.

Further highlighting the paucity of information available on SL in males,

Table 7

Included studies for education and awareness in males with secondary lymphoedema

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<tr>
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<td>France et al, 2000 Level 5</td>
<td>Phenomenological study using in-depth interviews</td>
<td>Six men who had completed a course of radiotherapy and/or chemotherapy diagnosed with breast cancer</td>
<td>Seven themes identified: delay in diagnosis, shock, attitudes to Male breast cancer, body image, causal factors and the provision of information and emotional support. None of the participants had been offered or given information or literature specific to male breast cancer; instead utilizing inappropriate literature designed for women. Lack of contact with breast care nurses (BCN) for information and support was noted by participants, as well as BCN lack of knowledge on male breast cancer. One respondent expressed concern at the lack of postoperative support and advice provided. Following a mastectomy and axillary lymph node excision he developed oedema of the arm associated with weakness. He believed that had he been informed about these side-effects, he could have taken appropriate action to minimise impact.</td>
<td>The authors concluded that there is a need for gender-specific information in the pre- and postoperative phase to help alleviate potential problems associated with the diagnosis and treatment of breast cancer.</td>
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only one study was identified which made reference to this condition with men diagnosed with breast cancer (France et al, 2000). This study rated 18/27 on the McMaster tool, as it was lacking specific information relating to trustworthiness of data and the researchers’ credentials. Themes identified within this study indicated a lack of male-specific literature and inequities in referral and access to services, despite male participants undergoing comparable surgery and adjuvant treatment to women diagnosed with breast cancer — perhaps again reflecting that the risk of men developing SL is less recognised (Table 7).

Discussion
This review has identified a paucity of evidence in all areas regarding SL in males following cancer. Prevalence and incidence reports are unreliable due to a number of well-documented issues, including the lack of a standard criteria and approach for the diagnosis and measurement of lymphoedema. Inadequate descriptions of lymphoedema and methods of measurement used in studies result in the inability to collect meaningful epidemiologic data regarding lymphoedema, and restrict the comparison of results across studies. The true impact of such a diagnosis within the general population and more specifically, the male population, remains unknown.

A number of studies include males and females but do not report gender-specific separation of data results. Available gender-specific literature is often of poor design, which means that results need to be interpreted with caution. In studies with men only, low response rates are common (Davidson et al, 1995; Feldman-Stewart et al, 2001 both cited in McCaughan and McKenna, 2007). Issues regarding recruitment of adequate patient samples may deter researchers from examining this specific group.

The small number of males within these selected studies may reflect difficulty in recruiting males for research. The use of multisite recruitment may alleviate this issue for potential research.

Furthermore, as men are reluctant to express their health needs

Men are less likely than women to disclose distress and seek help (Brain et al, 2000), hence it is possible that the paucity of research in this area reflects under reporting of the impact of SL by male patients.

(Courtney, 2000; White and Cash, 2004, both cited in McCaughan and McKenna, 2007), visit their GPs less frequently than women (France et al, 2000), and men with cancer are also less likely to use health services (Meryn and Jadad, 2001 cited in McCaughan and McKenna, 2007), recruitment of men with cancer and SL will pose a challenge to researchers and may contribute to the under diagnosis of SL within the male population. Other potential long-term side-effects of cancer treatment, including urinary incontinence and sexual dysfunction may be seen as a higher priority for males and researchers. Therefore, allocation of funding for research into this area may not have been considered as important in the past. Higher quality prevalence and incidence studies which accurately assess risk of SL and the number of men diagnosed with SL are required to further support research in this area.

Further exemplifying the need to investigate the impact of SL on the male population, is that genders differ in their approach to life, values and life roles (Dibble et al, 1998). Investigating gender-specific HRQoL issues related to SL may provide insight into how males cope with such a diagnosis and determine if gender-specific differences are evident in living with SL. This may have the potential to change clinical service delivery to males with SL, including provision of patient education and treatment recommendations. Men are less likely than women to disclose distress and seek help (Brain et al, 2000), hence it is possible that the paucity of research in this area reflects under reporting of the impact of SL by male patients.

Conclusions
There is a significant lack of male-oriented research regarding the incidence, prevalence, education, awareness and impact on HRQoL of SL related to cancer. Current clinical service provision, preventative initiatives and resources are focused on women with BCRL, perhaps reflecting that the risk of men developing SL is less recognised. The true prevalence of SL among the male population needs to be established. Furthermore, the information and educational needs of males at risk of SL and those with the condition need to be formally investigated leading to the potential development of male-specific resources. Addressing these issues is a priority as more males are being diagnosed with cancer; survival rates are increasing and subsequently more males are at lifelong risk of developing SL.

Key points

- Little male-specific research exists on the incidence, prevalence, educational needs and impact of quality of life of males with SL, despite reported rates of SL for urogenital cancer and melanoma being comparative to rates of SL following breast cancer.
- Current provision of care and education is focused on women.
- Further research is warranted on males with SL.
References


