ISHLT ID AND PULMONARY VASCULAR DISEASE. DECEMBER '22
JOURNAL WATCH

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EDITOR

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Badagliacca R., *et al*. **The paradox of pulmonary arterial hypertension in Italy in the COVID-19 era: is risk of disease progression around the corner?** *European Respiratory Journal.* 2022:2102276.

Objective

- To determine the consequences of governance measures on pulmonary arterial hypertension (PAH) management and risk of poor outcome in patients with COVID-19

Methods

- Multicentre (25) observational nationwide survey of adult patients with PAH, collecting data between March 1 and May 1, 2020 and comparing them with the same time period in 2019
- Collected data included demographics, number of in-person visits, 6-min walk and echocardiographic test results, BNP/NT-proBNP, WHO functional class assessment, presence of elective and non-elective hospitalisation, need for treatment escalation/initiation, newly diagnosed PAH, incidence of COVID-19 and mortality rates

Results

- Among 1922 PAH patients (43% class III-IV), incidences of SARS-CoV-2 infection and COVID-19 were 1.0% and 0.46%, respectively, with the latter associated with 100% mortality (n=9)
- Less elective activities were converted into more remote interfacing between clinicians and PAH patients, resulting in lower rates of hospitalisation (1.2% versus 1.9%) and related death (0.3% vs 0.5%) (p<0.001)

Results Cont.

- During the COVID-19 outbreak, new PAH diagnoses were reduced by 72.5% (p<0.001) and patients were less likely to receive elective sequential add-on therapy (1.2% vs 5.0%; p<0.001)
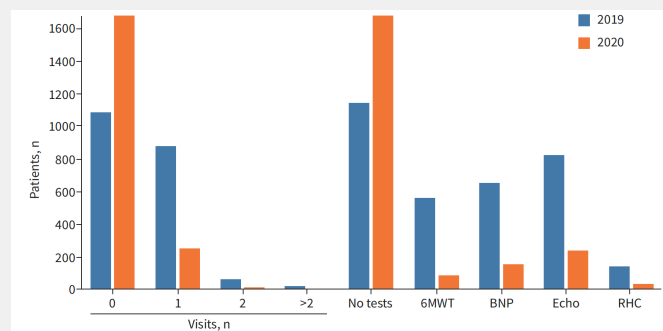

FIGURE 1 Systematic activities and relevant tests between March 1 and May 1, 2020, compared with the equivalent period in 2019. Overall number of pulmonary arterial hypertension patients performing in-person visits and tests are shown. 6MWT: 6-min walk test; BNP: N-terminal pro-brain natriuretic peptide; Echo: echocardiogram; RHC: right heart catheterisation.
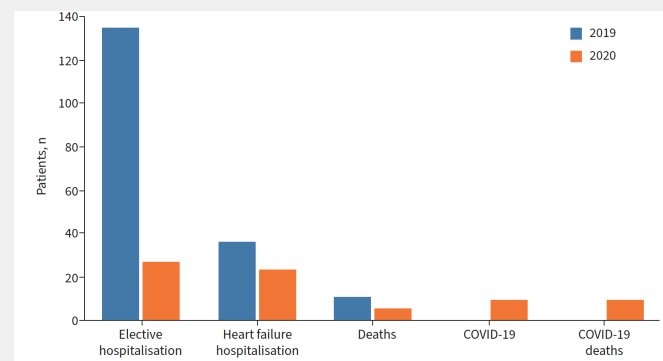
FIGURE 3 Hospitalisation for heart failure and mortality rates for non-infected pulmonary arterial hypertension (PAH) patients from March 1 to May 1 2020 compared with the equivalent period in 2019. COVID-19 PAH patients are reported in separate histograms.

Results Cont.
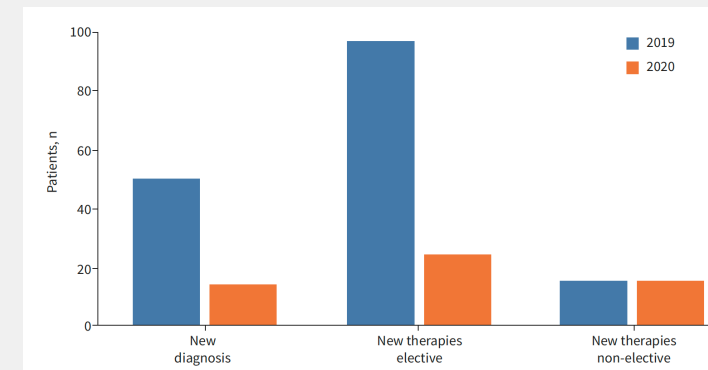
FIGURE 4 Number of new pulmonary arterial hypertension diagnoses, elective sequential add-on therapies and non-elective sequential add-on therapies from March 1 to May 2, 2020, compared with the equivalent period in 2019.

