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# Immediate postoperative care on high dependency unit or ward following microvascular free tissue transfer: lessons learnt from a change in practice imposed during the COVID-19 pandemic

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This article dedicated to Prof. Yuanwen Ouyangi.

## Abstract

The COVID-19 pandemic resulted in sudden changes to the established practice of using the high dependency unit (HDU) for the first night of postoperative care following microvascular free tissue transfer. Patients were managed instead on the head and neck ward. This retrospective case-note review aimed to report outcomes in consecutive patients treated before and during the pandemic, and to reflect on the implications of ward-based rather than HDU care. A total of 235 patients had free tissue transfer between 3 January 2019 and 25 February 2021: 125 before (lockdown 23 March 2020), and 110 during the pandemic (52 ward-managed and 58 HDU-managed). There were subtle case-mix differences during the pandemic, with 92% of ward-treated patients having oral cancers compared with 64% of HDU patients, and 73% of ward patients having a tracheostomy compared with 40% of HDU patients. Ward patients were less likely to receive electrolyte replacement (45% HDU vs 0% ward) and inotropes (12% HDU vs 2% ward). There were fewer returns to theatre for evacuation of a haematoma or re-anastomosis during the pandemic than there were before it. Other than fewer haematoma complications during the pandemic, the nature of complications was similar. In conclusion, the dramatic changes imposed by the pandemic have shown that the ward is a safe place for patients to be cared for immediately postoperatively, and it alleviates the bed pressures experienced in HDU. Careful case selection and clear criteria are required to identify patients who need the HDU.

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**Keywords:** Free tissue transfer; High dependency unit; Ward; Post-operative care; Head and neck cancer

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## Introduction

In England, the ‘lockdown’ on the 23 March 2020 due to the COVID-19 pandemic caused huge disruption to head and neck oncology services.<sup>1</sup> A national survey of oral and maxillofacial surgeons on the early effects of the pandemic on head and neck oncology and microvascular reconstruction practice reported that 8% were requested to pause head and

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neck cancer (HNC) surgery and 24% were requested to pause free flap surgery; 55% agreed that head and neck and reconstructive surgery should continue.<sup>2</sup> Jeannon et al reported their unit's continued provision of complex HNC surgery during the pandemic, and focused on a two-month period comprising only 13 patients with microvascular free tissue transfer who were highly selected as low-risk candidates.<sup>3</sup> In our unit the pandemic caused difficulties accessing theatres, but contingencies allowed us to continue ablative surgery for cancer and free flap reconstruction. The main difference during the pandemic was that we had to manage patients on the ward immediately postoperatively due to the unavailability of high dependency unit beds (HDU). Interestingly Zaid and Schlieve reported that most surgeons (92%) kept their patients in an intensive care unit (ICU) environment, whereas only 8% transferred them to a specialised step-down unit.<sup>2</sup>

In our unit it is standard practice for first-night postoperative patients to be managed on the HDU, but to enable us to continue with microvascular reconstruction during the pandemic it was necessary to use ward-based staff to manage patients on the head and neck ward. There was one-to-one nursing for the first night on the ward. For suitable patients, immediate transfer to an intermediate-level unit or ward with specialty-trained nursing staff is appropriate,<sup>4</sup> but changing established practice is problematic and the experience gained during the pandemic can be instructive. For a small proportion of patients, the pandemic will have made a difference to intention to treat and type of treatment, but these were relatively few and were difficult to clarify. The aim of this retrospective case note review therefore was to report on the impact of managing patients on the ward rather than HDU with respect to case-mix factors, use of tracheostomy, and complications; also management in the first 48 hours, the reason for acute medical assessment, and perioperative deaths.

## Methods

A consecutive cohort of patients (without exclusions) who had microvascular free tissue transfer from January 2019 to February 2021 was derived from existing multidisciplinary team (MDT) lists and ATMIS theatre logs. During the pandemic, the choice between ward and HDU management was driven by access to the HDU. The scrutiny of scanned notes (Electronic Document Management System, EDMS) enabled appropriate data to be recorded for subsequent analysis. These included age, gender, tumour site, and clinical staging, ACE 27 and WHO status, free-flap details, tracheostomy, days on the HDU, and length of surgery; also details of postoperative complications, medical emergency calls, returns to theatre, and Clavien-Dindo grading of complications.<sup>5</sup>

Fisher's exact test was used to compare categorical data between patient groups before and during the pandemic, and between HDU and ward management groups during the pandemic. The Mann-Whitney test compared duration of operation between the same groups. Three patients had

two operations before the pandemic and three had operations before and during the pandemic. For these six patients, the statistical independence of their data could not be assumed so the latest operation was selected for analysis. Statistical significance was regarded as  $p < 0.05$ . Analyses were performed using IBM SPSS Statistics for Windows version 25 (IBM Corp) and Stata Statistical Software release 13 (Stata-Corp). Where percentages are stated in the results section without a numerator and denominator, these are readily available within the tables.

