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The Impact of the COVID-19 Pandemic on Spine Surgery in Central Europe: A Questionnaire-Based Study

Anto Abramovic¹, Sara Lener¹, Lukas Grassner¹, Martin Thaler², Daniel Pinggera¹, Christian F. Freyschlag¹, Claudius Thomé¹, Sebastian Hartmann¹

■ **OBJECTIVE:** The severe acute respiratory coronavirus 2 (SARS-CoV2) crisis led to many restrictions in daily life and protective health care actions in all hospitals to ensure basic medical supply. This questionnaire-based study among spinal surgeons in central Europe was generated to investigate the impact of coronavirus disease 2019 (COVID-19) and consecutively the differences in restrictions in spinal surgery units.

■ **METHODS:** An online survey consisting of 32 questions on the impact of the COVID-19 pandemic and the related restrictions on spinal surgery units was created. Surgical fellows and consultants from neurosurgical, orthopedic, and trauma departments were included in our questionnaire-based study with the help of Austrian, German, and Swiss scientific societies.

■ **RESULTS:** In a total of 406 completed questionnaires, most participants reported increased preventive measurements at daily clinical work (split-team work schedule [44%], cancellation of elective and/or semielective surgeries [91%]), reduced occurrence of emergencies (91%), decreased outpatient work (45%) with increased telemedical care (73%) and a reduced availability of medical equipment (75%) as well as medical staff (30%). Although most physicians considered the political restrictive decisions to be not suitable, most considered the medical measures to be appropriate.

■ **CONCLUSIONS:** The COVID-19 pandemic resulted in comparable restrictive measures for spinal surgical

departments in central Europe. Elective surgical interventions were reduced, providing additional resources reserved for severe acute respiratory coronavirus 2–positive patients. Although similar restrictions were introduced in most participants' departments, the supply of personal protective equipment and the outpatient care remained insufficient and should be re-evaluated intensively for future global health care crises.

INTRODUCTION

2020 was marked mainly by the sudden appearance and rapid spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV2).¹ In approximately 20% of the infected patients, especially those at high risk (>50 years old, previous cardiovascular diseases, and diabetes mellitus), symptoms may deteriorate quickly, leading to respiratory failure, with the requirement of mechanical ventilation.¹ Rarely, healthy patients without relevant preexisting comorbidities may show severe courses of coronavirus disease 2019 (COVID-19) infections, sometimes resulting even in death.^{2,3} On March 3, 2020 the World Health Organization defined a case fatality rate of approximately 3.4%, which has been adjusted to 2%–3% according to recent literature.^{4,5} On February 25, the first 2 cases of COVID-19 were identified in Austria. Since then, a chain of prevention measures has been activated, which in some cases led to a near-total lockdown of the system, in which public life was restricted and work bans issued (Figure 1).

Key words

- COVID-19
- Lockdown
- Restrictive measures
- Spine surgery

Abbreviations and Acronyms

COVID-19: Coronavirus disease 2019

PPE: Personal protective equipment

SARS-CoV2: Severe acute respiratory coronavirus 2

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As a result of this development, many hospitals in central Europe, particularly in Italy, decided to reduce elective patient care to empty normal wards, especially intensive care units (ICUs) of all disciplines, which were kept free to be prepared for COVID-19-positive patients. In addition, personal protective equipment (PPE) was upgraded, and specialized training to handle SARS-CoV2-positive patients was implemented in some institutions. Because of these constraints, the COVID-19 pandemic was linked to enormous changes in many departments, so that surgical procedures were gradually reduced and elective surgeries were cancelled or postponed.

There has not been a clear consensus regarding the workflow of surgical departments during the initial COVID-19 peak, and hence, many hospitals or even single departments within a hospital association set up their own and individual COVID-19 guidelines, which changed daily during the most critical episode of the pandemic. Based on the absence of any guidelines, we developed a questionnaire-based study to assess the differences of spinal surgery units in central Europe regarding the impact of the spread of this pandemic as well as the preventive measures taken by the departments. The results of this questionnaire study may be used as a basis for a consensus of spine centers for future pandemics.

