



# Impact of COVID-19 epidemic on Maxillofacial Surgery in Italy

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## Abstract

Maxillofacial departments all over Italy were increasingly involved in facing the COVID-19 emergency. Elective surgeries have been progressively postponed to free beds and offer human and material resources.

We compiled an inventory of 32 questions to evaluate the impact of SARS-COV2 epidemic on Maxillofacial Surgery in 23 selected Italian Maxillofacial departments. The questionnaire focused on three different aspects: the variation of the workload, showing both a reduction of the number of team members (-16% among specialists, -11% among residents) due to reallocation or contamination and a consistent decrease

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of elective activities (the number of outpatients visits loss during the first Covid-19 epidemic month is about 10000 all over Italy), while only tumor surgery and trauma surgery has been widely guaranteed; the screening procedures on patients and physicians (22% of maxillofacial units found infected surgeons, 4% of all Maxillofacial surgeons); and the availability of Personal Protective Equipment, whose supply is considered partial from 48% of Maxillofacial departments.

The emergency forced the Italian health system to change the way we work but only time will prove these changes effective.

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## INTRODUCTION

The allegedly first case of Covid-19 in Italy was diagnosed on 20 February 2020 in the town of Codogno, Lombardy.

Despite the attempt to limit the outbreak at the defined “red zone”, quarantining all citizens and denying entry or leave to the area, similar cases were diagnosed in other cities without evident epidemiologic correlation, starting the day after the first identification.

During the last week of February, the prevalence of Covid-19 started to rise not only in Italy but, with a delayed but similar increasing trend, also in the rest of Europe. As we’re writing, the cumulative incidence counts more than 80000 cases of Covid-19 in Italy. Nevertheless, for a series of unclear factors, northern Italy (in particular Lombardy, Veneto and Emilia Romagna regions) suffered a heavier healthcare and, tragically, death burden.

Although general practitioners, emergency departments, infectious diseases units, respiratory disease units and Intensive Care Units (ICUs) were and still are standing in first line of action, every department of every hospital all over Italy was increasingly involved in facing this unique and unprecedented health emergency.<sup>1</sup> Since maxillofacial surgery departments aren’t standing in the first line of this struggle, elective surgeries have been postponed to free beds and offer human and material sources and day-to-day has been revolutionized in order to respond to the rapidly evolving health emergency.<sup>2</sup>

This article involving 23 Maxillofacial Surgery departments from northern to southern Italy focuses on the first four weeks of this pandemic, aiming to describe both features and obstacles of the involvement of Italian Maxillofacial surgery departments.

## MATERIAL AND METHODS

We compiled an inventory of 32 questions to evaluate the impact of SARS-COV2 epidemic on Maxillofacial Surgery in 23 selected Italian Maxillofacial departments, chosen to represent the present situation across the country with emphasis on the role of teaching departments whenever possible. Each department designated a specialist from the staff to answer the

questionnaire. Answers were subsequently collected anonymously, keeping track of the location of the department in order to geographically correlate answers.

The questionnaire (see Supplemental Material) was built around three major aspects:

- "02" Changes in the workload in terms of outpatient clinic, day-surgery and general anaesthesia surgery;
- "02" Screening Covid-19 procedures used for patients and/or healthcare workers;
- "02" Workforce and patient protection methods to avoid SARS-COV2 spreading during daily activities.

Moreover, personal protective equipment (PPEs) supply was considered a relevant topic in our field, due to the high frequency of oral and nasal cavity explorations.

Quantitative and qualitative data were recorded and statistically analyzed using Excel software 15.0 (Microsoft Corp, Redmond, WA, US). Our analysis divided Italian Maxillofacial Units into 3 areas: high SARS-COV2 diffusion area (“red zone” including Lombardy, Emilia-Romagna and Veneto regions), intermediate SARS-COV2 diffusion area (“yellow zone” including Piedmont and Liguria regions) and low SARS-COV2 diffusion area (“green zone” including the remaining Italian regions).

## RESULTS

We observed a reduction in the number of team members for all the considered zones, mostly among maxillofacial specialists (16% reduction vs. 11% reduction for residents) [Table 1].

Some maxillofacial surgeons, mostly in the red and yellow areas, had positive SARS-COV2 naso-pharyngeal swab (4% of all Maxillofacial specialists and residents in 22% of all Maxillofacial departments assessed) and were isolated for 14 days in the so-called “standard quarantine”, waiting for symptoms remission and/or negative test results in order to be re-admitted at work [Table 2].

Among the causes of staff reduction there was also the full-time or part-time re-allocation of maxillofacial surgeons, both specialists and residents (17% of team members). The majority was destined to COVID internal medicine units

Table 1  
Maxillofacial surgeons number variation during COVID-19 epidemic.