This study was approved by Liverpool University Hospital NHS Foundation Trust Audit Department (CAMS registration number 9936).

## Results

The 235 patients had free tissue transfer between 3 January 2019 and 25 February 2021: 125 before lockdown (23 March 2020) and 110 afterwards. Before the pandemic 125 patients were managed in the immediate postoperative period on the HDU, while during the pandemic it was a mix of 58 on the HDU and 52 on the ward, a total of 183 on the HDU and 52 on the ward.

The case-mix and surgical details are given in [Table 1](#). During the pandemic fewer composite free-flap operations were performed than beforehand (42% before vs 30% during), in particular fewer radial composite flaps (11% before vs 1% during). Operating times were 28 minutes shorter on average (504 before vs 476 during,  $p = 0.046$ ). WHO status was graded less severely in the patients treated during the pandemic ( $p = 0.043$ ) with 82% (during) vs 67% (before) being fully active and able to carry on all pre-disease performance without restriction. For the 110 patients treated during the pandemic, there was little difference in case-mix or operation details by whether they were managed on the HDU ( $n = 58$ ) or on the ward ( $n = 52$ ), apart from tumour site ( $p < 0.001$ ) (92% of ward patients had oral cavity tumours compared with 64% of HDU patients).

Other aspects of postoperative management and outcome are summarised in [Table 2](#), while details of postoperative complications are shown in [Table 3](#). During the pandemic more patients received standard treatment (fluids, regular medications, analgesia, antiemetics) within 48 hours of surgery than before (52% before vs 62% during). Regarding non-standard treatment, no transfusions were done during the pandemic whereas 8% were done before ( $p = 0.002$ ).

There were clear differences ( $p < 0.001$ ) regarding tracheostomy and overnight intubation. The tracheostomy rate was similar (62% before vs 55% during) while the overnight intubation rate halved (24% before vs 11% during), and the percentage with neither increased (14% before vs 34% during). There were fewer returns to theatre (26% before vs 15% during,  $p = 0.04$ ) and notably fewer returns for evacuation of a haematoma (11% before vs 2% during,  $p = 0.004$ ) and re-anastomosis (9% before vs 3% during,  $p = 0.06$ ). The percentage with Clavien-Dindo complications of grade III or higher was slightly lower (27% before vs 17% during,

Table 1  
Patient case-mix and operation details. Data are number (%) unless otherwise stated.