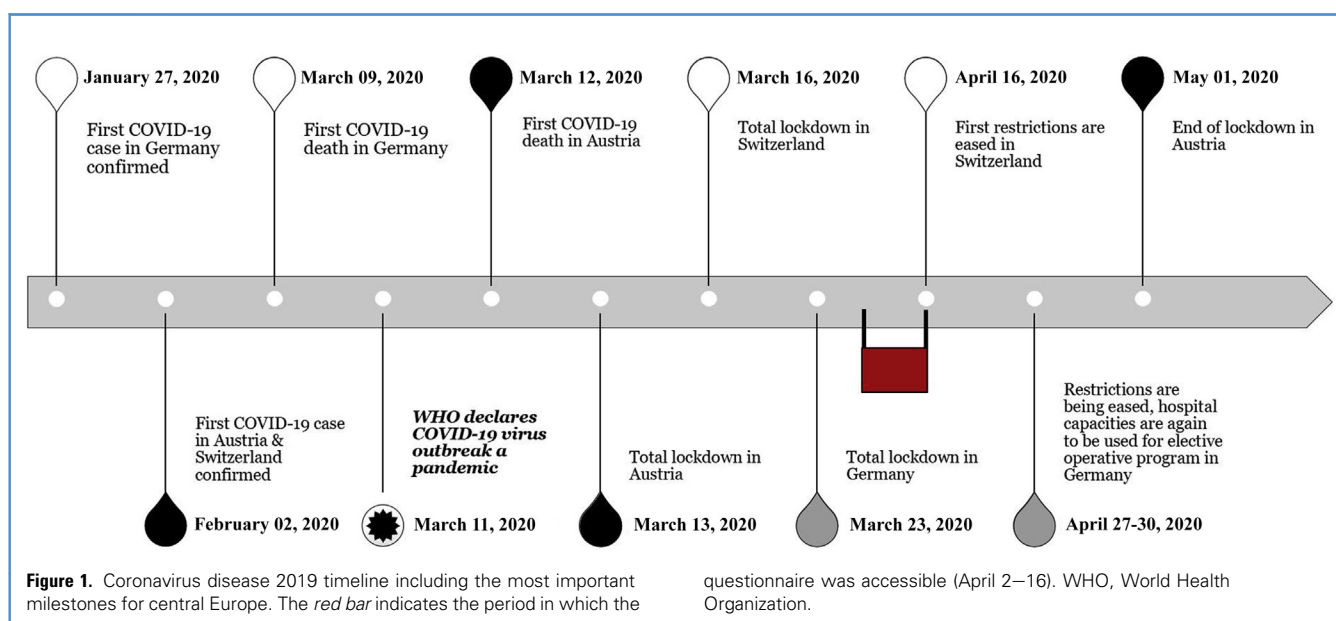
METHODS

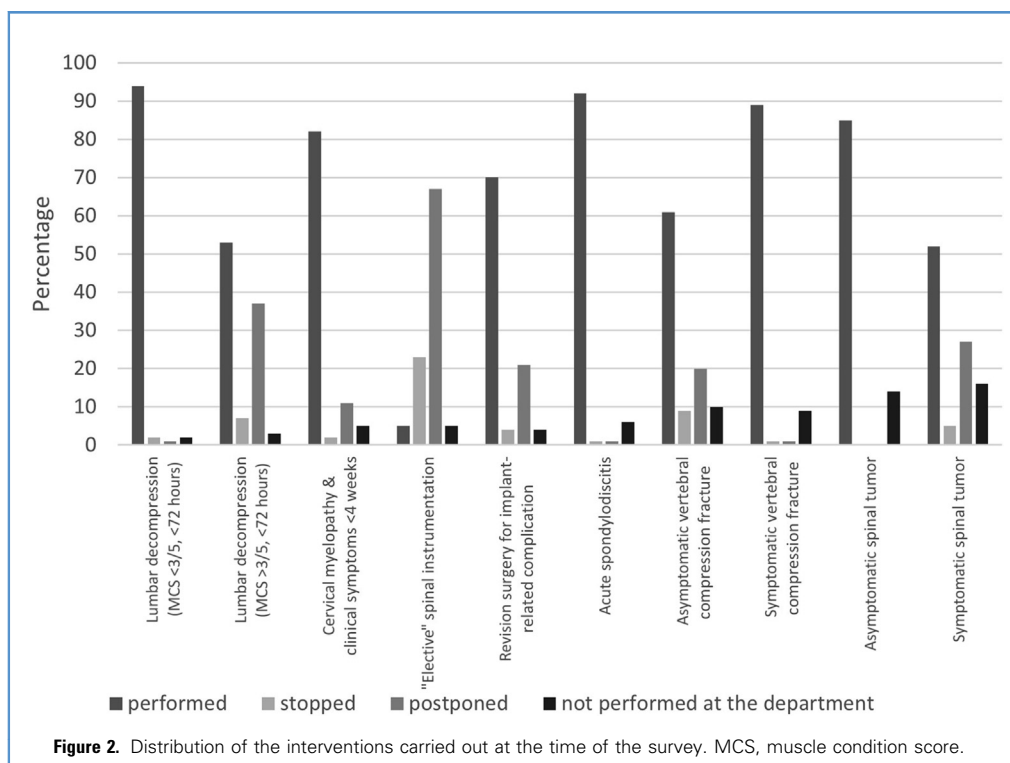
An online survey consisting of 32 questions on the impact of the COVID-19 pandemic and the related restrictions of spinal surgical departments using a software-based survey creation tool (SurveyMonkey, San Mateo, California, USA) was developed. The survey was based on a previously established questionnaire for orthopedic surgery,⁶ with additional adaptations where needed. All surgeon contacts were provided by the German Spine Society (Deutsche Wirbelsäulengesellschaft), German Society for Neurosurgery (Deutsche Gesellschaft für Neurochirurgie), Austrian Spine Society (Österreichische

Gesellschaft für Wirbelsäulenchirurgie), Austrian Society for Neurosurgery (Österreichische Gesellschaft für Neurochirurgie), Swiss Society for Neurosurgery (Schweizerischen Gesellschaft für Neurochirurgie), and Swiss Society of Spinal Surgery (Schweizerische Gesellschaft für spinale Chirurgie) or by an online invitation using social media (e.g., Twitter). Surgical fellows as well as surgical consultants from neurosurgical, orthopedic, and trauma departments were included in our study. Apart from basic questions (age group, gender, number of inhabitants of the work place, and specialty), the survey contained questions regarding the influence of COVID-19 on private as well as on daily working life (restrictions in the operating theater, communication, and daily visits) and the effect on the outpatient clinic (e.g., appointment allocation, emergency calls, and follow-up visits) as well as medical staff preventions (systematic SARS-CoV2 tests, PPE, and specialized COVID-19 training). The online questionnaire was carried out from April 2 to 16. During this period, all participating countries were in lockdown. The responses were represented in relative and absolute numbers as a function of total replies.

