Soft tissue sarcoma at the turn of the millennium
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Chapter 5

Soft tissue sarcoma - compliance with guidelines

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Introduction

Soft tissue sarcomas (STS) are very uncommon tumors, with approximately 8100 new cases annually in the United States and 422 new cases annually in the Netherlands [1,2]. Because of the rarity of these tumors in individual institutions, the great variability in clinical and histopathologic presentation, and the complex multimodality (limb-sparing) treatment, standardization of diagnosis and treatment seems necessary. This important issue was recognized by the national Dutch Cooperative Group for Soft Tissue Tumors, founded in 1991, that organized a nationwide consensus meeting in 1993, resulting in nationwide accepted guidelines with regard to the diagnosis and treatment of patients with STS [3]. Compliance with guidelines is important for various reasons: 1) appropriate preoperative investigations are vital parts in the process of care, accurate staging is essential for planning of appropriate treatment, and explicit guidelines improve clinical practice [4]; 2) frequently, factors other than scientific factors guide physicians in their decision making [5]; 3) adherence to guidelines can result in significant institutional and national health care savings [6]; and 4) there are indications that the appropriateness of treatment (according to the guidelines) is related to patient outcome and survival [4,7,8]. Despite an increase in the development and dissemination of medical practice guidelines, compliance with the guidelines has often been low. No data have been reported that definitively prove that adherence to guidelines improves care for patients with STS. However, in other medical situations, guidelines have been shown to improve patient care if development, dissemination, and implementation are appropriate [4].

In the region of the Comprehensive Cancer Center North-Netherlands (CCCN), the first guidelines for the diagnosis and treatment of patients with STS were developed in February 1983 by a cooperative group for rare tumors, consisting of specialists in surgical oncology, medical oncology, radiotherapeutic oncology, and pathology from various hospitals in the CCCN region [9]. After realization of the first Dutch nationwide accepted STS guidelines in 1993, the CCCN guidelines were revised for the first time in 1994 [10]. Later revisions took place in 1996 and 1998. All physicians who treated STS patients within the CCCN region received a written copy of these (revised) guidelines. It is important to realize that these Dutch guidelines have not been proven to improve patients outcome but have been agreed on by experts in the field and are expected to improve outcome. This study is an analysis of how well these guidelines are being followed in the CCCN region.

Materials and methods

Between January 1989 and January 1996, 833 patients were diagnosed with primary STS in the CCCN region, an area of 2.1 million inhabitants. From these, 393 STS were excluded because of urogenital or gastrointestinal origin, and 40 were excluded because they were diagnosed as Kaposi sarcoma. From the remaining 400 patients with head and neck, trunk (retro)peritoneal, or extremity STS, another 49 patients were excluded from analysis for various reasons, as listed in Table 1.

Cancer registration at the CCCN started in 1986, although full coverage of the whole area encompassed by the CCCN was achieved only from January 1, 1989. The main
sources for the Cancer Registry are the national computerized pathology databank (PALGA) and the hospital discharge databank to which all Dutch hospitals provide information annually on discharge diagnoses of admitted patients. Specially trained CCCN employees prospectively register data from the patients’ clinical records. For this study, data on diagnosis, treatment, and follow-up were reviewed by CCCN employees and, if necessary, revised and completed, based on information recorded in the patients’ chart. Within the CCCN district, the Groningen University Hospital is regarded as the referral center for patients with sarcomas and is indicated in the text as the center. Four of the other 18 hospitals in the CCCN region are teaching general hospitals, and 14 are nonteaching district general hospitals, all of which will be referred to as district hospitals. All district hospitals had access to well trained pathologists. Before 1995, tumor slides were reviewed by one of the STS experts at the Groningen University Hospital if histological typing was difficult or if patients were referred to the center. Since 1995, all STS diagnoses in the CCCN region have been revised and discussed monthly by a panel of pathologists from the various hospitals within the CCCN region under the chairmanship of experts from the center.

According to the 1983 guidelines, diagnostic work up of patients with STS should start with an adequate physical examination, especially with regard to the tumor region. Lactate dehydrogenase and liver and renal function should be assessed (the latter two of which had been dropped from the guidelines since the 1994 revision). Radiographic examination should include a conventional X-ray of the tumor, followed by computed tomography (CT) and/or ultrasonography (US) of the tumor region. In 1994, the conventional X-ray became an optional examination, whereas magnetic resonance imaging (MRI) of the tumor became the imaging technique of choice. The presence of distant metastatic disease was examined by pulmonary X-rays, and, if necessary, followed by pulmonary CT scan. A bone scintigraphy was obligatory until 1994, after which it had to be performed only on indication [11].