	Operations		p value	Operations		p value
	Pre-pandemic (n=125)	During pandemic (n=110)		HDU during pandemic (n=58)	Ward during pandemic (n=52)	
Age (years):						
<55	16 (13)	26 (24)	0.16	15 (26)	11 (21)	0.56
55-64	26 (21)	24 (22)		10 (17)	14 (27)	
65-74	54 (43)	39 (35)		20 (34)	19 (37)	
≥75	29 (23)	21 (19)		13 (22)	8 (15)	
Gender:						
Male	71 (57)	69 (63)	0.42	38 (66)	31 (60)	0.56
Female	54 (43)	41 (37)		20 (34)	21 (40)	
Stage (overall):						
Early	24 (19)	29 (26)	0.070	13 (22)	16 (31)	0.13
Advanced	83 (66)	64 (58)		33 (57)	31 (60)	
ORN	15 (12)	8 (7)		4 (7)	4 (8)	
Other*	3 (2)	9 (8)		8 (14)	1 (2)	
T stage:						
0-1	12 (11)	14 (15)	0.42	6 (13)	8 (17)	0.72
2	27 (25)	26 (28)		11 (24)	15 (32)	
3	8 (7)	11 (12)		6 (13)	5 (11)	
4	60 (56)	42 (45)		23 (50)	19 (40)	
N stage:						
2-3	26 (24)	29 (31)	0.33	15 (33)	14 (30)	0.91
1	21 (20)	12 (13)		5 (11)	7 (15)	
0	60 (56)	52 (56)		26 (57)	26 (55)	
Site:						
Oral cavity	101 (81)	85 (77)	0.77	37 (64)	48 (92)	<0.001
Oropharynx	11 (9)	10 (9)		7 (12)	3 (6)	
Other*	13 (10)	15 (14)		14 (24)	1 (2)	
Flap type:						
Composite	52 (42)	33 (30)	0.077	18 (31)	15 (29)	0.84
soft	73 (58)	77 (70)		40 (69)	37 (71)	
DCIA	3 (2)	2 (2)	0.012	2 (3)	0	0.55
Fibular	23 (18)	19 (17)		12 (21)	7 (13)	
Radial comp	14 (11)	1 (1)		0	1 (2)	
Scapular	12 (10)	11 (10)		4 (7)	7 (13)	
ALT	26 (21)	30 (27)		17 (29)	13 (25)	
Lat dorsi	2 (2)	0		0	0	
MSAP	2 (2)	0		0	0	
Radial soft	43 (34)	45 (41)		22 (38)	23 (44)	
Rectus ab	0	2 (2)		1 (2)	1 (2)	
Length of operation:						
≤422 minutes	29 (23)	33 (30)		13 (22)	20 (38)	
Quartiles (minutes):						
423-495	30 (24)	27(25)		18 (31)	9 (17)	
496-571	33 (26)	28 (25)		16 (28)	12 (23)	
≥572	33 (26)	22 (20)		11 (19)	11 (21)	
Median(IQR)	504 (427-578)	476 (403-557)	0.046	490 (424-556)	447 (377-558)	0.20
ACE 27:						
0	87 (70)	76 (69)	0.98	41 (71)	35 (67)	0.83
1	28 (22)	26 (24)		14 (24)	12 (23)	
2	9 (7)	7 (6)		3 (5)	4 (8)	
3	1 (1)	1 (1)		0	1 (2)	
WHO status:						
0	84 (67)	90 (82)	0.043	45 (78)	45 (87)	0.39
1	26 (21)	15 (14)		9 (16)	6 (12)	
2	12 (10)	3 (3)		3 (5)	0	
3-4	3 (2)	2 (2)		1 (2)	1 (2)	

Overall stage: early (T1N0M0, T2N0M0). The 12 others were adenoid cystic, ameloblastoma (3), clear-cell SCC, cutaneous SCC, extensive BCC, malignant melanoma, recurrent BCC (3) skin SCC.

Site: the 28 others were antrum (5), columella (2) larynx (1), left neck (1), left pinna (1), left posterior ethmoid (1), lip (2), nasal cavity (6), orbit (2), pinna/parotid (1), post-auricular (2), right parotid (2), scalp (1), skin of cheek/parotid (1). TN staging excludes ORN/others.

p value: Fisher's exact test apart from Mann-Whitney for length of operation.

Table 2  
Postoperative management and outcome.

	Operations		p value	During pandemic		p value
	Pre-pandemic (n=125)	During pandemic (n=110)		HDU (n=58)	Ward (n=52)	
Treatment in first 48 hours:**						
Standard treatment*	65 (52)	68 (62)	0.15	25 (43)	43 (83)	<0.001
Non-standard treatment:						
Inotropes	16 (13)	8 (7)	0.20	7 (12)	1 (2)	0.06
Electrolyte replacement	25 (20)	26 (24)	0.53	26 (45)	0	<0.001
Steroids	1 (1)	3 (3)	0.34	2 (3)	1 (2)	>0.99
Haemostatic agents	1 (1)	0	>0.99	0	0	-
Transfused	10 (8)	0	0.002	0	0	-
Other	16 (13)	13 (12)	0.85	6 (10)	7 (13)	0.77
Tracheostomy:						
Yes	78 (62)	61 (55)	<0.001	23 (40)	38 (73)	<0.001
No	17 (14)	37 (34)		23 (40)	14 (27)	
Overnight intubation	30 (24)	12 (11)		12 (21)	0	
Days on HDU:						
1	99 (79)	50 (86)	0.63	50 (86)	-	N/A
2	18 (14)	5 (9)		5 (9)	-	
3-4	5 (4)	1 (2)		1 (2)	-	
5-12	3 (2)	2 (3)		2 (3)	-	
Postoperative complication:						
Yes	72 (58)	60 (55)	0.69	34 (59)	26 (50)	0.44
No	53 (42)	50 (45)		24 (41)	26 (50)	
MET call:						
Multiple	0	2 (2)	0.12	1 (2)	1 (2)	0.72
One	14 (11)	7 (6)		5 (9)	2 (4)	
None	111 (89)	101 (92)		52 (90)	49 (94)	
Return to theatre:						
Yes	33 (26)	16 (15)	0.04	11 (19)	5 (10)	0.19
No	92 (74)	94 (85)		47 (81)	47 (90)	
Reason for return to theatre:**						
Haematoma evacuation	14 (11)	2 (2)	0.004	1 (2)	1 (2)	>0.99
Re-anastomosis	11 (9)	3 (3)	0.06	2 (3)	1 (2)	>0.99
Airway	7 (6)	5 (5)	0.77	4 (7)	1 (2)	0.37
Debulking/debridement of flap	4 (3)	1 (1)	0.38	1 (2)	0	>0.99
Drainage and washout of wound	1 (1)	1 (1)	>0.99	1 (2)	0	>0.99
New free flap	3 (2)	3 (3)	>0.99	2 (3)	1 (2)	>0.99
Other	5 (4)	4 (4)	>0.99	1 (2)	3 (6)	0.34
Clavien-Dindo grade:						
0	42 (34)	50 (45)	0.32	23 (40)	27 (52)	0.22
I	17 (14)	15 (14)		10 (17)	5 (10)	
II	32 (26)	26 (24)		13 (22)	13 (25)	
IIIA	1 (1)	0		0	0	
IIIB	28 (22)	16 (15)		11 (19)	5 (10)	
IVA	1 (1)	2 (2)		0	2 (4)	
IVB	0	0		0	0	
V	4 (3)	1 (1)		1 (2)	0	