Reviewer's impression

- A high mortality is described in PAH patients with COVID-19 (initial strain)
- Findings raise concerns about unknown long-term adverse effects of delayed diagnoses and elective therapies, rather than short- term
- Decreased in the level of activity among PAH patients during lockdown could have contributed to the reduction in HF hospitalisations and mortality noted despite decreased elective work-ups and therapies

Limitations

- Retrospective data, with a narrow perspective on the restricted healthcare at the very start of the pandemic due to priorization and telemedecine, which does not take into consideration later adjustments and new SARS-CoV-2 variants
- Does not account for change in patient behavior, level of activity and relationship to risk with subsequent waves of the pandemic

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Vasudeva R *et al.* **Hospital outcomes for patients with pulmonary arterial hypertension in sepsis and septic shock.**
BMC Pulmonary Medicine. 2022. doi:10.1186/s12890-022-02145-1

Study Highlights

Aim: Determine in-hospital mortality, morbidity and resource utilization among patients with pulmonary artery hypertension (PAH) hospitalized with sepsis or septic shock (SSS).
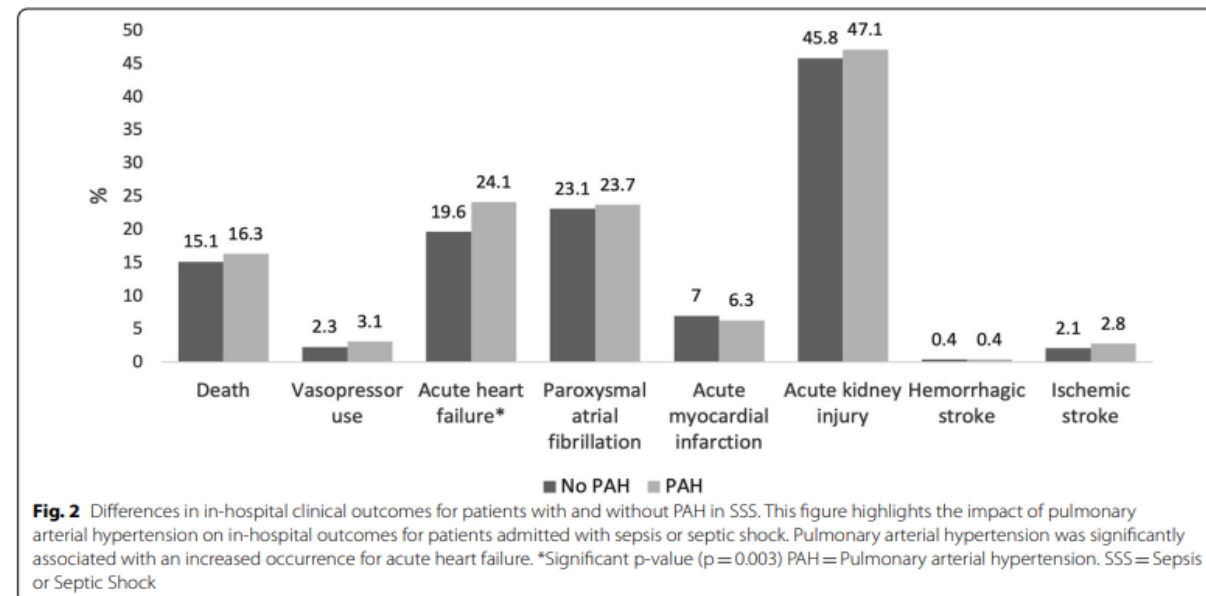
Design:

- Retrospective review of National Readmissions Database
- Hospitalized adult patients with SSS.
- A 2:1 ratio nearest propensity matching method to compare in-hospital outcomes between patients with vs without PAH.