Fine-needle aspiration and core biopsy were advised only to differentiate between mesenchymal, epithelioid or lymphoid origin of the tumor. For definitive histologic diagnosis, a surgical biopsy procedure was advocated. A (radical) excisional biopsy should be performed only in patients with small, unsuspicious, superficial tumors. Although no specific size was mentioned in the 1983 and 1994 guidelines, a small tumor size was interpreted as < 3 cm. In patients with larger (≥ 3 cm), suspicious, and/or deeply seated tumors, an incisional biopsy had to be performed prior to definitive resection. Further-

<table>
<thead>
<tr>
<th>Table 1. Reasons for exclusion.</th>
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<tr>
<td><strong>Reason</strong></td>
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<tr>
<td>Pediatric STS</td>
</tr>
<tr>
<td>Medical chart lost</td>
</tr>
<tr>
<td>Medical chart inaccessible</td>
</tr>
<tr>
<td>Diagnosis postmortem</td>
</tr>
<tr>
<td>Morphology not STS (revised)</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>
more, it was stated in the guidelines that biopsy should be performed preferentially by
the same surgeon who would be responsible for the definitive treatment. In patients
with large tumors and/or tumors located at ‘difficult’ locations, referral to the center was
recommended.

Actions were classified as appropriate, if the investigations performed and the interven-
tions undertaken were in agreement with the guidelines, whereas deviations from the
guidelines were classified as inappropriate. Comparison between groups was performed
using the chi-square test.

Results

Between January 1989 and January 1996, 351 patients with primary STS were diagnosed
in the CCCN region. More than half of the patients were age > 60 years (n=201 patients;
57%). Ninety-eight patients were even age > 70 years (28%). Figure 1 presents the age
distribution in patients who underwent biopsy and treatment in the center compared
with patients who underwent biopsy in a district hospital but who were treated in the
university hospital and patients who were diagnosed and treated in district hospitals.
There was an obvious age difference between patients who were treated in the center and
those who were treated in the district hospitals. More of the younger patients were treated
in the center, whereas more of the older patients were treated in community hospitals
(P<0.001). Furthermore, there was a significant, nearly linear decline in the referral rate
with increasing patient age (P=0.002) (Fig. 2).

Malignant fibrous histiocytoma was the most frequent histologic type (24%), followed by

![Figure 1. This chart shows the age distribution among patients who were treated at a specialized treat-
ment center (Groningen University Hospital; center), referred for treatment to a specialized center (re-
ferred), or treated at district general hospitals (district hospitals). The inset at right indicates patient ages
in years.]()
liposarcoma (23%), leiomyosarcoma (21%), fibrosarcoma (7%), synovial sarcoma (5%), malignant peripheral nerve sheath tumors (5%), and rhabdomyosarcoma (4%). Six percent of the STS tumors were classified as otherwise specified, whereas 5% were classified as not otherwise specified. The distribution of histologic types differed between the three patient groups, with a higher incidence of synovial sarcomas in the specialized center (center: 8 of 59 patients; 14%; referred: 6 of 62 patients; 10%; district hospital: 3 of 230 patients; 1%), and a higher incidence of leiomyosarcomas in district hospitals (center: 6 of 59 patients; 10%; referred: 6 of 62 patients; 10%; district hospital: 61 of 230 patients; 27%). Most synovial sarcomas (n=12 tumors) were located in the lower limb (71%), especially around the knee (n=6 tumors; 36%). Overall, 17 of 73 leiomyosarcomas were encountered in the retroperitoneum (23%).

Table 2 shows the distribution of STS according to anatomic site. Overall, most STS were located in the extremities (n=159 tumors; 45%). The distribution according to anatomic site differed significantly between hospital groups (P <0.001). Most obvious were the higher incidence of lower extremity STS in the center and the higher incidence of STS of retroperitoneal, abdomen, pelvis, and head and neck in the community hospitals. In the specialized center, nearly 50% of the STS were located in the lower extremity and hip compared with only 21% of patients diagnosed and treated in community hospitals. The relatively highest referral rates were in STS of the lower extremity and hip (45%) and upper limb and shoulder (19%). Fifteen of 40 referred patients with lower limb STS (38%) were referred to the center for hyperthermic isolated limb perfusion with tumor necrosis factor α and melphalan, followed by resection. Thirteen patients were referred for reexcision of an STS that was diagnosed after an unplanned excision (‘whoops-operation’) in a district hospital (33%). Two patients (5%) were referred for primary resection because of radiographic suspicion of infiltration into bone or vascular structures. In the remaining 10 patients, the reason for referral could not be derived from the medical
records. Six of seven referred patients (86%) with upper limb STS were referred for reexcision after a ‘whoops-operation’ in a district hospital. The other patient was referred for final treatment after incisional biopsy in a district hospital.