\*Of fluids, regular medication, analgesia, antiemetics.

\*\*Multiples were possible.

p value: Fisher's exact test.

p=0.09). There was little difference in medical emergency calls (11% before vs 8% during) or postoperative complications (58% before vs 55% during).

Other than there being fewer haematoma complications during the pandemic (7% before and 1% during) the distributions of complications appeared similar. The complication rate for patients having tracheostomy was 62% (48/78) before and 59% (36/61) during the pandemic; this compared to 50% (15/30) and 58% (7/12), respectively, for patients having overnight intubation, and 47% (8/17) and 46%

(17/37), respectively, for those having neither. For the 110 patients who had surgery during the pandemic, there was little difference between those managed on the HDU (n=58) and those managed on the ward (n=52) apart from tracheostomy/overnight intubation and initial treatment within the first 48 hours (both p<0.001). Whereas 21% of the patients managed on the HDU during the pandemic had overnight intubation, there were none administered for ward managed patients; 40% of HDU patients and 73% of ward patients had a tracheostomy. Ward patients were more likely

Table 3  
Main postoperative complications.

	Pre-pandemic (n=125)	During pandemic (n=110)	p value	During pandemic		p value
				HDU (n=58)	Ward (n = 52)	
Main postoperative complication:						
Surgical	46 (37)	26 (24)	0.06	15 (26)	11 (21)	0.67
Medical	26 (21)	34 (31)		19 (33)	15 (29)	
None	53 (42)	50 (45)		24 (41)	26 (50)	
Main surgical complication:						
Bleed from surgical site	2 (2)	1 (1)	0.55	1 (2)	0	0.84
Chyle leak	2 (2)	1 (1)		1 (2)	0	
Flap failure	4 (3)	3 (3)		2 (3)	1 (2)	
Haematoma	9 (7)	1 (1)		1 (2)	0	
Seroma	2 (2)	4 (4)		2 (3)	2 (4)	
Problem with tracheostomy	5 (4)	1 (1)		1 (2)	0	
Vascular compromise	4 (3)	4 (4)		3 (5)	1 (2)	
Wound dehiscence	7 (6)	4 (4)		1 (2)	3 (6)	
Wound infection	10 (8)	6 (5)		3 (5)	3 (6)	
Other	1 (1)	1 (1)		0	1 (2)	
Main medical complication:						
Cardiovascular	3 (2)	8 (7)	0.47	5 (9)	3 (6)	0.91
Gastrointestinal	0	1 (1)		1 (2)	0	
Multiple organ failure	0	1 (1)		0	1 (2)	
Need for transfusion	4 (3)	2 (2)		1 (2)	1 (2)	
Renal	2 (2)	1 (1)		1 (2)	0	
Respiratory	17 (14)	21 (19)		11 (19)	10 (19)	

p value: Fisher's exact test.

to receive standard treatment in the first 48 hours (43% HDU vs 83% ward); the main differences in non-standard treatment were in electrolyte replacement (45% HDU vs 0% ward,  $p < 0.001$ ) and the use of inotropes (12% HDU vs 2% ward,  $p = 0.06$ ).