	Number of specialists			Number of residents		
	Pre-epidemic	In-epidemic	Variation rate	Pre-epidemic	In-epidemic	Variation rate
red zone	7,2 (±1,99)	5,90 (±2,33)	<b>-18%</b>	4,5 (±2,91)	4,2 (±2,93)	<b>-6%</b>
yellow zone	8,50 (±0,71)	4,50 (±6,36)	<b>-47%</b>	7,00 (±9,89)	7,00 (±9,89)	<b>0%</b>
green zone	7,27 (±2,20)	6,73 (±2,41)	<b>-6%</b>	4,18 (±6,06)	3,36 (±5,50)	<b>-20%</b>
23 Maxillofacial Units	7,35 (±1,99)	6,17 (±2,67)	<b>-16%</b>	4,56 (±5,02)	4,04 (±4,77)	<b>-11%</b>

Table 2  
Positive doctors' percentage and their management.

	Positive doctors			No, there are not positive doctors in my department	I don't know if there are positive doctors in my department
	Yes, there are positive doctors in my department				
	Standard quarantine	Prolonged quarantine	Come back work		
Red zone	<b>3%</b>	0%	0%	36%	4%
Yellow zone	<b>0,5%</b>	0%	0%	11%	0%
Green zone	0,5%	0%	0%	40%	5%
23 Maxillofacial Units	4%	0%	0%	87%	9%

Table 3  
Maxillofacial surgeon re-allocation during COVID-19 epidemic.

	Re-allocated doctors	Wards for re-allocation							
		COVID internal medicine	NON-COVID internal medicine	Infectious disease	Respiratory disease	ER	ICU	Service medicine	Other
red zone	3,60 out of 117	<b>44%</b>	0%	6%	6%	6%	0%	6%	0%
yellow zone	0 out of 31	<b>0%</b>	0%	0%	0%	0%	0%	0%	0%
green zone	1,00 out of 126	<b>6%</b>	0%	0%	0%	13%	0%	6%	6%
23 Maxillofacial Units	2,04 out of 274	<b>50%</b>	0%	6%	6%	19%	0%	13%	6%

(50% of the reallocated resources), while 19% of physicians were included in emergency departments, 13% in the service medicine units, 6% in the infectious disease units and 6% in the respiratory disease units. The re-allocation process of Maxillofacial surgeons took part mostly in red and yellow zones [Table 3].

Questionnaire results show an important decrease in every Maxillofacial activity, with no substantial difference among the three identified zones. Outpatient visits showed an 87% decrease, while outpatient surgery (i.e. day surgery) decreased by 86% [Table 4]. The maintained activity includes biopsy and skin cancer surgery in all the departments.

Inpatient general anaesthesia surgery decreased as well, (78% countrywide reduction. Despite COVID-19 epidemic, most of Maxillofacial surgery units have carried on the surgical management of facial traumas - although with much reduced incidence - (74%) and head and neck oncology (90%), considered time-depending diseases. On the other hand, only few departments have maintained other kind of surgery, such as cranio-facial (9%), microsurgery (17%) and paediatric surgery (4%).

The number of visits performed weekly among the 23 Maxillofacial surgical units over Italy in the pre-epidemic

period was about 2518. Therefore, during the first Covid-19 epidemic month, the missed Maxillofacial visits were about 10000. Similar considerations could be referred to outpatient surgery, with the unavoidable delay of over 1700 procedures, as well as 800 missed inpatient Maxillofacial surgeries during March 2020 all over Italy.

Speaking about the private practice, only 9% of Maxillofacial units maintained their current activity, mainly about undelayable procedures such as oncology evaluations and surgery.

61% of maxillofacial surgery have been merged with other units, while 17% remained open with a reduced number of beds. 9% of Maxillofacial wards, mainly in the red zone, have been converted in Covid-19 units.

43% of questionnaires (10 out of 23) reported that regional healthcare systems identified a number of COVID-19-free hospitals (hubs) to warrant contamination-free essential surgical procedure. The designated hub hospitals involved those pathologies that cannot be postponed: 50% of hub hospital deal with major traumas, 50% deal with COVID-free traumas, 40% with COVID traumas, while major head and neck oncology with post-operative ICU admission is performed in 70% of hub hospital and COVID-free head and neck oncology in 50% of hub hospital. Only three structures have been

Table 4  
Visits and Surgery variation during COVID-19 epidemic.