Physical examination

The anatomic site of the tumor could be retrieved from all charts. Table 3 illustrates the adherence to the guidelines. Overall, even after completion of the diagnostic process, tumor size could not be retrieved from the medical charts of 76 of 351 patients (23%).

<table>
<thead>
<tr>
<th>Table 2. Distribution according to anatomic site.</th>
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<tbody>
<tr>
<td>ICD-O code</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Head/neck</td>
</tr>
<tr>
<td>Upper limb/shoulder</td>
</tr>
<tr>
<td>Thorax</td>
</tr>
<tr>
<td>Retroperitoneum</td>
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<tr>
<td>Abdomen</td>
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<tr>
<td>Trunk</td>
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<tr>
<td>Pelvis</td>
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<tr>
<td>Lower limb/hip</td>
</tr>
<tr>
<td>Total</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Table 3. Adherence to the guidelines.</th>
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<tbody>
<tr>
<td>Guideline</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Physical examination</td>
</tr>
<tr>
<td>Tumor size recorded</td>
</tr>
<tr>
<td>Tumor depth recorded</td>
</tr>
<tr>
<td>Regional LN examined</td>
</tr>
<tr>
<td>Radiological examination</td>
</tr>
<tr>
<td>US/ CT/ MRI tumor region</td>
</tr>
<tr>
<td>Pulmonary XT/ CT</td>
</tr>
<tr>
<td>Bonescan</td>
</tr>
<tr>
<td>Laboratory examination</td>
</tr>
<tr>
<td>Liver function tests performed</td>
</tr>
<tr>
<td>LDH measured</td>
</tr>
</tbody>
</table>

LN: lymph node; US: ultrasound; CT: computed tomography; MRI: magnetic resonance imaging; XT: x-ray; LDH: lactate dehydrogenase.

1 There was a statistically significant difference between center, referred patients, and not referred patients.
with a highly significant difference between patients who were diagnosed and treated in the center, referred patients, and patients who were diagnosed and treated in district hospitals ($P = 0.002$). This difference was age related but was not influenced by differences in anatomic distribution. In patients age < 65 years, tumor size was recorded significantly better in the center ($P = 0.002$), whereas, for patients age $\geq 65$ years, such difference could not be demonstrated ($P = 0.29$). Figure 3 presents the distribution of the recorded tumor size, which was not significantly different between the three groups ($P = 0.227$). Recording of tumor depth differed significantly between the three groups of patients: it was worst in patients who were diagnosed and treated in district hospitals (Table 3). In the center, 38 of 59 tumors were deeply seated (64%), and 16 tumors were located superficially (28%), whereas, in the remaining 5 patients (8%), the exact tumor depth was described insufficiently or not at all. For patients who initially were diagnosed in a district hospital, these rates were 38 of 292 tumors (28%), 90 of 292 tumors (31%), and 119 of 292 tumors (41%), respectively. In the center, in 31 of 40 STS of the extremities, head and neck, and pelvis, the regional lymph node status was recorded (78%). For referred and not referred patients, initially diagnosed in district hospitals, these rates were 36 of 52 tumors (69%), and 49 of 135 tumors (36%), respectively.

Radiologic examination

Overall, radiologic examination of the tumor region by ultrasonography, CT, or MRI was performed in 188 of 351 patients (54%) (Table 3). Because CT/MRI became obligatory only after 1994, we examined how the change in guidelines had influenced clinical practice. Before 1994, at least US or CT of the tumor region was performed in 85% of the
patients who were diagnosed and treated in the center, in 56% of the referred patients, and in 41% of the patients who were diagnosed and treated in the community hospitals. For the period 1994-1996, these rates were 100%, 83%, and 43%, respectively.

Patients who were diagnosed and treated in the specialized center more often underwent a plain pulmonary X-ray and/or pulmonary CT scan (Table 3). Furthermore, in the center, most of the patients had both radiologic examinations (42 of 54 patients; 78%), whereas, in the district hospitals, in only 41 of 171 patients were both radiologic examinations performed (24%). In the center, 76% of the patients with normal chest X-rays underwent an additional pulmonary CT scan compared with only 24% of comparable patients in the district hospitals. In case the chest X-ray was suspect for metastatic disease, then these rates were 83% and 44%, respectively.

Overall, a bone scan was made in only 122 of 351 patients (35%) (Table 3). In patients who were treated finally in the specialized center, a bone scan was performed significantly more often. This difference could be demonstrated for all different anatomic sites. According to the guidelines from 1983-1993, this examination was obligatory in all STS patients. However, since 1994, bone scans were performed on indication. During the period before 1994, 73% of patients who were diagnosed and treated in the center had a bone scan compared with 62% of referred patients and only 16% of patients who were diagnosed and treated in district hospitals. During the period 1994-1995, these rates were 79%, 82%, and 14%, respectively, resulting in an overall increase from 33% in 1989-1993 to 39% after 1994.

**Laboratory examination**

Overall, liver function tests were performed in 294 of 351 patients (84%). Again, the difference between the three patient groups was significant (Table 3). Although liver function tests were abandoned in the 1994 revision of the guidelines, no change in practice was observed. From 1989 to 1993, at least one liver function test was performed in 199 of 239 patients (83%), whereas, in the period 1994-1995, this number increased to 95 of 112 patients (85%). The median and mean numbers of liver function tests performed were equal in both periods (1989-1993, 4 and 3.4, respectively; 1994-1996, 4 and 3.3, respectively). Serum lactate dehydrogenase also was determined most frequently in the specialized center (Table 3).

**Diagnostic procedure**

Overall, 100 of 233 tumors ≥3 cm (43%) were diagnosed after an unplanned excision (‘whoops-operation’). The management of patients with these larger tumors differed significantly between the specialized center and community hospitals (P < 0.001). According to the guidelines, an incisional biopsy had to be performed in patients with these larger tumors. In the center, this guideline was followed in 32 of 50 patients with tumors ≥3 cm (64%) compared with 19 of 47 referred patients with a tumor of that size (40%), and only 34 of 136 patients who were diagnosed and treated in community hospitals (25%). Tables 4 and 5 present the management of patients with tumors ≥3 cm according to anatomic site. The diagnostic management of patients with larger retroperitoneal
and abdominal STS did not differ between the specialized center and the community hospitals \((P = 0.93)\). However, the management of patients did differ for those with larger STS at other sites \((P < 0.001)\).

In the center, in four patients with tumors \(\geq 3\) cm who underwent an unplanned excision, the medical chart explicitly stated the surgeon’s conviction of the benign nature of the tumor \((8\%)\). Such statements were encountered in the charts of 17 of 183 patients with a tumor \(\geq 3\) cm who were diagnosed initially in community hospitals \((9\%)\). Five of the latter patients were referred to the specialized center for definitive treatment.

To determine the influence of experience on adherence to the guidelines, we divided district hospitals into two groups according to the number of patients diagnosed in the study period \((\geq 15\) or < 15\). In six district hospitals, which included the four teaching hospitals, 15 or more patients were diagnosed. Table 6 summarizes the adherence to the individual guidelines and compares the specialized center with district hospitals, which are divided into two groups according to patient volume. For all individual guidelines, compliance was significantly better in the specialized center. In district hospitals, patient volume had no significant impact on compliance, except for one important item,
i.e., the management of patients with larger tumors. In district hospitals, where fewer than 15 patients were diagnosed with STS in the 7-years period, significantly more often, an inadequate biopsy or even no biopsy was performed prior to resection of the larger and, thus, suspicious soft tissue tumors (P = 0.02). Furthermore, there was a trend toward better preoperative imaging in district hospitals with larger patient volumes compared with hospitals that had less experience (P = 0.056). The difference in the diagnostic approach for patients with larger tumors was not influenced by tumor depth, as shown in Table 7. For patients with both superficially located and deeply seated STS measuring ≥ 3 cm, the guideline for performing an incisional biopsy was best followed in the specialized center followed by ‘higher’ volume district hospitals. In ‘lower volume’ district hospitals the compliance rate was less than 20%.