During the pandemic 56% (33/59) of patients whose operation started (knife to skin time) between 9:30 and 10:29 am were managed on the ward, compared with 40% (16/40) whose operations started between 10:30 and 10:59 am, and 27% (3/11) whose operations started after 11:00 am ( $p = 0.11$ ). Regarding finishing times, 73% (16/22) of operations that ended before 5 pm were managed on the ward, compared with 45% (10/22) that ended between 5:00 and 5:59pm, 38% (16/42) that ended between 6:00 and 7:59pm, and 42% (10/24) that ended after 8pm or later ( $p = 0.06$ ). There were no obvious trends regarding the day of surgery (results not shown).

Throughout the study, there were three perioperative deaths, two of them in the pre-pandemic HDU group (one 25 days after surgery from complications of hospital-acquired pneumonia and one 22 days after surgery from complications of aspiration pneumonia). The third patient was in the HDU group during the pandemic and died 21 days after surgery from a cardiac arrest.

## Discussion

Although outcomes following HNC ablation and free tissue transfer are remarkably good even in older patients,<sup>6</sup> controversy remains regarding the optimal place in which to care for them immediately after free tissue transfer.<sup>4</sup> More inten-

sive management on the HDU over the first night might reduce early acute complications such as hypotension or airway difficulties, and allow for better pain control, particularly for donor sites such as the deep circumflex iliac artery (DCIA) free flap. Optimal care could be a factor in reducing flap compromise. However, the HDU is a relatively costly and valuable resource with limited bed availability. Operations can be delayed whilst waiting for bed confirmation and are occasionally cancelled if none is available. It is possible to get additional ward staff at short notice to allow patients to be managed on the ward, but this adds to the work burden as unplanned overtime for existing staff.

Our established practice is to use the HDU, but the pandemic forced a change and created an opportunity for transfer to the head and neck ward after a few hours in the postoperative recovery area in the theatre complex. Ward staff had no specific HDU training and in making this change there was a degree of trepidation around patient safety.

Although this study includes a large number of consecutive free flaps over two years, there are several limitations. The ward experience was from a single institution and might not be representative of ward environments elsewhere. The unit has experience of 'specialising' patients on the ward when a HDU bed is not available. In addition, given the number of free flaps performed annually, the ward staff have considerable experience of early postoperative care, as all patients typically return to the ward from HDU by early afternoon the day after their operation. Support is given by the consultant anaesthetist in charge of the case who sees the patient on the ward both before and after the operation. This is augmented by members of the HDU outreach team,

who not only are available if the patient's vital signs deteriorate, but are also there for advice as part of the ward rounds. Understandably, it may not be possible to replicate this experience elsewhere.

Relatively few patients went to the ward and although random allocation was not involved, it is a relative strength of the study that the decision to use the ward was based solely on HDU availability. At the height of the pandemic the case-mix will have been affected with fewer referrals and, due to NHS constraints, perhaps fewer were offered free flap reconstruction. However, the purpose of this study was not to comment on selection for free tissue transfer. The possible effect of dual consultant operating on outcomes is hard to account for, and while infrequent before COVID, it became standard practice during the peak of the pandemic and has continued since then.

The study findings suggest subtle changes in case mix over the timeframe, for example, relatively more oral cancers being managed on the ward during the pandemic. However, with the ability to provide cancer ablation and free tissue transfer throughout the pandemic, patients on the ward and HDU were comparable in age, stage, comorbidity, and flap type. Case selection was influenced more by the decision to treat rather than postoperative ward care.

Although the literature suggests an average length of stay on the HDU of two to three days,<sup>7,8</sup> our patients typically stay just one night postoperatively. Most who develop postoperative medical complications do so several days later, and it would be reasonable to postulate that staying less than 24 hours in the HDU should not have an impact on this. Also, surgical complications such as haematomas and flap salvage might not have different outcomes whether on the ICU or ward.

Our data suggest that the ward environment can address most postoperative medical issues. This is set in the context of first-tier, dentally-qualified, on-call juniors, supported by ward nurses and second-tier, dual-qualified surgical trainees. Experienced ward staff might be better at detecting early flap compromise, which is key to successful salvage.<sup>9</sup> A difference in management was noted for electrolyte replacement and inotropes. There is most likely to be a more 'intensive' care plan on the HDU, but for most cases the data suggest that this was not an essential aspect of postoperative management. The head and neck anaesthetists managed the cases similarly in the theatre recovery suite, whether going to the HDU or returning to the ward.