	Outpatient visits per week			Outpatient surgery per week			Inpatient surgery per week		
	Pre-epidemic	In-epidemic	Variation rate	Pre-epidemic	In-epidemic	Variation rate	Pre-epidemic	In-epidemic	Variation rate
red zone	140,5 (±68,97)	18,5 (±12,92)	<b>-87%</b>	25,1 (±21,06)	4,1 (±7,21)	<b>-84%</b>	11,66 (±3,06)	2,55 (±0,97)	<b>-78%</b>
yellow zone	110,00 (±14,14)	12,5 (±17,67)	<b>-89%</b>	22,50 (±10,61)	2,00 (±2,82)	<b>-91%</b>	8,50 (±0,71)	2,01 (±2,82)	<b>-76%</b>
green zone	114,36 (±82,98)	14,09 (±8,17)	<b>-88%</b>	19,72 (±14,19)	2,27 (±1,84)	<b>-88%</b>	12,54 (±8,74)	2,81 (±1,60)	<b>-78%</b>
23 Maxillofacial Units	125,34 (±72,60)	15,86 (±10,89)	<b>-87%</b>	22,30 (±16,88)	3,04 (±4,91)	<b>-86%</b>	11,81 (±6,31)	2,63 (±1,40)	<b>-78%</b>

Table 5  
Screening procedures on patients during COVID-19 epidemic.

	Nasopharyngeal swab					
	Yes, for everyone	Yes, hospitalized patients	Yes, patients undergoing surgery	Yes, patients with comorbidity	Yes, symptomatic patients	No
red zone	0%	9%	9%	0%	9%	17%
yellow zone	0%	0%	0%	0%	9%	0%
green zone	0%	9%	0%	0%	25%	13%
23 Maxillofacial Units	0%	18%	9%	0%	43%	30%

Table 6  
Positive patients' percentage and their management.

	Positive patients		
	yes		no
	isolated	transferred	
red zone	0%	26%	17%
yellow zone	0%	9%	0%
green zone	0%	9%	38%
23 Maxillofacial Units	0%	43%	57%

chosen as hub structures for paediatric surgery (20%) and neurosurgery (10%), respectively.

Nasopharyngeal swabs were performed mostly in symptomatic patients (43%), followed by already hospitalized patients (18%) and candidates to surgery (9%). This last rate is low due to the recent introduction of such preoperative screenings in most centers. 43% of patients screened positive for SARS-COV2 infection. These patients were transferred in Covid-19 departments for evaluation and treatment [Table 5 and 6].

Speaking about PPEs, FFP2/N95 masks were provided in 61% of Maxillofacial departments, mainly in the "red zone" (80%); a similar but reduced distribution is observed considering FFP3/N99 masks, provided only in 26% of Maxillofacial units (40% red zones unit).

Disposable gloves and surgical masks are provided in 91% and in 100% of Maxillofacial wards, respectively, while disposable gowns are supplied only in 39% of Maxillofacial units. PPEs' supply is considered partial from 48% of Maxillofacial departments, mainly in red (60%) and yellow (100%) areas, while 48% of the remaining ones considered the supply adequate for the requests, mostly in the green zone (73%).

Several methods have been applied to reduce SARS-COV2 diffusion. During visits the most used methods were limitation of social physical interaction (91%), health workers wearing PPEs (83%) and waiting room redesign (83%), followed by using risk factors' surveys (39%), telephonic symptoms' evaluation (35%) and patients PPEs given by the hospital (35%).

During inpatient activity, similar methods are adopted. The most used were again limitation of physical interaction (91%), limitation of relatives' visits (96%), health workers wearing PPEs (83%) and body temperature control of both patients (61%) and health workers (48%). We assessed less application of screening procedures such as nasopharyngeal swab (26%), telephonic Covid-19 symptoms' evaluation (43%) and risk factors survey (52%).

## DISCUSSION

Since the COVID-19 epidemic started, maxillofacial elective surgery was gradually reduced nationwide and clinical work scaled down in order to keep services running without putting both the healthcare workers and patients at risk.

A common trend emerged in keeping services running, while progressively reducing the outpatient accesses to those solicited by primary care physicians and other specialists. For outpatient visits, this kind of selection could be performed by the identification of prescriptions marked as urgent or solicit.

For what concerns outpatient and inpatient surgery, on a clinical and management level, the maxillofacial surgeons have to make important choices to identify cases that would necessarily need surgical treatment even in health emergency situations. These choices have the goal to guarantee the ideal timing to perform surgery for time-depending pathologies such as head and neck cancers and facial traumas. Due to

the emergent situation, guide-lines for Italian Maxillofacial surgeons were not available, and other societies recent suggestions are not based on evident based medicine.<sup>3,4</sup>

Treatment of cleft lip and palate deformities were not delayed over 9 months of age to avoid subsequent impeachment of speech. Also, facial paralysis patients have been added to the urgent surgeries if the onset of paralysis was close to 18 months in order to avoid losing the chance to reanimate mimetic musculature.<sup>5</sup>

Even if some regional specific Hub have been identified in order to collect all patients affected by a specific pathology in a COVID-19 free location allowing not to suspend all the elective surgery, the questionnaire focuses the attention on the missed visits and surgical procedures since the COVID-19 epidemic started. The huge reduction of outpatient visits (-87%) and outpatient (-86%) and inpatient surgical procedures (-78%) that the questionnaire shows four weeks after the beginning of the pandemic suggests a longer and longer waiting lists for all non-urgent pathologies.