RESULTS

A total of 406 completed individual responses were obtained. Of the attending surgeons, 80% were located in Germany, 13% in Austria, and 7% in Switzerland. Most surgeons worked in cities with >200,000 inhabitants (42%) or smaller towns with <50,000 inhabitants (20%). Most the participants were men (88%). Most of the attending surgeons were aged between 45 and 54 years (33%) followed by 55 and 64 (29%) and 35 and 44 years (28%). The subspecialty of most of the surgeons was neurosurgery in 70%, and 30% of the respondees were orthopedic/trauma surgeons. Approximately 50% of the surgeons worked in public hospitals and 25% in university hospitals or private hospitals, respectively. Only a few surgeons worked in private practice.



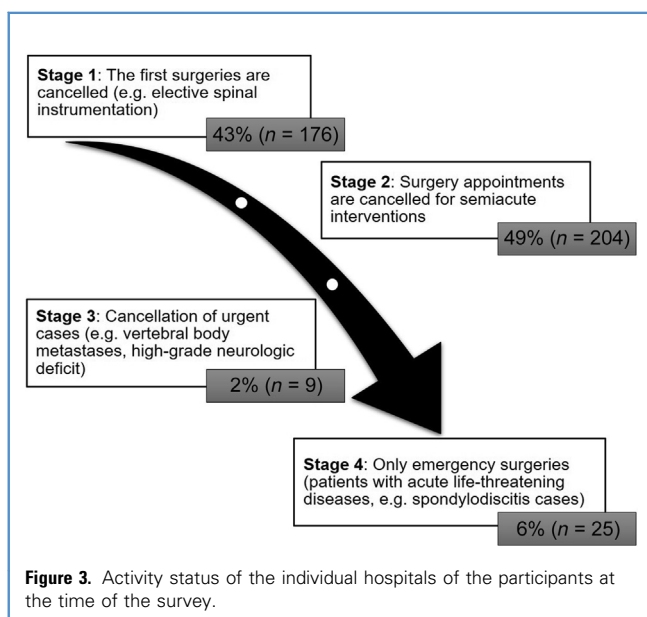


The Influence of COVID-19 on Everyday Work Life

Of the respondents, 83% reported a reduced workload as a result of the restrictive measures at their hospital. The number of performed surgeries decreased in 95% of the participants' hospitals and led to more administrative work (or research) in 44%. The pandemic also had an impact on the training of surgical fellows,

so that 41% of the specialists stated that teaching or training were suspended during the COVID-19 pandemic.

In approximately 50% of the surgeons, the sudden development of SARS-CoV2 led to the cancellation of all elective as well as semielective procedures (Figure 2). Of surgeons, 6% performed only urgent or emergency operations, and 36% and 67% postponed lumbar disc or decompression surgery with minor symptoms (muscular deficit >3/5) and elective spinal instrumentations, respectively (Figure 3). Surgical interventions for severe diseases (spinal tumors/vertebral body fracture with a sensorimotor deficit) were performed without any restriction in most participants.



COVID-19 and the Impact on Outpatient Clinic

Of the respondents, 45% reported that only patients with acute spinal diseases (fracture, infection, and neurologic deficits) were referred to an outpatient clinic and received a clinical examination. More than 50% of the centers implemented a screening questionnaire, if patients had visited COVID-19 hot spots or if flulike symptoms were present in recent weeks (Table 1). If there was doubt, most institutes tested their patients for SARS-CoV2 before the outpatient clinical visit and especially in cases of hospitalization. Because of these circumstances, 90% of the participants noticed a reduced number of patients with degenerative spinal diseases in outpatient clinics. The same effect was found for degenerative disc disease in approximately 70% of participants. A clear reduction in emergencies was noticed by most surgeons, 70% of whom stated this as a consequence of the restrictive measures in public life (Table 1). According to 62% of

Table 1. Illustrative Private Life–Associated and Work Life–Associated Questions

Questions in Survey	%	n
Are you afraid of infecting your friends or family and how do you take a preventive approach?		
Yes, I wash and disinfect my hands more often than usual	71	298
Yes, I'm more careful at work than usual	71	297
No, at home, I'll be behaving as usual	47	197
Yes, I try to keep distance from my family at home	12	51
Other	6	25
What are the concrete effects of the COVID-19 pandemic on your outpatient clinics?		
All patients are questioned about clinical symptoms and must complete a questionnaire before the examination	50	208
Only patients with acute symptoms (fracture, infection, neurological deficits) are examined in our outpatient clinic	45	189
Patients with clinical symptoms and/or positive screening are tested for SARS-CoV-2	37	153
No changes in our outpatient clinic	6	24
Other	14	59
Does the COVID-19 pandemic affect your regular business meetings?		
Reduced staff in the meetings	48	201
No more meetings are held	20	84
All personnel participate in the meetings with the necessary distance from each other	12	48
Meetings take place exclusively online via video conferences	9	38
All personnel attend the meetings with protective clothing (masks, coats, etc.)	6	23
No impact on our department	3	12
What has changed in the emergency volume in your department?		
Reduced number of cases due to burden/risk reduction due to the temporary restrictions in public life	70	290
Unnecessary ideas that otherwise occupy us are omitted	62	256
Necessary presentations are made by the patients out of fear of infection	43	180
Reduced number of cases due to lack of absorption capacity or keeping reserves free	32	135
Necessary conceptions on the part of the patients are not carried out due to concern for the load of the system	20	83
No change	9	36

Full-length survey available in the [Supplementary Material](#).

the respondents, the number of nonemergent clinical presentations decreased significantly. This situation even meant that patients with a definite indication for surgical intervention did not visit the outpatient clinic because of concerns about infection (43%) or an additional burden for the hospital workload (20%) (Table 1).

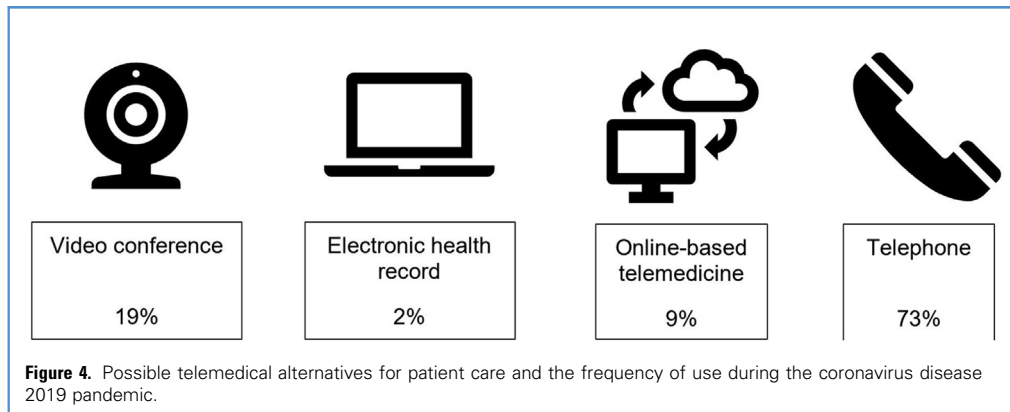
To ensure and to maintain the usual patient care, 73% of the respondees (20%) provided telephone consultation or offered video conferences for their patients (Figure 4). Face-to-face clinical presentations were continued in approximately 35% of the participants.

Measures to Protect Patients and Staff

Systematic staff testing for SARS-CoV2 was carried out in 9% of the respondents' departments, whereas random sampling tests were provided in 14%. Of the participants, 69% reported already having treated SARS-CoV2–positive patients, whereas another 60%

reported SARS-CoV2–coworkers in the medical field and 25% had SARS-CoV2–positive nonmedical coworkers (e.g., administration) (Figure 5). Of participants, 18% did not have any positive cases of SARS-CoV2 at their institution. The main problems of the COVID-19 pandemic were represented by a reduced supply of PPE or medical gear in general in 75% of the respondees (e.g., because of delivery problems), a lack of regular intensive care unit resources (27%), and reduced number of employees at their department (30%).

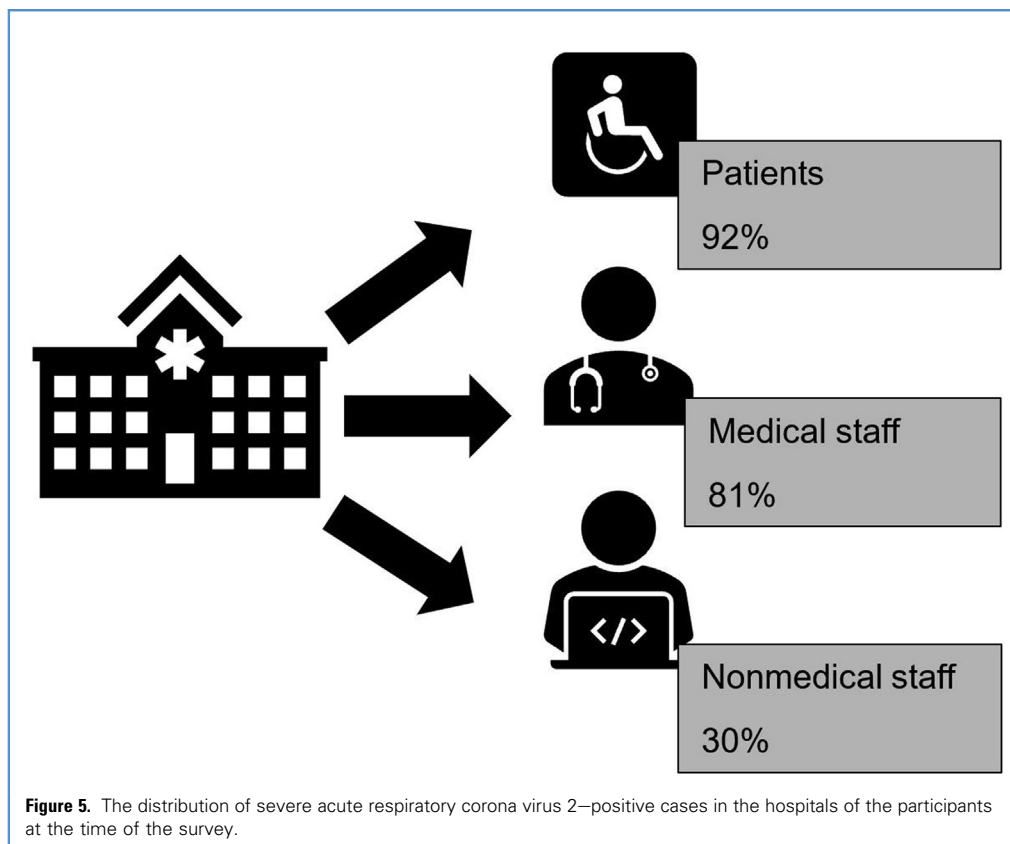
More than 70% of the respondents stated that they already had an individual COVID-19 screening outpatient clinic at their hospital as well as general wards and ICU beds for SARS-CoV2–positive patients at the time of the survey. In one third of the participants, an operating theater was kept free especially for COVID-19–positive patients. To ensure adequate patient care, 56% of the respondents reported specialized training for the treatment and management of SARS-CoV2–positive patients.

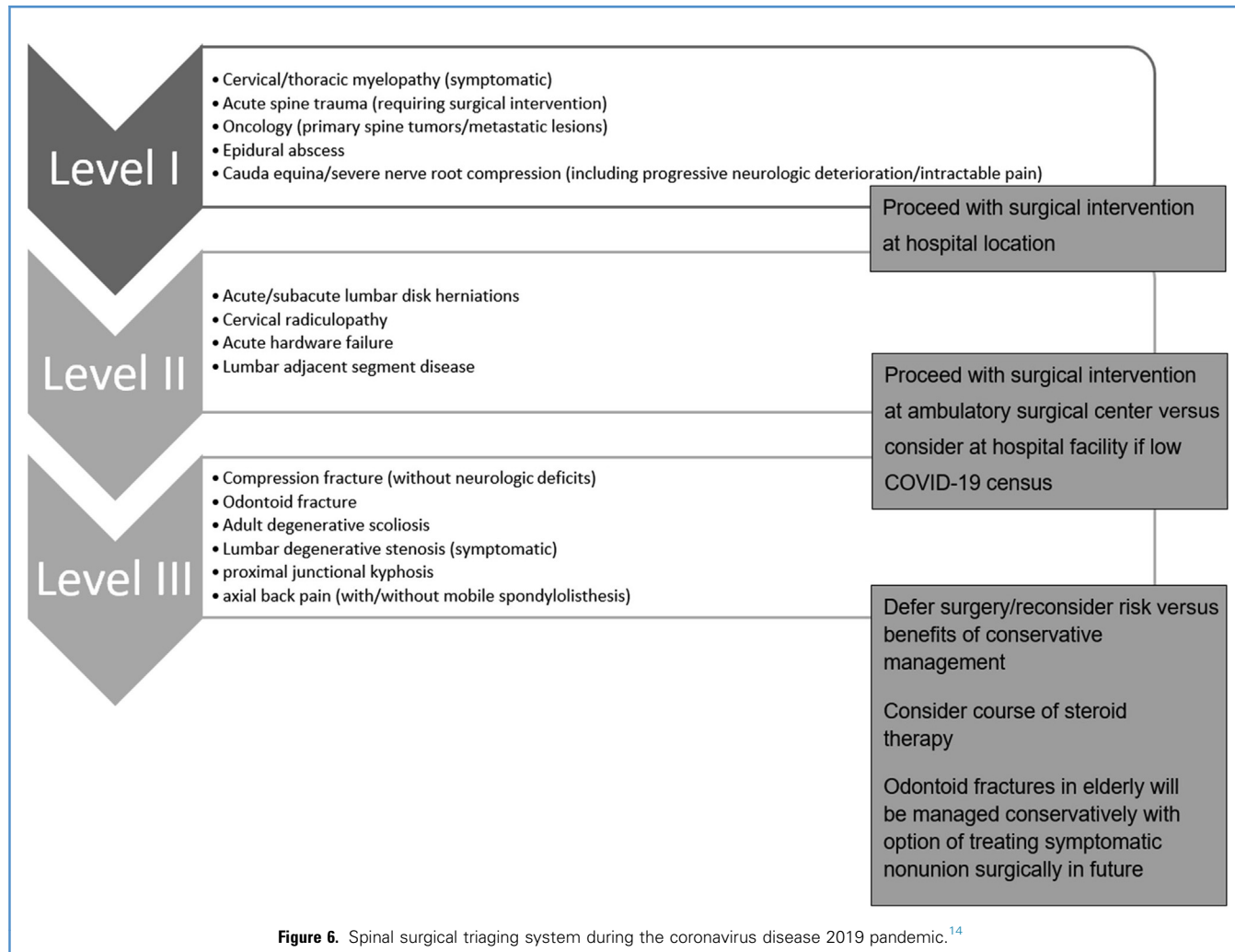


Face-to-face team meetings no longer took place for 20% of the respondents, and meetings with a reduced staff were performed in 50% (Table 1). A medical split team was introduced in 60% of all spine surgeons' departments and all employees were equipped with individual protective clothing (surgical masks, protective coats, gloves, and shoes). Although the physicians reported that they were mainly provided with surgical masks and gloves on the general ward, the ICU was clearly better equipped with surgical caps and FFP2 and 3 masks as well as disposable coats.

The Influence of COVID-19 on Spinal Surgeons' Private Life

One of the biggest concerns of many surgeons is related to potential infections of close relatives. Of respondents, 71% reported more frequent hand disinfection and increased awareness at work in general, whereas 48% of the respondents did not take any additional precautions at home (Table 1). Of the participants, 12% tried to avoid close contact with other family members at home and a few (2%) decided to live in a hotel/apartment/second residence during the COVID-19 pandemic to protect their family members.





DISCUSSION

The rapid development of the COVID-19 pandemic is partly responsible for the fact that many hospitals had to decide autonomously on their restrictive measures, because there were no available guidelines. In the initial phase, it could be assumed that spinal surgical practice, which includes both elective and emergency surgery as well as the management of inpatient and outpatient clinics, was put on individual and sometimes uncoordinated rapidly changing restrictive measures.

The results of our questionnaire show the significant impact of COVID-19 both in private life and in working life. Only 11% of the participants reported that they had no positive cases in their hospital or close environment. More frequent hand disinfection and a generally more cautious approach to potential sources of infection were typical behaviors seen in most respondents, although this should be part of our daily practice. In addition to the personal protective measures to prevent infection of patients or themselves, a clear change of private hygienic habits was also noticed. Most respondents stated that they minimized contact with their family

members, reducing the risk of infection. Previous studies have shown increased concerns of safety at work in spinal surgical departments during the COVID-19 pandemic.⁷ The lack of knowledge combined with weekly or even daily changes in political as well as medical facilities regarding the disease itself and preventive measures may arouse concerns in many employees.^{8,9} This finding highlights the importance of information about the potential infection, with adequate preparation and structured training to maintain the self-confidence and safety of the team.

For capacity reasons, the availability of internal or neurologic COVID-19 ICU or general ward resources was often extended to surgical departments, so that isolation of surgical units took place. Consequently, operations could no longer be carried out. Because of the rapid spread of the disease, elective surgeries had to be cancelled or at least postponed and the operating room schedule was reduced to a minimum in about half of the respondents to create the necessary resources for SARS-CoV2—positive patients and to block the necessary anesthesiologic resources (Figure 2).^{7,10} Further, surgical equipment such as masks or surgical gloves had to

be saved because of a delivery bottleneck.¹¹ Many elective procedures without acute symptoms were postponed, whereas emergencies, such as vertebral body fractures with motor deficits, were still performed in most of the respondees' institutes. During the beginning of the pandemic or even during the stepwise lockdown of the operative program, it was recommended to perform smaller surgical (minimally invasive) interventions to keep the surgical time as short as possible to reduce the patient's hospitalization to a minimum.¹² Patients scheduled for spine surgery are typically older, with several comorbidities, often leading to an extended postoperative inpatient stay, which could increase the risk of nosocomial SARS-CoV2 infection.¹³ A clear elaboration of the triage of patients for spinal surgery was developed during the COVID-19 pandemic, so that spinal diseases were categorized into 3 groups with different recommendations regarding the timing of surgery (Figure 6).¹⁴ Similar scenarios of surgical reduction and preventive measurements have also been reported for joint arthroplasty, musculoskeletal tumor surgery, and arthroscopic procedures.¹⁵⁻¹⁷

The strict reduction of the elective surgical program and especially outpatient clinics has led to a "post-COVID-19 run," with an approximately 15%–20% increased patient presentation with spinal emergencies. As the questionnaire showed, patients with a clear indication for surgical intervention did not visit the outpatient clinic because of concerns of infection (43%) or additional burden for the hospital workload (20%). Most patients with a clear surgical indication did not receive an appointment in the outpatient department and had to come to the clinic as an emergency. As a result, many patients with true emergencies did not obtain an appointment and waited until reopening, so that in some cases, serious clinical symptoms worsened, with resultant progression of disease.

The outpatient clinics were reduced to a minimum in most departments. Approximately 50% of all respondees reported that they examined only acute emergencies. In general, a significantly reduced patient volume in the outpatient clinics during the strict lockdown as a result of a reduced number of accidents and the fear of SARS-CoV2 contamination was observed. To guarantee sufficient patient care despite the precarious situation, a screening questionnaire before the clinical visit in the outpatient clinic was introduced in our department. Patients with suspected SARS-CoV2 infection were potentially identified before any kind of physical contact.

Despite all precautionary measures and previous planning, the rapid increase of infections in Europe led to production difficulties and delivery bottlenecks of PPE, which was also present in our hospital at the time of the survey.¹⁸ A shortage of PPE for medical staff means not only an additional threat to the health care system but also an increased risk for patients in outpatient clinics and general wards. The results of the survey showed that 60% of the participants already had positive cases in medical staff in their hospital. Because of the frequent mild or even asymptomatic course of a SARS-CoV2 infection, equipping medical staff is one of the key issues for successfully handling such a pandemic.^{19,20} A recent study²¹ has shown an increased number of infections among medical staff in Wuhan because of lack of or insufficient PPE.

In many departments, a split-team working plan with 2 groups, which usually changed every week, was introduced.²² If there was a SARS-CoV2-positive case within 1 team, the other group could stand in and continue the clinical work. Additional measures led to

a reduction of internal team meetings and clinical teaching. Therefore, alternative methods of teaching or team meetings (e.g., webinars and mail contact) were introduced. The same was true for public events, such as congresses. Nevertheless, COVID-19-specific training was performed for only 56% of the study participants, which is similar to recent results.²³ This fact does not only form additional psychological stress for health care workers but could also lead to increased infection rates among health care workers.

Not strictly necessary face-to-face contacts between patients and clinicians were replaced by telemedical renewals in most of the attending spine surgeons. The advantage of a well-developed telemedical network should be considered especially during pandemic crises.²⁴ In addition to telephone consultations, technological progress enables us to provide video conferences and online questionnaires to record the type and severity of the patient's symptoms and categorize the necessity of further clinical or imaging examination as well as the need for a clinical presentation in cases of an emergency.²⁵ This situation may provide alternative ways of patient contact to economize the medical system in future decades.²⁶

The purpose of this study was to capture the measures that have been adopted to reduce the intrahospital spread of COVID-19 and to prepare for a potential surge of patients with coronavirus during the first wave in 2020 in the DACH (Germany [D], Austria [A], and Switzerland [CH]) region. Although these countries have a similar management in everyday treatment of patients scheduled for spine surgery precisely because of their shared professional societies, the COVID-19 crisis was the first to show such divergence of individual measures, representing the surgical, inpatient, and outpatient settings. In addition to predictable reasons, such as the highly variable impact of COVID-19 on different regions, there is still no definite answer to some of the difficulties and problems that are shown in this study. The results of this study should serve as an incentive for German-speaking spinal surgical societies to develop guidelines based on studies such as ours to manage future pandemics in an even more optimized manner.

Limitations

This study has several weaknesses, which limit the validity of the results. First, because of the anonymization of the data, the questionnaire did not allow backtracking of the individual answers to a certain hospital or country, and hence, an in-depth analysis of country-specific or hospital-specific measures was not possible. Because of the high response rate of spine surgeons from Germany and the limitation of a country-specific analysis, the results may be distorted because most responses are from Germany.

CONCLUSIONS

Despite the lack of clear guidelines among spine centers during the initial pandemic peak, the results of this questionnaire study show a clear trend regarding the use of personal protective issues (hand disinfection and PPE), a lower incidence of nonemergency patients in outpatient departments, and a clear reduction of the surgical program, as well as the establishment of specific COVID-19 measures in high-volume spine centers across central Europe.

This behavior should serve as the basis to improve medical strategies for future health crises and the ongoing pandemic.

CRedit AUTHORSHIP CONTRIBUTION STATEMENT

Anto Abramovic: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Writing – original draft, Visualization, Project administration. **Sara Lener:** Methodology, Validation, Formal analysis, Writing – review & editing. **Lukas Grassner:** Methodology, Writing – review & editing. **Martin Thaler:**

Conceptualization, Methodology, Writing – review & editing, Supervision. **Daniel Pinggera:** Writing – review & editing. **Christian F. Freyschlag:** Conceptualization, Methodology, Software, Investigation, Resources, Writing – review & editing, Supervision. **Claudius Thomé:** Conceptualization, Methodology, Validation, Formal analysis, Resources, Writing – review & editing, Supervision. **Sebastian Hartmann:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration.

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SUPPLEMENTARY MATERIAL

QUESTIONNAIRE COVID-19: SPINE

Thank you for your participation in this survey.

We would like you to take about 6 minutes to complete an online survey about the COVID-19 pandemic and the impact on your patients and workplace.

All data and questions are treated absolutely anonymously. All answered questions are saved so that you can return to your last question and continue the survey from that question.

1. In which country are you currently active?

Germany

Austria

Switzerland

2. In which state do you currently work?

3. In which city do you currently work?

4. Gender?

Male

Female

Diverse

5. Age group?

< 25

25–34

35–44

45–54

55–64

65+

6. In which field do you work? (Multiple selection possible)

Orthopedics - spinal

Neurosurgery - spinal

Trauma surgery - spinal

Resident in Neurosurgery - no specialization

Resident Orthopedics - no specialization

Resident Trauma surgery - no specialization

None of the above (please specify)

7. What type of facility do you work in?

University Hospital

Public hospital

Private hospital

Other (please specify)

8. How many years have you been in this profession?

9. Are you afraid of infecting your friends or family, and how do you go about preventing it? (Mark all that apply)

Yes, I don't go home anymore (I live in a hospital, hotel, second home, etc.).

Yes, I wash and disinfect my hands more often than usual

Yes, I try to keep my distance from my family at home

Yes, I no longer stay in the same room with other family members

Yes, I disinfect all surfaces in my house/apartment after I have touched them

Yes, I wear a surgical mask/other protective clothing at home

Yes, I avoid close physical contact with my family

Yes, I am more careful than usual at work

Yes, I have taken a vacation

No, at home I behave as always

No, I am not concerned about the current situation

Other (please specify)

10. What is the specific impact of the COVID-19 pandemic on your department? (Mark all that apply)

No changes at the department

All surgeries were cancelled

The department has cancelled elective procedures of inpatients

The department has cancelled elective procedures of outpatients

The department has selectively limited elective procedures of inpatients

The department has selectively limited elective procedures of outpatients

11. What is the specific impact of the COVID-19 pandemic on your outpatient clinic? (Mark all that apply)

All patients are tested for SARS-CoV-2 prior to the clinical examination.

All patients are interviewed regarding clinical symptoms and must complete a questionnaire prior to the examination

Patients with clinical symptoms and/or positive screening are tested for SARS-CoV-2.

No changes in our outpatient clinic

Only patients with acute symptoms (fracture, infection, neurological deficits) are examined in our outpatient clinic.

Other (please specify)

12. What clinical disease are you currently seeing less of in your outpatient clinic compared to before the COVID-19 pandemic?

Traumatic spinal injury

Tumor-associated spine disease

Degenerative spine disease

Spondylodiscitis

Degenerative disc disease

13. What has changed about the emergency volume at your department? (Mark all that apply)

- Lower number of cases due to preliminary restrictions in public life
- Lack of bed capacity
- Reduced frequency of unnecessary patient presentations, that otherwise occupy us
- Necessary presentations of the patients do not take place due to the patient's concern of burdening the system.
- Necessary presentations of the patients do not take place due to the patient's fear of infection.
14. What specific impact does the COVID-19 pandemic have on your work as a spine surgeon? (Mark all that apply)
- No influence
- My number of surgeries has decreased
- Increased conversations with patients (e.g. education on delayed surgery due to pandemic, etc.)
- Trainings/teachings (students, residents, colleagues) do not take place due to the pandemic
- Increased non-surgical, orthopedic/trauma/neurosurgical care
- Increased administrative activities
- Surgeons increasingly needed for COVID-associated patients
15. Are the following procedures currently being performed at your department? (yes/stopped/postponed/not being performed at our department)
- Lumbar decompressions/sequestrectomies in patients with severe sensorimotor deficits since less than 72h (muscular deficit MCS $\leq 3/5$).
- Lumbar decompressions/sequestrectomies in patients with mild sensorimotor deficits for less than 72h (muscular deficit MCS $\geq 4/5$).
- Decompression in patients with cervical myelopathy and clinical symptoms < 4 weeks
- "elective" spinal instrumentations
- Surgery for implant-related complications of the entire spine (symptomatic screw/rod fracture, screw loosening, plate fracture, etc.)
- Surgical treatment of acute spondylodiscitis
- Surgical treatment of vertebral body fractures without neurologic impairment
- Surgical treatment of vertebral body fractures with neurologic impairment
- Surgical treatment of spinal tumors with sensorimotor deficit
- Surgical treatment of spinal tumors without sensorimotor deficit
16. Imagine 4 stages of activity reduction, what stage is your department in right now?
- Stage 1: The first operations are cancelled (e.g. elective spinal instrumentation for inpatients/outpatients)
- Stage 2: Surgery appointments are cancelled for semi-acute surgeries
- Stage 3: Cancellation of urgent cases (e.g., vertebral metastases, high-grade neurological deficit).
- Stage 4: Only emergency surgeries (patients with acute life-threatening diseases, e.g. acute spondylodiscitis with sepsis)
17. Was there any COVID-19 specific training for your OR staff?
- Yes
- No
- Is planned
18. What facilities have been established at your hospital to treat COVID-19 patients?
- COVID-19 Screening Outpatient Clinic
- Dedicated normal ward for suspected cases
- Dedicated normal ward for confirmed COVID-19 cases.
- Dedicated ICU for confirmed COVID-19 cases.
- Dedicated operating room for confirmed COVID-19 cases.
- None
- Other (Please specify)
19. Were/are asymptomatic employees tested at your department?
- Yes, all
- Yes, randomly
- No
20. Have there been any previous positive COVID-19 cases at your department (confirmed infection)? (Mark all that apply)
- Patient in our hospital
- Patient at our department
- Health care worker in our hospital
- Health care worker at our department
- Non-medical staff in our hospital
- Non-medical staff at our department
- None of the above
21. Are there any issues related to the pandemic? (Mark all that apply)
- Personnel deficit
- Supply deficit (delivery problems, etc.)
- Lack of regular ICU beds
- Lack of regular IMCU beds
- Lack of regular beds in the normal ward
- Missing COVID-19 ICU beds.
- Missing COVID-19 IMCU beds.
- Missing COVID-19 normal ward beds.
- Other (Please specify)

22. Does the COVID-19 pandemic impact your regular professional meetings?
- No impact on our department
 - Reduced staff in meetings
 - Meetings are no longer held
 - All personnel participate in the meetings, with necessary distance from each other
 - All personnel attend meetings wearing personal protective equipment (masks, coats, etc.)
 - Meetings take place exclusively online via video conferencing
 - Other (please specify)
23. What are your measures to prevent illness-related absences of staff due to the COVID-19 pandemic? (Mark all that apply)
- The staff was divided into groups
 - Reduced staff presence in meetings
 - Individual protective personal equipment (masks, coats, gloves, etc.)
 - Home office (research, participation in webinars, telemedicine, etc.).
 - No measures
24. What type of personal protective equipment (PPE) is available for employees at your **normal ward**? (Please mark all that apply)
- Surgical hood
 - Surgical mask
 - FFP1 mask
 - FFP2 mask
 - FFP3 mask
 - Full face respirator
 - Safety goggles
 - Face shield
 - Apron/dressing gown
 - Gloves
 - Shoe cover
 - None
 - Other (please specify)
25. What type of personal protective equipment (PPE) is available for staff in your **ICU**? (Please mark all that apply)
- Surgical hood
 - Surgical mask
 - FFP1 mask
 - FFP2 mask
 - FFP3 mask
- Full face respirator
 - Safety goggles
 - Face shield
 - Apron/dressing gown
 - Gloves
 - Shoe cover
 - None
 - Other (please specify)
26. Do you offer patient care via telemedicine? (Mark all that apply)
- Video conferencing (Skype, Zoom, etc.)
 - Web-based telemedicine (Google Chat, etc.)
 - EHR/EMR (electronic health record/electronic medical record)
 - Phone
 - None
 - Other (please specify)
27. How long do you think the COVID-19 pandemic will impact your clinical routine/surgical schedule?
- 2–4 weeks
 - 5–8 weeks
 - 8–12 weeks
 - 3–6 months
 - 6–9 months
 - 9–12 months
 - More than 12 months
28. What is the impact of the COVID-19 pandemic on you? (Mark all that apply)
- I effectively do not work due to an institutional or self-imposed deferral of elective procedures
 - I am not working due to personal illness, COVID-19 exposure, or quarantine.
 - I am in a high-risk group for COVID-19 (older than 60 years, relevant secondary diseases; e.g., high blood pressure, diabetes, cardiovascular disease)
 - So far, there have been no confirmed COVID-19 cases at my hospital or in my setting
 - There are confirmed COVID-19 cases in my hospital or in my setting
 - None
 - Other (please specify)
29. Do you still perform follow-up visits on patients after decompression surgery or spinal instrumentation? (Mark all that apply)
- Yes, clinical follow-up

- Yes, imaging follow-up
- Yes, wound checks/suture removals are performed at our department
- Yes, but only for high-risk patients (complex revisions, infections, etc.).
- No, wound checks/suture removal are performed in the office-based setting
- No, the patients do not currently have any progress controls
- Other (please specify)
30. Is physical therapy or rehabilitation provided to previously discharged patients after spinal instrumentation? (Mark all that apply)
- Yes, stationary
- Yes, outpatient
- No
- Only in individual cases
- Other (please specify)
31. The current political measures for social life I consider: o(bad)—1o(good)
32. I consider the current measures of my hospital to be: o(bad)—1o(good)