Results:

- Study sample: PAH N = 1134 vs No PAH N= 2,667,560
- PAH patients with SSS had increased rate of acute heart failure (24.1% vs 19.6%, p=0.003), longer hospitalization (13.5 days vs 10.9 days, p<0.001), and greater hospital costs ($164,252 vs $129,185, p<0.0001).
- SSS in PAH was not associated with increased in-hospital mortality.

Central Figure

Fig. 2 Differences in in-hospital clinical outcomes for patients with and without PAH in SSS. This figure highlights the impact of pulmonary arterial hypertension on in-hospital outcomes for patients admitted with sepsis or septic shock. Pulmonary arterial hypertension was significantly associated with an increased occurrence for acute heart failure. *Significant p-value (p = 0.003) PAH = Pulmonary arterial hypertension. SSS = Sepsis or Septic Shock

Reviewer's Comments

While mortality did not significantly differ between patients with and without PAH hospitalized with SSS, morbidity (*e.g.* incidence of heart failure), hospital length of stay, and hospital costs were all significantly higher among PAH patients. Additional studies are needed to determine why heart failure occurs with greater frequency in PAH patients with SSS, particularly as it relates to underlying right ventricular strain.

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Oweis J. et al. **Influence of right ventricular structure and function on hospital outcomes in COVID-19 patients.**
Heart Lung. 2023; 57:19-24.

Clinical Question

What is the impact of right ventricular (RV) structure and function on the in-hospital outcomes in patients with COVID-19 infection?

Methods

- Single tertiary center conducted a retrospective cohort study of 997 PCR-confirmed COVID-19 patients → 194 patients without history of pulmonary hypertension underwent echocardiograms for clinical indications.
- Clinical endpoint data collected via chart review: mortality, ICU admission, need for mechanical ventilation or pressor support.

Results

- Mean age 68+/-16, 42% female, BMI 29.8+/-9.5 kg/m2.
- COPD in 13%, asthma in 10%, CAD in 25%.
- Overall 27% mortality – 46% in ICU patients, 9% in the rest of the cohort with no significant differences in co-morbidities between expired patients and survivors.
- RV dilatation in 19%, decreased RV function in 17%, RV dilatation or decreased RV systolic function in 24%.

Results Cont.

Predictors of mortality: * = detrimental effect ie: increase mortality

Parameter	Univariate model		Multivariate model	
	HR, 95% CI	p-value	HR, 95% CI	p-value
ICU admission	8.8, 3.963–19.502*	<0.001	2.3, 0.738–7.358	0.149
Positive pressure ventilation	10.1, 4.867–21.100*	<0.001	3.7, 1.218–11.084*	0.021
Acute hemodialysis	6.3, 1.802–21.837*	<0.004	2.4, 0.527–10.646	0.261
IV pressors	7.7, 3.731–15.853*	<0.001	1.9, 0.714–4.833	0.205
RV dilatation	2.336, 1.095–4.985*	0.028	2.3, 0.938–5.716	0.069

Parameter "X":	RV dilatation as a predictor of mortality in patients with "X" parameter		RV dilatation as a predictor of mortality in patients without "X" parameter	
	HR, 95% CI	p-value	HR, 95% CI	p-value
ICU admission	2.966, 1.067–8.243*	0.037	0.696, 0.081–6.012	0.742
Positive pressure ventilation	1.8, 0.537–5.938	0.344	3.3, 0.989–11.231	0.052
Acute hemodialysis[†]	–	–	2.326, 1.053–5.184*	0.037
IV pressors	1.524, 0.389–5.968	0.545	2.702, 0.969–7.535	0.057

RV dilatation was significantly more common in expired patients (15% vs 29%, p = 0.026), and associated with increased mortality in ICU patients (HR 2.966, 95%CI 1.067–8.243, p = 0.037), who did not require positive pressure ventilation, IV pressor support or acute hemodialysis.

Reviewer's Impression

This study reiterates the known independent relationship between COVID-19 infection and RV dysfunction.

The direct mechanism underlying the associated RV dysfunction remains to be determined and could be a manifestation of lung injury, direct myocardial involvement or even pulmonary vascular inflammation.

Regardless of the pathophysiology, this study shows significantly increased mortality in patients with COVID-19 infection who develop RV dysfunction.