Four week after the pandemic started, in a moment when nobody is able to say how long the pandemic lasts, physicians start to wonder how the waiting list issue could be manage at the end of the course of this pandemic. This already evident and more and more emerging problem should be managed in order to guarantee an acceptable care level in term of correct timing of diagnosis and treatment.

Physicians can only assume that possible solutions to this issue include the permanent hiring of temporary workers and the purchase of the medical and surgical tools, in order to increase the workforce and consequently the provided services.

The questionnaire answers show pandemic effects also on the private practice. In order to protect both the healthcare workers and the patients, the private practice has been interrupted almost everywhere. The exceptions are two wards in the “green zone” where private practice is still possible for urgency.

The temporary interruption of the private practice and the elongation of the waiting might increase of the private practice in the next future.

While the COVID-19 connected emergency was becoming more and more diffused and the routinely maxillofacial surgery activity reducing, a variable part of the maxillofacial staff was reallocated.

Maxillofacial surgeons and residents have joined mostly COVID-19 internal medicine and emergency departments and provided temporary tracheostomies to patients and nasopharyngeal tests for health-workers and patients. Few resources were allocated for shifts in Respiratory and Infectious Disease departments, due to the relevant skills required in these wards. Other activities involved maxillofacial residents in volunteering in full emergency medical services (911 equivalent).<sup>6</sup>

Eventually, personal safety in healthcare workers, both in Maxillofacial surgery practice and in new COVID-19 departments, became a hot topic due to SARS-COV2 high

transmission rates. In fact, we frequently perform aerosol-generating procedures. This underlines the importance of wearing adequate personal protective equipment PPEs during most of our shift, balancing the lack of supplies in COVID-19 emergency. Also, it seems reasonable to avoid as much as possible aerosol-generating procedures.

However, PPEs refill can be very variable between hospitals in different areas of Italy, as well between different wards in the same hospital. According to Xu et al., recommendation, in COVID-19 endemic area, for patients with or without fever, should take Level 2 protection gear (N95/FFP2 masks or superior, medical protective glasses, disposable gown, glove, medical hat and boot cover).<sup>7</sup>

Level 2 protection protocol shall be followed even during our regular nose and throat visits. On the other hand, disposable surgical mask should be used by patients as well to reduce one-way diffusion.<sup>7-9</sup>

For presumptive and confirmed COVID-19 patients, surgery might be performed with a Level 3 protection (in addition to level 2 protection, medical comprehensive respirator, medical breathing mask or positive pressure headgear are required): this material has not been utilized by surgeons of this survey because not available. Several adjunctive second protection were taken in those cases: double eye and double feet protections, double gloves, neck protection, impermeable gown.

Nevertheless, we had to face the lack of PPEs and protocols during this first month of Covid-19 spreading. Even our same old disposable surgical masks became a staple good in these days, while “true” PPEs, such as FFP2/N95 masks started spreading only in the last week. Only 61% of maxillofacial departments has FFP2/N95 masks for surgical activities, mostly in red zone areas (80%). Disposable gown and FFP3/N99 masks are less provided, while disposable gloves, glasses and surgical masks are adequately supplied.

Similar considerations could be extended to other behavioral methods used to delimit SARS-COV2 diffusion both during inpatient and outpatient practice and applied to healthcare workers and patients. Alongside personal protective equipment, the most required actions were removal of unnecessary physical contacts, limited access to the hospital/department for relatives and body temperature assessment before admission into the hospital for patients. On the contrary and unfortunately, naso-pharyngeal test for SARS-COV2 infection and risk factor screening questionnaire were less performed among different Italian hospitals.

## CONCLUSIONS

Italian maxillofacial surgeons had an attitude of high collaboration with non-surgeons colleagues and 22% of maxillofacial units found infected surgeons (4% of Maxillofacial surgeons), with a different grade according to the intensity

of contamination of the geographic areas. All maxillofacial activity has been highly reduced during the first month of COVID-19 epidemic: tumor surgery and trauma surgery has been widely guaranteed, while other pathologies are accumulating delays.

It might be interesting and useful to compare the Italian experience with other countries, which are at present at a different time point of the outbreak.

### Conflict of Interest

None

### Ethics statement/confirmation of patient permission

No

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### Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.bjoms.2020.04.035>.

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