Bridging the PH Pathways
Abbey Jennalyn

- Speaker Bureau for Actelion Pharmaceuticals, Disease Education & Therapy Access
WHO ARE WE?

Abbey
• Nurse Practitioner, University of Utah Palliative Care Team
• Advanced Certified in Hospice and Palliative Care

Jennalyn
• Nurse Practitioner, University of Utah Pulmonary Hypertension & Dyspnea Program
• Pulmonary specialty in multi-disciplinary program
• Program Coordinator, Accredited by the Pulmonary Hypertension Association
OBJECTIVES

Discuss:

- Pulmonary hypertension (PH)
- Disease projection and prognosis
- Palliative care role in PH
- “Bridging the pathways” of care
- Symptom burden and management
- Barriers to palliative care
- End-of-life obstacles
“CTEPH CINDY”

- 54 year old woman with PMH of 3 miscarriages attributed to genetic abnormality, c/s and tonsillectomy
- 2010 noted exercise intolerance, a few months later lower extremity edema, and increased SOB
- 12/2010 admitted to an outside ICU and diagnosed with bilateral PE and PH (PA102/40 (60)), started IV epoprostenol and anticoagulation
- 4/2011 starts O2
- 10/2011 bosentan added
- Continues to decline
- 8/2012 meets U of U transplant team with residual PE concern
- 8/2012 referral to USCD comes through (PA 104/40)
- 8/2012 PTE, post-PA 41/22 (29)
- Followed by community provider, ultimately starts and increases to treprostinil 105 ng/kg/min, bosentan 125 mg BID, and riociguat 1.0 mg TID
- 1/2019 Transferred to U of U MICU on dopamine for PH exacerbation, AF/RVR (failed cardioversion)

Picture: http://www.phacanada.ca/cteph/
1/2019 admit
- AMS noted during visit
- Stroke- cardioembolic etiology
- At DC noted difficulty safely managing IV meds
- Nursing and SP assisted training with family members for IV med
- “Will consider palliative care consult if no further transplant options remain after discussion with transplant team at [outside facilities]”
- Evaluated by U of U transplant and not a candidate at facility
- Community pulmonologist wanted to continue management.

Model: The pathophysiology of chronic thromboembolic pulmonary hypertension
Gérald Simonneau, Adam Torbicki, Peter Dorfmüller, Nick Kim
European Respiratory Review Mar 2017, 26 (143) 160112; DOI: 10.1183/16000617.0112-2016
2/2019 admit
- Continued weight gain and pain with ascites
- Admitted for **palliative paracentesis** (risk with OAC)
- Short admit
- Community hospital near home unable to manage
- May have transplant option in another state where she has family, evaluation pending insurance

3/2019 admit
- For ascites management
- Delicate diuresis
- Worsens, requiring pressors
- Symptoms include dyspnea, lack of appetite, back pain, insomnia
- Denied for transplant out of state
- **Palliative Care Consulted**
Palliative Care Consulted

- DNR/DNI Decision made
- Voiced she did not want to die at home
- Complexity with IV management
  - Weaning pressors and treprostinil
  - Cost/availability of management outside the facility
  - Limited data on rates for decreasing prostacyclin
- Crucial family conversations

... to be continued
WHAT IS PH?

- Pulmonary Hypertension
  - mPA ≥25 mmHg
  - 6th World Symposium of Pulmonary Hypertension proposed change to definition of mPA >20
  - Right heart catheterization is gold standard of diagnosis, echo most widely available screening tool
SYMPTOMS OF PAH SIMILAR TO ALL PH PATIENTS

- 27% reported fatigue
- 15% reported fainting or light-headedness
- 22% reported chest pain
- 86% reported shortness of breath
- 13% reported palpitations
- 21% reported edema (swelling)


Picture: https://phassociation.org/patients/aboutph/
GROUPS OF PH

TABLE 2 Updated clinical classification of pulmonary hypertension (PH)

<table>
<thead>
<tr>
<th>1 PAH</th>
</tr>
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<tbody>
<tr>
<td>1.1 Idiopathic PAH</td>
</tr>
<tr>
<td>1.2 Heritable PAH</td>
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<tr>
<td>1.3 Drug- and toxin-induced PAH (table 3)</td>
</tr>
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<td>1.4 PAH associated with:</td>
</tr>
<tr>
<td>1.4.1 Connective tissue disease</td>
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<tr>
<td>1.4.2 HIV infection</td>
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<tr>
<td>1.4.3 Portal hypertension</td>
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<tr>
<td>1.4.4 Congenital heart disease</td>
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<tr>
<td>1.4.5 Schistosomiasis</td>
</tr>
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<td>1.5 PAH long-term responders to calcium channel blockers (table 4)</td>
</tr>
<tr>
<td>1.6 PAH with overt features of venous/capillaries (PVOD/PCH) involvement (table 5)</td>
</tr>
<tr>
<td>1.7 Persistent PH of the newborn syndrome</td>
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<table>
<thead>
<tr>
<th>2 PH due to left heart disease</th>
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</thead>
<tbody>
<tr>
<td>2.1 PH due to heart failure with preserved LVEF</td>
</tr>
<tr>
<td>2.2 PH due to heart failure with reduced LVEF</td>
</tr>
<tr>
<td>2.3 Valvular heart disease</td>
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<tr>
<td>2.4 Congenital/acquired cardiovascular conditions leading to post-capillary PH</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3 PH due to lung diseases and/or hypoxia</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Obstructive lung disease</td>
</tr>
<tr>
<td>3.2 Restrictive lung disease</td>
</tr>
<tr>
<td>3.3 Other lung disease with mixed restrictive/obstructive pattern</td>
</tr>
<tr>
<td>3.4 Hypoxia without lung disease</td>
</tr>
<tr>
<td>3.5 Developmental lung disorders</td>
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<thead>
<tr>
<th>4 PH due to pulmonary artery obstructions (table 6)</th>
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</thead>
<tbody>
<tr>
<td>4.1 Chronic thromboembolic PH</td>
</tr>
<tr>
<td>4.2 Other pulmonary artery obstructions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5 PH with unclear and/or multifactorial mechanisms (table 7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 Haematological disorders</td>
</tr>
<tr>
<td>5.2 Systemic and metabolic disorders</td>
</tr>
<tr>
<td>5.3 Others</td>
</tr>
<tr>
<td>5.4 Complex congenital heart disease</td>
</tr>
</tbody>
</table>

PAH: pulmonary arterial hypertension; PVOD: pulmonary veno-occlusive disease; PCH: pulmonary capillary haemangiomatosis; LVEF: left ventricular ejection fraction.
DIFFERENCES AMONG GROUPS

Table 5: Risk Factors for Survival (All-cause Mortality) Using Univariate Cox Regression Analysis

<table>
<thead>
<tr>
<th></th>
<th>PAH, n = 685 [HR (95% CI; p-value)]</th>
<th>PVH, n = 307 [HR (95% CI; p-value)]</th>
<th>LD-PH, n = 546 [HR (95% CI; p-value)]</th>
<th>CTEPH, n = 459 [HR (95% CI; p-value)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>NYHA</td>
<td>Class II Reference</td>
<td>Reference</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>Class III</td>
<td>1.80 (1.18 to 2.77; 0.007)</td>
<td>3.04 (1.10 to 8.40; 0.032)</td>
<td>1.69 (0.99 to 2.87; 0.054)</td>
<td>3.51 (1.27 to 9.71; 0.015)</td>
</tr>
<tr>
<td>Class IV</td>
<td>3.60 (2.29 to 5.65; &lt;0.001)</td>
<td>6.35 (2.18 to 18.52; 0.001)</td>
<td>2.18 (1.27 to 3.75; 0.005)</td>
<td>7.84 (2.80 to 21.95; &lt;0.001)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>Reference</td>
<td>Reference</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>&lt;50</td>
<td></td>
<td>1.41 (1.06 to 1.88; 0.20)</td>
<td>6.29 (1.45 to 26.68; 0.014)</td>
<td>1.38 (0.93 to 2.03; 0.109)</td>
</tr>
<tr>
<td>50 to 63</td>
<td></td>
<td>11.21 (2.92 to 50.31; 0.001)</td>
<td>1.83 (1.24 to 2.71; 0.002)</td>
<td>1.30 (0.76 to 2.24; 0.343)</td>
</tr>
<tr>
<td>63 to 71</td>
<td></td>
<td>1.97 (1.34 to 2.68; 0.001)</td>
<td>12.94 (3.13 to 53.59; &lt;0.001)</td>
<td>2.67 (1.65 to 3.70; &lt;0.001)</td>
</tr>
<tr>
<td>&gt;71</td>
<td></td>
<td></td>
<td>2.43 (1.46 to 4.02; 0.001)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Male (female as reference)</td>
<td>1.29 (1.02 to 1.63; 0.033)</td>
<td>1.70 (1.17 to 2.47; 0.005)</td>
<td>1.43 (1.15 to 1.80; 0.002)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.53 (1.10 to 2.14; 0.013)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6MWD (meters)</td>
<td>Reference</td>
<td>Reference</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>&gt;390</td>
<td></td>
<td>1.99 (1.31 to 3.02; 0.001)</td>
<td>2.65 (1.56 to 12.51; 0.217)</td>
<td>1.50 (0.87 to 2.61; 0.147)</td>
</tr>
<tr>
<td>311 to 390</td>
<td></td>
<td>2.82 (1.84 to 4.33; &lt;0.001)</td>
<td>7.94 (1.83 to 34.52; 0.006)</td>
<td>3.82 (1.67 to 8.75; 0.002)</td>
</tr>
<tr>
<td>216 to 311</td>
<td></td>
<td>5.78 (3.87 to 8.63; &lt;0.001)</td>
<td>12.91 (2.96 to 56.31; 0.001)</td>
<td>2.95 (1.75 to 4.96; &lt;0.001)</td>
</tr>
<tr>
<td>&lt;216</td>
<td></td>
<td></td>
<td>6.56 (2.82 to 15.26; &lt;0.001)</td>
<td></td>
</tr>
</tbody>
</table>

CI, confidence interval; CTEPH, chronic thromboembolic pulmonary hypertension; HR, hazard ratio; LD-PH, pulmonary hypertension due to lung disease; NYHA, New York Heart Association; PAH, pulmonary arterial hypertension; PVH, pulmonary hypertension due to left heart disease; 6MWD, 6-minute walk distance.

*Age groups represent quartiles.

6MWD groups represent quartiles of the full population.
CAUSE OF DEATH

• Among all PH (cause of death known in 592/924 patients in cohort)
  – 23.8% right heart failure from PH
  – 21.8% respiratory insufficiency
  – 9.5% Combined R&L heart failure
  – 9.0% malignancy
  – 7.6% sepsis
  – 5.4% pulmonary infection
  – 4.4% sudden cardiac death
PALLIATIVE & PH

Death Rates of Pulmonary Hypertension* Among All Ages, by State, 2016

https://www.cdc.gov/dhdsp/data_statistics/fact_sheets/fs_pulmonary_hypertension.htm
CARE RECOMMENDATIONS

The importance of patient perspectives in pulmonary hypertension


Number 13 in the series
"Proceedings of the 6th World Symposium on Pulmonary Hypertension"
Edited by N. Gallé, V.V. McLaughlin, L.J. Rubin and G. Simonneau

The importance of patient perspectives in pulmonary hypertension severity may suggest that traditional parameters of pulmonary hypertension may be the "tip of the iceberg" when the broader range of patient concerns is considered.
Palliative care

Palliative care was traditionally a change in the focus of care at the end of life away from therapies intended to cure or slow the progression of disease, to management of physical symptoms (e.g. pain) and emotional distress. Palliative care is currently better understood as an interdisciplinary approach to managing the physical, psychological, social, and spiritual needs of patients with life-limiting illnesses. It has been defined as “patient and family-centered care that optimizes quality of life by anticipating, preventing, and treating suffering. Palliative care throughout the continuum of illness involves addressing physical, intellectual, emotional, social, and spiritual needs and to facilitate patient autonomy, access to information, and choice” [64].

In a survey of 774 PAH patients, 276 analysable responses revealed that awareness of and access to palliative care resources were low despite marked impairment of HRQoL, physical and emotional distress, and the expectations of patients and caregivers. The majority of patients were not aware of palliative care, and most did not seek it for themselves. These findings are consistent with previous studies, with the lack of awareness of palliative care being a significant barrier to the delivery of appropriate care [20, 49, 65–69]. Since PH-targeted therapies do not usually alleviate all physical symptoms or necessarily improve patients’ psychosocial function, a role for integrating palliative care techniques and expertise early to optimise HRQoL has been recommended [63].

Obstacles to expanding the use of palliative care include lack of awareness of its benefits (e.g. symptom management and psychological well-being), failure to distinguish palliative care from end-of-life care, misunderstanding palliative care as synonymous with hospice care, and patient and caregiver’s being resigned to an imminent death, and not understanding that PH-targeted medications can continue within a palliative care strategy [63]. Therapies for PH have side-effects which may negatively impact HRQoL despite achieving symptomatic improvement of haemodynamics and some symptoms. Therefore, a focus on HRQoL during otherwise beneficial treatment arguably become even more imperative.
Equating the term “palliative care”, which is currently burdened with the notion of “end-of-life” care, with “holistic” or “quality-of-life” care will be an important strategy for reorienting perceptions about this discipline.

FIGURE 2 Representation of components of a multidimensional approach to care of the pulmonary hypertension patient.
WHAT ABOUT THE PATH TO TRANSPLANT?

“For patients with refractory disease, lung transplantation remains an important treatment option. Patients should be referred to a transplant centre when they remain in an intermediate- or high-risk category despite receiving optimised pulmonary arterial hypertension therapy. ... In experienced centres, the 1-year survival rates after lung transplantation for PH now exceed 90%.”

Lung transplantation
The modern era of successful lung and heart–lung transplantation started in the early 1980s with patients suffering from PH [42]. Today, due to the introduction of effective therapies for PAH and chronic thromboembolic PH, lung transplantation is performed less frequently in patients with severe PH, but remains an important treatment option for patients with refractory disease.
TABLE 4 Specific criteria for lung transplant referral and listing in patients with pulmonary arterial hypertension (PAH)

| Referral | Potentially eligible patients for whom lung transplantation might be an option in case of treatment failure  
|          | ESC/ERS intermediate or high risk or REVEAL risk score >7 on appropriate PAH medication  
|          | Progressive disease or recent hospitalisation for worsening of PAH  
|          | Need for i.v. or s.c. prostacyclin therapy  
|          | Known or suspected high-risk variants such as PVOD or PCH, scleroderma, large and progressive pulmonary artery aneurysms  
|          | Signs of secondary liver or kidney dysfunction due to PAH or other potentially life-threatening complications such as recurrent haemoptysis  
| Listing  | Patient has been fully evaluated and prepared for transplantation  
|          | ESC/ERS high risk or REVEAL risk score >10 on appropriate PAH medication, usually including i.v. or s.c. prostacyclin analogues  
|          | Progressive hypoxaemia, especially in patients with PVOD or PCH  
|          | Progressive, but not end-stage, liver or kidney dysfunction due to PAH or life-threatening haemoptysis  

ESC: European Society of Cardiology; ERS: European Respiratory Society; REVEAL: Registry to Evaluate Early and Long-term Pulmonary Arterial Hypertension Disease Management; PVOD: pulmonary veno-occlusive disease; PCH: pulmonary capillary haemangiomatosis.
ERS/ECS 2015 RISK ASSESSMENT IN PULMONARY ARTERIAL HYPERTENSION

<table>
<thead>
<tr>
<th>Determinants of prognosisa (estimated 1-year mortality)</th>
<th>Low risk &lt;5%</th>
<th>Intermediate risk 5–10%</th>
<th>High risk &gt;10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical signs of right heart failure</td>
<td>Absent</td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td>Progression of symptoms</td>
<td>No</td>
<td>Slow</td>
<td>Rapid</td>
</tr>
<tr>
<td>Syncope</td>
<td>No</td>
<td>Occasional syncopeb</td>
<td>Repeated syncopec</td>
</tr>
<tr>
<td>WHO functional class</td>
<td>I, II</td>
<td>III</td>
<td>IV</td>
</tr>
<tr>
<td>6MWD</td>
<td>&gt;440 m</td>
<td>165–440 m</td>
<td>&lt;165 m</td>
</tr>
<tr>
<td>Cardiopulmonary exercise testing</td>
<td>Peak VO2 &gt;15 ml/min/kg (&gt;65% pred.)</td>
<td>Peak VO2 11–15 ml/min/kg (35–65% pred.)</td>
<td>Peak VO2 &lt;11 ml/min/kg (&lt;35% pred.)</td>
</tr>
<tr>
<td></td>
<td>VE/VO2 slope &lt;36</td>
<td>VE/VO2 slope 36–44.9</td>
<td>VE/VO2 slope &gt;45</td>
</tr>
<tr>
<td>NT-proBNP plasma levels</td>
<td>BNP &lt;50 ng/l</td>
<td>BNP 50–300 ng/l</td>
<td>BNP &gt;300 ng/l</td>
</tr>
<tr>
<td></td>
<td>NT-proBNP &lt;300 ng/l</td>
<td>NT-proBNP 300–1400 ng/l</td>
<td>NT-proBNP &gt;1400 ng/l</td>
</tr>
<tr>
<td>Imaging [echocardiography, CMR imaging]</td>
<td>RA area &lt;18 cm²</td>
<td>No pericardial effusion</td>
<td>RA area &gt;26 cm² pericardial effusion</td>
</tr>
<tr>
<td></td>
<td>No or minimal, pericardial effusion</td>
<td>RAP &lt;8 mmHg Cl 2.5 l/min/m² SVO₂ &gt;65%</td>
<td></td>
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<tr>
<td></td>
<td>RAP 8–14 mmHg Cl 2.0–2.4 l/min/m² SVO₂ 60–65%</td>
<td>RAP &gt;14 mmHg Cl 2.0 l/min/m² SVO₂ &lt;60%</td>
<td></td>
</tr>
</tbody>
</table>

6MWD: 6-minute walking distance; BNP: brain natriuretic peptide; Cl: cardiac index; CMR: cardiac magnetic resonance; NT-proBNP: N-terminal pro-brain natriuretic peptide; pred.: predicted; RA: right atrium; RAP: right atrial pressure; SVO₂: mixed venous oxygen saturation; VE/VO₂: ventilatory equivalents for carbon dioxide; VO₂: oxygen consumption; WHO: World Health Organization. aMost of the proposed variables and cut-off values are based on expert opinion. They may provide prognostic information and may be used to guide therapeutic decisions, but application to individual patients must be done carefully. One must also note that most of these variables have been validated mostly for IPAH and the cut-off levels used above may not necessarily apply to other forms of PAH. Furthermore, the use of approved therapies and their influence on the variables should be considered in the evaluation of the risk. bOccasional syncope during brisk or heavy exercise, or occasional orthostatic syncope in an otherwise stable patient. cRepeated episodes of syncope, even with little or regular physical activity.

2015 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension
BACK TO CTEPH CINDY...

Detect right heart failure, ensure appropriate monitoring, avoid intubation, contact expert centre

- Treat triggering factors such as infection, arrhythmias, pulmonary embolism, etc., and administer supportive therapy
- Optimise fluid status, remove excess fluids by using diuretics or haemofiltration
- Reduce RV afterload (i.v. prostacyclin, other PAH drugs, inhaled NO)
- Optimise cardiac output (inotropes such as dobutamine, milrinone)
- Optimise blood pressure (vasopressors such as norepinephrine, vasopressin)

Realistic perspective of recovery or lung transplantation

Insufficient response or further clinical deterioration

Awake ECMO or other ECLS devices as bridge to transplant or until recovery

Best supportive care

No realistic perspective of recovery or lung transplantation

FIGURE 1 Therapeutic approach to patients with severe right-sided heart failure. RV: right ventricular; PAH: pulmonary arterial hypertension; NO: nitric oxide; ECMO: extracorporeal membrane oxygenation; ECLS: extracorporeal lung support. Reproduced and modified from [80] with permission.
IN PRACTICE

• 2 stories
• 2 woman
• PAH secondary to scleroderma
• 3 vasodilator therapies
• Vastly different personal preferences
Maria, now 70 years old

- Diagnosed with scleroderma 2007, symptoms since 2003
- PAH diagnosis 2010, ILD overlap with FVC stable around 70%
  - Managed on 2 oral agents until symptomatic worsening 2015
- 10/2015 Repeat RHC and escalation to inhaled treprostinil
  - SQ/IV therapy offered without interest
  - Lung Transplant referral offered, she declined
- Some initial improvement but begins to feel worse summer 2016, concerned may have more ILD activity, prostacyclin stopped, ILD team adjusted immunosuppression, we increased diuretics
- 10/2017 admit for dyspnea and possible ILD exacerbation
- 1/2018 admit for respiratory failure, meets Palliative Care
  - Clarifies goals of care, misses her independence, wants to be comfortable with high flow O2
  - DC to LTAC, then to SNF and to home with high O2 need
- 4/2018 admit with aspiration pneumonia, transitioned to hospice
- 12/2018 received refill request for diuretic, comfortable at home with friends and family
MARIA & ROSANNA – 2 PATHS

Rosanna, now 53 years old

- 2014 SOB, dx PAH at outside facility
  - ERA, PDE5 and oral prostacyclin
- 2015? Scleroderma confirmed
- 6/2016 transferred from OSH for worsening cardiopulmonary status
  - Transitioned oral to IV prostacyclin
  - Evaluated by Palliative Care & Transplant Services
    - Poor medical literacy and language barrier
    - Framed conversation in Plan A (w/ Tx) & Plan B (w/o Tx)
    - Husband felt hope was taken away
    - Son was able to come from Mexico to visit
    - Due to insurance status not a transplant candidate
- 3/2017 returns to U of U PH Program and transitions end-stage care
- 1/2019 insurance status changes and transplant work up begins
Has Palliative Care been used appropriately?

What would you do?

What does the evidence suggest?
WHEN-AT DIAGNOSIS

2019 updated guidelines for PAH added early referral to palliative care along with usual therapy.

“Clearly documented benefits to patients and outcomes”

Klinger, et al., 2019
Patients with suspected PAH

Evaluate promptly at PH center (Recommendation 2; ungraded consensus-based)

Upon Confirmation of PAH:
- Evaluate severity in a systematic and consistent manner
- Coordinate care between local physicians and PH centers
- Treat contributing causes of PH aggressively
- Incorporate palliative care services in the management of PAH patients
  - Participate in supervised exercise activity as part of the integrated care of their disease
  - Maintain current immunization against influenza and pneumococcal pneumonia
  - Avoid Pregnancy. When pregnancy does occur, we suggest care be provided at a pulmonary hypertension center
  - Avoid exposure to high altitude. When exposure to high altitude or air travel occurs, use supplemental oxygen as needed to maintain oxygen saturations > 91%
  - Avoid non-essential surgery. When surgery is necessary we suggest care at a pulmonary hypertension center

(Recommendations 1, 3, 6, 72-78; ungraded consensus-based)

Suggest acute vasoreactivity testing at a center with experience (Recommendation 7; ungraded consensus-based)

Positive

Treat with oral CCB (Recommendation 8; ungraded consensus-based)

Negative, RV Failure or contraindication to CCB

Should not be treated with oral CCB (Recommendation 9; ungraded consensus-based)

Treatment naïve PAH patients with WHO FC I

Continued monitoring for disease progression (Recommendation 4; ungraded consensus-based)

Determine when to start therapy

Combination therapy with ambrisentan and tadalafil (Recommendation 10; weak recommendation, moderate quality evidence)

Is the patient willing or able to tolerate combination therapy? *

Yes

Monotherapy with either bosentan, macitentan, ambrisentan, riociguat, sildenafil, or tadalafil (See Box 1)

No

(Continued)

Klinger, et al., 2019
WHY

- Life-improving care
- Life-prolonging care
- Avoid unnecessary fortunes
HOW CAN PALLIATIVE CARE HELP?

• Advance Care Planning
• Dynamic Goals of Care Conversations
• Clinician Collaboration
• Pain/Symptom Management
ADVANCE CARE PLANNING

- Advance Directives/Living Will
- Medical Power of Attorney
- POLST Forms
- Treatment Preferences Addendum

![Bar chart showing completion rates for various advance care planning activities.](chart.png)
DYNAMIC GOALS OF CARE CONVERSATIONS

- As survival increases, the need to understand how PAH affects people at different stages of their life.
- If done with compassion and appropriate context does not take away hope.
- Addressed regularly as goals change as disease progresses.
- Most patients with PAH express wishes to die at home surrounded by loved ones.
- >65% die in hospital.
- >80% in the ICU.
CLINICIAN COLLABORATION

- Early discussions between PAH clinicians and PC providers provide opportunities to mutually understand how each can contribute to patients’ goals simultaneously.
- Utilize outpatient PC to transition to hospice at EOL.

Fenstad, et al., 2016

- 41% end of life care
- 32% hospice referral
- 27% comanagement of dyspnea or impaired QOL
PAIN/SYMPTOM MANAGEMENT

• Profound symptom burden and impaired QOL even with optimal PAH therapy
• PAH and PC clinicians advise on medication taper to allow for discontinuation over a timeframe that is consistent with GOC and reduces risk of adverse effects
IMPAIRED QOL

• Severely reduced-similar to COPD, renal failure, and treatment-resistant cancer
• Profound and clinically significant deficit in QOL
  – 57% fatigue
  – 56% sub-optimal physical well-being
  – 49% social activity
  – 49% emotional well-being

Swetz, et al., 2012
SYMPTOM BURDEN

- Dyspnea on exertion
- Fatigue
- Drowsiness
- Pain
- Depression
- Palpitations
“THE ACTIVE IDENTIFICATION AND MANAGEMENT OF CHRONIC REFRACTORY BREATHLESSNESS IS A HUMAN RIGHT.”

Currow, Abernethy, & Ko, 2013
SYMPTOM PREVALENCE AND SEVERITY VARIES BY AGE

- **Young Adult (18-40)**
  - SOB on exertion-100%
  - Fatigue-92%
  - Palpitations-87%

- **Middle Adult (41-64)**
  - SOB on exertion-98%
  - Palpitations-82%
  - Dizziness-77%

- **Older adult (>65)**
  - SOB on exertion-98%
  - Fatigue-92%
  - Cough-68%

Matura, McDonough, & Carroll, 2016
HOW DO WE TREAT SYMPTOMS?

• Dyspnea
  – Oxygen
  – Seated position, increased air movement to the face via fan or open window
  – Diuretics
  – Low dose opioids
    • Morphine 5mg PO Q4-6H PRN
HOW DO WE TREAT SYMPTOMS?

• Fatigue
  – Glucocorticoids
    • Prednisone 7.5-10mg PO QD, dexamethasone 1-2mg PO QD
  – Psychostimulants
    • Methylphenidate 5mg PO Q8am and Q12pm
    • May enhance opioid analgesia and reduce opioid sedation
HOW DO WE TREAT SYMPTOMS?

• Insomnia
  – OTC
    • Melatonin 2-8mg PO QHS
  – