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SPECIAL EDITORIAL

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SSE Spine Tango – content, workflow, set-up

www.eurospine.org – Spine Tango

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Abstract The Spine Tango registry is now accessible via the SSE webpage under **www.eurospine.org – Spine Tango**. Links to the Swiss/International, German and Austrian modules are provided as well as information about the philosophy, methodology and content. Following the links, the users are taken to the respective national modules for registration or log-in and data entry. The Swiss/International module, also accessible under **www.spinetango.com**, is used by all Swiss and international users, who do not have a separate national module. The physician administered forms for surgery, staged surgery and follow-up can be downloaded as PDFs.The officially recommended Spine Tango patient forms are also available. All forms were implemented in an online version and as scannable optical mark reader forms which can be ordered from the corresponding author.

Keywords Spine · Registry

Introduction

The history and philosophy of Spine Tango have been described in previous articles [1, 5]. The current article aims to give detailed information about the final content of Spine Tango and the macro set-up of the registry with its distributed national servers, and also to offer recommendations for the integration of Spine Tango documentation into the day-to-day clinical workflow.

Format

The multitude of questions in the Spine Tango pilot version was consolidated into a question set small enough to be arranged on the front and back of an A4 sheet of paper, for the purposes of either online or paper-based implementation. Nevertheless, the refined set of questions still allows documentation of the broad spectrum of pathologies and treatments in spine surgery. This is made possible by means of a list of main pathologies and their specifications and the so-called surgical matrix, a terminology system reducing the interventions to their basic principles – decompression, fusion, stabilization rigid, stabilization motion preserving, percutaneous procedures and others. The duplication and, hence, separation of these principles into anterior and posterior ones completes the matrix.

Content and structure

The first half of the front page of the 'Surgery' form serves to specify the level of the procedure, admission

date, case history (previous conservative and surgical treatments), main and additional pathology, most severely affected segment and extent of lesion. This information is grouped into the 'Admission' subform.

The 'Specification of main pathology' subform makes up the second part of page one and comprises 1–3 questions per 'Main pathology' category. These serve to provide more information about the main pathology. Since 'Main pathology' is a single answer question, only one group applies per form. Accordingly, between 11–13 questions must be answered on the front page. On the reverse side of the sheet are the 'Surgery', 'Surgical measures' and 'Discharge' subforms. The 'Surgery' subform is the largest (12 questions) and inquires about surgery date, implants used, goals of surgery, the surgical matrix, surgeon credentials, access and technology, operation time, morbidity state and blood loss. The 'Surgical measures' subform applies the same principle as the 'Specification of main pathology' subform – only the items relevant to the information given for the matrix questions need to be completed. Typically, this can be done with two to four questions. Finally, the 'Discharge' subform enquires about the discharge date, surgical and general complications, measures taken, and the status of complications upon discharge. It makes up between 3–7 questions. In summary, a Spine Tango Surgery form consists of a minimum of 26 and a maximum of 35 questions, depending on the case in question.

In addition to the Surgery form, there is also a so-called Staged form and a Follow-up form. The Staged form serves to document the second part of planned two-stage procedures, i.e. procedures where the patient remains in the hospital between the first and the second intervention. If the patient is discharged, a new surgery form must be completed. Also, if an early revision is carried out, the correct way to document this is with a new surgery form with the diagnosis 'failed spine'. The Staged form is identical to the Surgery form but without the anamnestic questions about previous surgeries and the discharge date. The admission date must be completed in order to ensure linking to the correct Surgery form, in which the same admission date should have been recorded. The Main pathology question has an additional answer 'same as first surgery'.

The Follow-up form is just one side of the A4 sheet and consists of a 'Follow-up' subform and a 'Complications' subform. In its paper format, it can be completed in less than a minute. After the date of follow-up and the follow-up interval have been completed, the patient's work status is documented, and the surgical goals that were achieved, partially achieved, or not achieved at all are indicated. Only the surgical goals that are indicated on the Surgery form are to be considered. Current medication, rehabilitation and the surgeon's rating of the outcome are then recorded. The last question in the 'Follow-up' subform inquires about the need (or not) for further follow-up, revision surgery, or another primary intervention.

In the absence of complications, the 'Complications' subform can be completed with just one answer 'no' to the 'complications' question. Where complications have arisen, the point of time at which they occurred, the type of complications, and therapeutic and individual consequences are inquired about.

Patient-orientated measures: short and sweet

The assessment of patient-orientated outcomes is an indispensable part of any good medical documentation system. In order to confer clinical relevance to the surgical data collected in Spine Tango, the latter must be complemented by data regarding patient outcomes. While the ability to register patient-orientated data, using long and detailed outcome questionnaires (e.g. for patients participating in specific research studies), remains a possibility in Spine Tango, a short questionnaire has also been developed with the specific aim of collecting patient-orientated data from all patients who undergo spinal surgery and whose corresponding surgical details have been entered into the Spine Tango system. The benefit of a *short* collection of pertinent questions is that it facilitates the implementation of the questionnaire *in the daily clinical routine* – in all patients, on a prospective basis, and with relatively minimal administrative effort. The questionnaire that we recommend for these purposes is an adaptation of the core set of outcome measures originally proposed by Deyo et al. [2] and since adapted for use in the German and Spanish languages, which is shown to be a reliable, valid and sensitive instrument [3, 4]. We aim to have adaptations of the questionnaire in all languages of the countries participating in Spine Tango by the end of 2006 (anyone interested in adapting the questionnaire for their own national language should contact the authors).

The core-set of questions comprises several dimensions of outcome, each addressed to a single item: pain severity, assessed separately for back and leg (for lumbar spine patients) or for neck and arm (for cervical spine patients); function; symptom-specific well-being; general well-being ('quality of life'); disability (work); disability (social role); plus (at follow-up) satisfaction with treatment and global rating of treatment outcome. The versions for the longer-term follow-ups include two additional questions enquiring about complications and re-operations. These serve to double check the surgeon's input and also ensure that data from patients who may have subsequently received treatment from a different healthcare provider are still recorded.

The follow-up questionnaires are to be completed by all patients before and at various time intervals after

surgery, i.e. at the first postoperative check-up (2–3 months), and 12 and 24 months postoperative, and whenever the patient presents complications.

Implementation

As stated above, there are two main ways in which the Spine Tango questionnaire can be completed. In the online version, the five subforms are represented by tabs, whereby only the content of the currently opened subform is visible. A subform is the minimal data set that must be completed in order to be able to save the data. Incomplete subforms are rejected by the system; closing the application without saving the subform also leads to loss of the respective data subset. The different subforms can be completed by different staff members, at different points of time and from different computer terminals; thus enabling real time data collection at the source in a team effort. Only when all subforms have been saved is it possible to submit the questionnaire to become part of the SSE Spine Tango data pool. Whilst online entry of information corresponds with a direct transfer of data to the database, these two steps are separated when using the paper version of Spine Tango. Here, staff members complete the questionnaire with paper and pencil. The obvious advantages are the quick and convenient way of capturing data and the fact that each single pencil mark is a piece of stored information. The subform structure may still be utilized for distributing responsibilities and structuring workflow. In a second, more administrative step, a secretary, research nurse, or other staff member scans the form into the system, thereby transferring the information to the central database. This seemingly more cumbersome process is actually advantageous from the point of view of the busy surgeon: the time spent for data entry is shorter, the mode of data entry is easier and the procedure of data transfer can be delegated. Although the latter approach is seen as less 'modern' by those who condemn the use of pen and paper, and plead for and predict a rapid digitalization of our hospital systems, the reality is that the paper-based approach is, without doubt, the preferred and most frequently used mode of data collection. The optical mark reader for scanning forms is a high tech tool for rapidly transferring the data to the central database. A low tech alternative of the paper-based approach is the use of normal, non-scannable questionnaires followed by subsequent data entry by a secretary using the online interface. This type of work system is adopted in the majority of hospitals participating in the Swedish Lumbar Spine Register (P. Fritzell, personal communication) and clearly demonstrates what can be considered a normal documentation process in today's hospitals.

Workflow

While the surgeon's skills are the most crucial factors for a successful intervention, organizational skills are the key to success in medical documentation. Optimal integration of the Spine Tango system into the daily routine is the only way of ensuring completeness, correctness and validity of the data collected, and of guaranteeing the sustainability of the project. An excellent IT infrastructure is a basic prerequisite for the routine use of the online mode of data entry. Computers with sufficiently modern software and fast web access must be available in all strategically important locations, i.e. wards, operating theatre and outpatient clinics. In addition, all staff members involved in data collection must have sufficient knowledge of the application. In contrast, paper questionnaires, whether of the scannable or non-scannable sort, can be completed by anyone and with very few instructions. Only one computer and one person are needed for managing the application and entering the data. A possible source of problems in relation to the paper-based mode is the volatility of paper forms in the hospital environment. All involved must be disciplined enough to ensure that the completed forms end up in the documentation office and not in office drawers or in the hospital's archives. Moreover, timely feedback mechanisms must be implemented in order to register and report cases with incomplete or missing data to the responsible staff members. This should happen at least on a weekly basis. The later the feedback is given, the less likely are the chances that the information will be accurately delivered retrospectively.

Time investment

Tables 1 and 2 show the average time needed for the work steps for the different means of completing a surgery form. The times are given for advanced users who are beyond the learning curve and deliver complete forms without errors. Note that the time required may vary somewhat for the online processes, since external factors like the speed of web access and traffic on the web may influence performance.

Makro set-up

The set-up of the Spine Tango registry follows a distributed server concept that recognizes the importance of protecting patient and physician privacy. In addition to the central server, which is the database and application service provider, a network of satellite servers – the so-called modules – is built up in the participating countries. Each satellite server has its own local database

Table 1 Spine Tango Surgery online processes:

Work process	Duration (s)
Log-in, create/search patient, open patient e-chart	30
Create Spine Tango form	20
Complete and save 'Admission' subform	40
Complete and save 'Specification of main pathology' subform	60
Complete and save 'Surgery' subform[a]	80
Complete and save 'Surgical measures' subform	45
Complete and save 'Discharge' subform, submit completed Spine Tango form	40
Total	5 min and 15 s

[a]Without implant documentation (optional)

Table 2 Spine Tango Surgery paper and online/scanning processes:

Work process	Duration (s)
Complete 'Admission' subform (paper)	25
Complete 'Specification of main pathology' subform (paper)	5
Complete 'Surgery' subform (paper)	30
Complete 'Surgical measures' subform (paper)	15
Complete 'Discharge' subform (paper)	15
Log-in, create/search patient, open patient e-chart (online)	30
Scan paper questionnaire, submit e-form (online)	50
Total	Form completion: 90 s Form administration: 80 s

Fig. 1 Registry access via SSE web page, data segregation and communication of users with national module and central database

and acts as a filter of all user and patient-related data; and this completely anonymous medical data set is passed on to the central SSE Spine Tango data pool in Switzerland (Fig. 1). Within the satellite servers, user and patient data are separated from the medical information and replaced by two keys. The medical data set, the two keys and the module ID are finally stored in the central database. Hence, neither of the two entities stores the complete data set and consequently both sides are blinded. Only the user, when querying the data, receives both parts of the information. Therefore, no identifiable data set crosses national or European borders and patient confidentiality is assured. Table 3 displays the parameters that are replaced by the encryption process.

Access

In order to avoid complications with different web-addresses belonging to the various modules, there is only one central point of entry for all modules, which is the Spine Tango section on the SSE website **www.eurospine.org**. All available modules are displayed as links and the users are automatically forwarded by clicking on their country of choice. The Swiss module is also available under **www.spinetango.com** and serves not only as a filter for all Swiss users, but also as an access point for users from other countries where an early installation of an independent national module cannot be expected.

Experiences of a pilot clinic

The feasibility of implementing the Spine Tango has been examined in the Spine Unit of the Schulthess Clinic, Zurich, Switzerland. After initial teething problems, the system now runs successfully and achieves

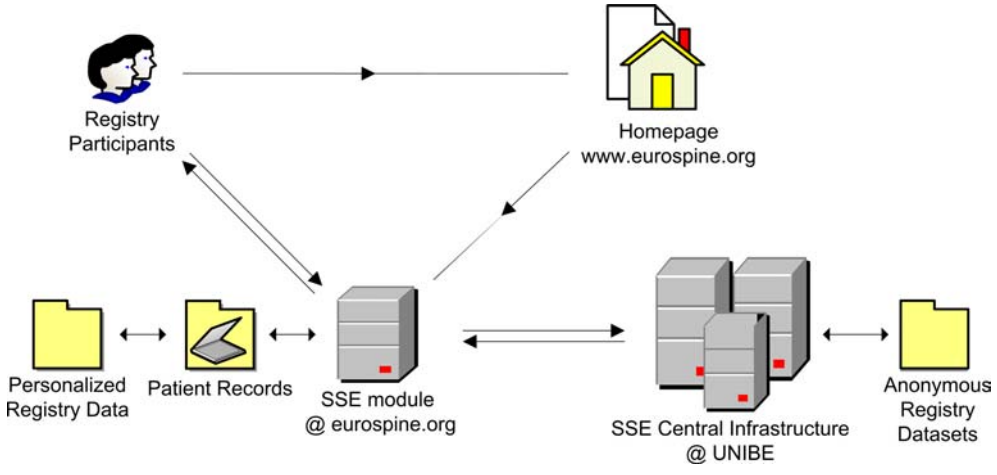

Table 3 Spine Tango data segregation and encryption

	Parameter in satellite database	Encoding key in central database
User information	User name Password	X
Patient information	Medical record number Day, month of birth Personalized information	Y
Medical information	Not stored	Not encoded
Module information	Module ID	Module ID (not encoded)

pre-surgery compliance rates of 98%, first follow-up of 96% and 12-month follow-up of 91%. The pre-surgery questionnaires are sent by post to the patients at the same time as the information regarding their forthcoming operation. The patients are requested to complete the questionnaire in advance and hand it in upon admission to the hospital. Each day, the Spine Tango administrator ensures that questionnaires have been received from all patients on the admission list; any missing questionnaires are otherwise tracked down on the wards, before the operation. At follow-up, the questionnaires are mailed directly to the patients with a stamped and addressed envelope. Late-responders are contacted by telephone until the questionnaire is returned or the patient expressly states that one will not be returned. As the questionnaire is so short, it is also possible to complete it over the phone for the few patients who fail to return it by post. In a hospital with over 1,000 spine patients per year, administration of both the Spine Tango 'Surgery' and 'Follow-up' forms and the whole patient-orientated questionnaire system – including administration of the questionnaires at each time-point, patient reminders and 'core measures' questionnaire data input – requires the employment of an administrator (nurse, practice assistant and student) working approximately 32 h/week.

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