**Discussion**

Because of the rarity of STS, many surgeons are unfamiliar with these tumors, often leading to unforeseen findings during or after an operation for a soft tissue mass. Inadequate treatment, especially inadequate skin incision, intraoperative tumor spillage, postoperative bleeding, or hematoma, can seriously hamper definitive surgery, that, often, is already very challenging. Furthermore, it can increase the morbidity of the definitive resection, increase the necessity for adjuvant radiation therapy, and possibly even interfere with the sparing of a limb. Although it seems likely that such inadequate primary resections negatively influence locoregional control or even prognosis, this has not
been demonstrated in patients with STS, provided that negative surgical margins can be achieved after definitive resection.

There are only limited studies with respect to adherence to guidelines. Progress in cancer treatment can be made only if guidelines are followed. This may explain why cancer patients who are treated in trial protocols have a better prognosis [12,13]. In patients with cervical and endometrial carcinoma, observational studies in seven districts of the South East Thames Regional Health Authority demonstrated that survival was influenced not only by biologic and demographic factors but also, independently, by appropriateness of care according to guidelines [7,8]. This seems to be a particularly important finding, because, unlike biologic and demographic factors, treatment patterns can be changed. We therefore analyzed the diagnostic process in patients with primary STS in the northeastern part of the Netherlands, with special attention to differences in adherence to the guidelines according to specialization and experience.

The majority of patients who present with a primary STS, as demonstrated in other studies [14,15,16,17], were age > 60 years (57%). Younger patients were treated more often in the center, a phenomenon also seen in the referral pattern of patients according to age. In contrast to patients ages 15-29 years, of whom 43% were sent to the specialized center, only 14% of patients age > 60 years, by far the largest group, were referred. One of the reasons might be a more aggressive approach of younger patients compared with a more conservative and often fatalistic attitude toward older patients. Cancer in the elderly is treated surprisingly poorly, and the behavior of the disease in older patients often is understood poorly [18]. Several other studies have shown clearly that cancer therapy varies significantly with age and that the percentage of patients receiving definitive therapy declines with increasing age [19,20,21]. One of the contributing factors may be that, in older patients, physicians are less likely to recommend specialist consultation [20]. Unfortunately, the current study did not examine this issue. Other factors may be considered, although, in the Netherlands, financial issues and difficulties of getting to the medical center seem to be of minor importance because of excellent public health insurance and relatively short traveling distances combined with good public transport facilities.

Table 7. Incisional biopsy procedure in tumors ≥ 3 cm according to tumor depth and patient volume.

<table>
<thead>
<tr>
<th>Tumor depth</th>
<th>District hospitals</th>
<th>P value (difference between groups)</th>
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<tr>
<td></td>
<td>Total</td>
<td>Center ≥15 patients/7 yrs &lt;15 patients/7 yrs</td>
</tr>
<tr>
<td></td>
<td>n %</td>
<td>n %</td>
</tr>
<tr>
<td>Superficial</td>
<td>19/55 35</td>
<td>9/15 60</td>
</tr>
<tr>
<td>Deep</td>
<td>40/92 43</td>
<td>21/31 68</td>
</tr>
<tr>
<td>Uncertain or unknown</td>
<td>26/86 30</td>
<td>2/4 50</td>
</tr>
<tr>
<td>Total</td>
<td>85/233 36</td>
<td>32/50 64</td>
</tr>
</tbody>
</table>

* There was a statistically significant difference between center and lower and higher volume district hospitals.

The distribution of histologic types was in concordance with the literature [14-17]. Most
obvious differences were the higher incidence of synovial sarcomas in the center and the higher incidence of leiomyosarcoma in the community hospitals. Synovial sarcomas occur predominantly in the lower extremity, where they tend to arise in the vicinity of large joints, especially the knee region. Furthermore, they are most prevalent in younger patients [22], which was shown in the current series. Therefore, the higher incidence of synovial sarcomas in the center can be explained by the higher incidence of younger patients and lower extremity STS. Because leiomyosarcomas have the highest incidence in patients age > 65 years [17] and significantly more patients age > 65 years were diagnosed initially in district hospitals, the observed higher frequency of leiomyosarcomas diagnosed in district hospitals was not unexpected.

One of the decisive factors for definitive (surgical) treatment is a correct diagnostic procedure. During the study period, guidelines advised the performance of an incisional biopsy for patients with larger tumors. Therefore, the adequacy of the biopsy was evaluated in that perspective, although core biopsy has been promoted as a very elegant diagnostic tool and although some surgeons have suggested that definitive resection without biopsy is the best treatment for patients with STS, especially if the tumors are contained within a muscle, provided that a ‘wide’ margin can be obtained. Notwithstanding the guideline, 43% of tumors ≥ 3 cm was diagnosed after excisional biopsy. This seems very disappointing but is in accordance with the results of a nationwide survey of the management of patients with STS in the United States. In that study, which was carried out under the auspices of the Commission on Cancer of the American College of Surgeons, 49% of patients with STS were diagnosed by excisional biopsy [23].

The current study demonstrated a significant difference in the diagnostic management of patients with larger STS between the specialized center, ‘higher volume’ district hospitals and ‘lower volume’ district hospitals, in both superficially located STS and deeply located STS. Because we could not demonstrate a difference between the specialized center and the other hospitals in the diagnostic approach of larger retroperitoneal and abdominal STS (Table 4), the difference in biopsy procedure in patients with deeply located tumors must be explained by different approaches in patients with larger STS located at other anatomic sites. Because the appropriateness of the biopsy procedure is very important for definitive treatment, a concentration of patients with these rare tumors in a limited number of hospitals seems advisable. Progress in the treatment of patients with STS can be made only by combined modality treatment, which is another argument for treating patients with these tumors in defined centers. In addition, to get more insight into the disease itself, modern sophisticated basic research is needed, which can be performed only in such centers.

A remarkable finding was that, in 9% of patients with STS ≥ 3 cm, the patient’s medical chart contained an explicit statement of the surgeon’s conviction of the benign nature of the tumor, although its greater size should have raised some suspicion. It appears that the optimal diagnostic approach for patients with soft tissue masses should be an important topic for educational programs for practicing surgeons.

In their review of baseline institutional compliance with the National Comprehensive Cancer Network guidelines regarding patients with non-small-cell lung carcinoma, Walsh and Winn demonstrated excessive, inappropriate, and expensive radiologic testing in
50% of patients [6]. Their conclusion was that significant institutional and national health care savings would result if clinicians would to use and implement the recommendations put forth in the guidelines. This also can be demonstrated in the current study. Although liver function tests and bone scans were no longer obligatory because of the revisions to the guidelines in 1994, we could not demonstrate a change in clinical practice. Instead of a decline, the number of liver function tests slightly increased by 2%, whereas the number of bone scans increased by 18%. It seems obvious that adherence to the guidelines would have resulted in considerable savings.

In a systematic review of rigorous evaluations of clinical guidelines, Grimshaw and Russell concluded that explicit guidelines do improve clinical practice and patient outcome if development, dissemination, implementation, and evaluation all are appropriate [4]. In their classification of clinical guidelines, guidelines with the highest probability of being effective are those that are developed internally, with specific educational interventions and patient-specific reminders at the time of consultation. Conversely, guidelines with the lowest probability of being effective are those that are developed nationally and are disseminated by publication in a journal without patient specific feedback but with only general reminders [24]. According to this classification system, the probability that the CCCN STS guidelines would have been effective seems to be rather low. These guidelines were developed locoregionally by a cooperative group of oncologic specialists from various hospitals in the CCCN region. Thereafter, written guidelines were sent to all treating physicians in the region. However, adequate implementation and quality-control programs were lacking. With regard to the dissemination strategy, which was designed to ensure that target clinicians had a knowledge of the guidelines, the review by Russell and Grimshaw suggested that the greater the educational component, the greater the likelihood that the guidelines would be adopted into clinicians’ practices. Specific locoregional educational initiatives seem to be more effective than mailing to targeted clinicians or publication in professional journals. Concerning implementation strategy that is designed to encourage clinicians to adopt the guidelines, Russell and Grimshaw suggested that strategies specific to individual patients (specific feedback) more likely would encourage clinician compliance.

For the introduction of future guidelines for the diagnosis and treatment of patients with these rare tumors, knowledge of this complex process and its crucial steps is vital. Guidelines should be developed by those who are to use them, should be disseminated by enthusiastic educational programs, and should be implemented by a quality-control program with patient specific feedback.

**Conclusions**

In many aspects of the diagnostic process of STS, existing guidelines are not followed, especially in community hospitals. Adherence to individual guidelines is significantly better in specialized centers. Although, in district hospitals, patient volume had no significant impact on adherence to most guidelines, the biopsy procedure in larger tumors was significantly better in higher volume hospitals. Because the correct diagnosis, staging, and treatment of patients has been shown to be crucial in the management of many tumors, concentration of patients with STS in a limited number of hospitals, and intensified collaboration with specialized centers seem advisable.
Because STS is a disease of the elderly, special attention should be paid to the older patients, because significantly more often, they are not referred to a specialized center for treatment.

References