Interestingly the pandemic brought into focus the use of temporary tracheostomy. The unit had a low threshold for tracheostomies to secure the airway in the early postoperative period,<sup>10</sup> accepting that they have a negative impact on the patient's experience.<sup>11</sup> There was a gradual reduction in tracheostomies with an increasing avoidance of tracheostomy altogether or overnight intubation. However, as there was a perceived increased risk of airway compromise for patients managed on the ward, more tracheostomies were performed there during the pandemic, a trend now being reversed through careful case selection.

Another change in practice, two-consultant operations, was done mainly to shorten the operating time; this was 43 minutes shorter for ward patients but the difference was not significant. The start and finish times were earlier for ward patients, reflecting greater certainty of a postoperative bed and no delays whilst awaiting confirmation of a bed in the HDU. Informal feedback from trainees has suggested that twin consultant operating enhanced rather than detracted from their theatre experience. Small numbers, however, prevent any meaningful comment on how dual-consultant operating might affect returns to theatre for events such as evacuation of haematoma or re-anastomosis.

The pandemic allowed us to reflect on possible future changes to postoperative care, and also demonstrated the close collaboration, communication, and teamwork between the ward and the intensive care outreach team. To continue ward management in this immediate postoperative recovery phase, there is a need to develop and evaluate the selection criteria for who is managed on the HDU and ward, standard operating procedures on the ward in terms of patient care escalation to the outreach team, and enhanced training for ward-based staff. It would be helpful to include a cost analysis and patients' experiences, as these would strengthen a business case.

In conclusion, the COVID-19 pandemic forced a change in postoperative practice which, with refinement, could lead to quality improvement. The data suggest that ward management is safe, and an efficient use of resources.

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### Conflict of interest

We have no conflicts of interest.

### Ethics statement/confirmation of patients permission

The data was collected for service evaluation and approved by the local Clinical Governance Department. Patients' permission not required, anonymised data.

### References

- 1.. Shaw R, COVIDSurg Collaborative. UK head and neck cancer surgical capacity during the second wave of the COVID—19 pandemic: have we learned the lessons? *Clin Otolaryngol* 2021;**46**:729–735.
- 2.. Zaid W, Schlieve T. The early effects of coronavirus disease-2019 on head and neck oncology and microvascular reconstruction practice: a national survey of oral and maxillofacial surgeons enrolled in the Head and Neck Special Interest Group. *J Oral Maxillofac Surg* 2020;**78**:1859–1868.
- 3.. Jeannon JP, Simo R, Oakley R, et al. Head and neck cancer surgery during the coronavirus pandemic: a single-institution experience. *J Laryngol Otol* 2021;**135**:168–172.

- 4.. Varadarajan VV, Arshad H, Dziegielewski PT. Head and neck free flap reconstruction: what is the appropriate post-operative level of care? *Oral Oncol* 2017;**75**:61–66.
- 5.. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg* 2004;**240**:205–213.
- 6.. Chieng CY, Davies A, Lowe D, et al. Clinical characteristics, treatment intent, and outcome in a consecutive 10-year cohort of oral cancer patients aged 75 years and older. *Br J Oral Maxillofac Surg* 2021;**59**:303–311.
- 7.. Morse E, Henderson C, Carafeno T, et al. A clinical care pathway to reduce ICU usage in head and neck microvascular reconstruction. *Otolaryngol Head Neck Surg* 2019;**160**:783–790.
- 8.. Abo Sharkh H, Madathil S, Al-Ghamdi O, et al. A comprehensive clinical care pathway for microvascular maxillofacial reconstructive surgery. *J Oral Maxillofac Surg* 2019;**77**:2347–2354.
- 9.. Ho MW, Brown JS, Magennis P, et al. Salvage outcomes of free tissue transfer in Liverpool: trends over 18 years (1992–2009). *Br J Oral Maxillofac Surg* 2012;**50**:13–18.
- 10.. Littlewood CG, Jebriil A, Lowe D, et al. Factors contributing to delayed decannulation of temporary tracheostomies following free tissue reconstructive surgery for head and neck cancer. *Br J Oral Maxillofac Surg* 2021;**59**:472–477.
- 11.. Nazir H, Lowe D, Rogers SN. Patients' experience of the monitoring of free flaps after reconstruction for oral cancer. *Br J Oral Maxillofac Surg* 2017;**55**:1008–1012.