Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Table 1 Select Donor and Recipient Characteristics of Patients Undergoing Lung Transplantation

	No PGD (n=81)	PGD (n=18)	p value
Positive donor smoking history	11 (13.6%)	2 (11.1%)	>.999
Positive donor heavy alcohol use	20 (24.7%)	2 (11.1%)	0.347
Graft ischemic time (min)	343 (204-851)	364 (191-843)	0.577
Intraoperative IVF (ml)	2031 (400-4700)	1800 (507-3800)	0.576
Recipient BMI	24.8 (17.2-31.6)	26.1 (17.9-30.9)	0.253
Intraoperative RBC (ml)	0 (0-8700)	475 (0-3300)	0.032
Intraoperative FFP (ml)	292 (0-5880)	611 (0-2974)	0.048
Intraoperative platelets (ml)	204 (0-2554)	528 (0-2072)	0.037
Intraoperative cryoprecipitate (ml)	0 (0-620)	158 (0-836)	0.017
Intraoperative RBC >1000ml	12 (14.8%)	7 (38.9%)	0.041
Use of intraoperative ECMO (vs CPB)	12 (14.8%)	5 (27.8%)	0.297
Preoperative use of OCS	8 (9.88%)	2 (11.1%)	>0.999
Recipient gender (female)	42 (51.9%)	7 (38.9%)	0.463
Recipient age (yrs)	58.1 (24.1-69.3)	56.7 (24.3-69.3)	0.737
Donor etiology of respiratory failure			0.031
Cystic fibrosis	16 (19.8%)	3 (16.7%)	
COPD	28 (34.5%)	1 (5.56%)	
ILD/IPF	35 (43.2%)	13 (72.2%)	
Other	2 (2.4%)	1 (5.56%)	

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Tele-Rehabilitation during the COVID-19 Pandemic: Experience of a Large Lung Transplant Program

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Purpose: The COVID-19 pandemic resulted in a rapid shift from centre-based to tele-rehabilitation. Experience with this delivery model on a large scale has not been described.

Methods: A program evaluation of usage and satisfaction of lung transplant (LTx) candidates and recipients who used a web-based, remote monitoring App for a least 4 weeks between March 16th and September 1st 2020. Within-subjects analysis was performed for self-efficacy for exercise (SEE) and physical activity pre-LTx at baseline and after 4 weeks and exercise volumes between at baseline and last entry.

Results: 78 LTx candidates and 30 recipients were included (50% male, 58 ± 12 years, 50% ILD, 31% COPD). 90% of LTx candidates had oximeters, 35% a treadmill and 75% weights. 34% reported being alone when exercising. 64% of LTx candidates and 50% of recipients entered ≥ 10 prescribed exercise sessions. Pre-LTx, non-treadmill walking was recorded as steps (range 230-4847), distance (18m-3.2km) or time (3-80 mins), n=48. 26 patients used a treadmill (range 0.5 - 2.8 mph) for 5-45 minutes. Walking increased in duration (16-22mins, p=0.002) but not speed (1.7-1.75mph, p=0.31). Quadriceps weight used for leg extension did not change (3.6-3.9lbs, p=0.08, n=37). On the Rapid Assessment of Physical Activity (RAPA), 57% scored as active which improved to 87% (p=0.02, n=23). On the SEE, confidence for exercising regularly when alone increased (46%), decreased (14%) or remained the same (40%), n=37. LTx recipients increased treadmill speed (1.9 - 2.7mph, p=0.003) but not time (19-26 minutes, p=0.07, n=9). Non-treadmill walking was recorded as time (range 11-90 mins) and steps (1902-15903). Quadriceps weight increased (2.3 - 5.7lbs, p=0.0002, n=12). At 3 months post-transplant, 76 % scored as active (n=17) with a high total SEE score of 74 ± 11 (n=12). Patients engaged in 365 physiotherapy video visits. 83% of LTx candidates agreed the App helped prepare them for surgery and 85% of LTx recipients agreed that asynchronous texting was helpful to their recovery. Patients accessed the App's exercise card (278 views), pre-LTx exercise video (116 views) and guidelines for exercising after LTx (89 views).

Conclusion: Exercise participation and progression occurred despite issues around equipment access. This early experience will inform the development of a robust, effective and equitable remote/hybrid rehabilitation model.

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Screening for Severe Hypogammaglobulinemia in Lung Transplant Recipients

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Purpose: Severe hypogammaglobulinemia (HG), IgG <400 mg/dL, is associated with increased infections and mortality post-lung transplant (LT). Pre- and post-LT screening is recommended, but optimal protocols have not been determined and practices vary between LT centers. We designed and implemented a screening program to detect severe HG in LT recipients.

Methods: We developed and implemented standard pre-/post-LT IgG screening protocols through iterative PDSA cycles starting 1/1/19. We collected pre-/post- IgG levels for LT recipients between 1/1/94-10/15/20 to measure process outcomes and inform future improvements.

Results: Both pre- and post-LT IgG screening increased after screening protocols were implemented (Table). Of 45 patients who underwent LT between 1/1/17-10/15/20 and had pre-LT IgG checked, 0% (0) had severe HG, 11% (5) HG (IgG 400-700 mg/dL), 9% (4) isolated low IgG subclasses, 4% (2) isolated low IgA, and 13% (6) isolated low IgM. All 5 patients with pre-LT HG, 2 with associated low IgA and/or IgM, developed severe or clinically significant HG post-LT requiring IgG Replacement Therapy (IgG-RT). Of 249 patients who underwent LT before 6/30/20 and had post-LT IgG checked, severe HG rates were 17% (8/48), 7% (4/60), 5% (3/56), 14% (8/56), 11% (6/53), 6% (3/48), 3% (1/34), and 3% (1/35) at 0.5, 1, 2, 3, 6, 12, 18, and 24 months. Median [range] time from LT to severe HG onset was 90 [14-730] days. Time from severe HG onset to recovery was 31 [16-184] days in 9 patients whose severe HG resolved without IgG-RT. IgG-RT was started in 28 patients 212 [0-3533] days after LT per immunology recommendation. Pre-LT IgG (r=0.78, p=0) and IgG3 (r=0.82, p=0) correlated with the lowest IgG level post-LT. Pre-LT CD27 + (r=-0.58, p=0.007) and CD27+IgM+IgD+ (r=-0.52, p=0.02) B cells inversely correlated with the lowest IgG level post-LT.

Conclusion: Implementation of standard HG screening protocols increased detection of severe HG post-LT and revealed novel findings regarding the significance of immunologic abnormalities in LT recipients.

Percentage of patients with IgG levels checked pre-LT and at least once in the first year post-LT.

LT Date	Pre-LT IgG Checked	Post-LT IgG Checked
1/1/17-12/31/17	2% (1/43)	5% (2/43)
1/1/18-12/31/18	9% (4/47)	53% (25/47)
1/1/19-12/31/19	17% (12/70)	91% (64/70)
1/1/20-6/30/20	45% (18/40)	88% (35/40)

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Hypogammaglobulinemia Identification and Management in Lung Transplant Patients: Survey of Provider Practices

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Purpose: Severe hypogammaglobulinemia (HG) in lung transplant recipients is associated with increased infections and one-year mortality. As standard protocols for HG screening and management do not exist, we surveyed lung transplant centers to characterize current practices in HG screening and management.

Methods: We created a survey which was reviewed by three experts in Lung Transplant Pulmonology and Allergy/Immunology. The survey consisted of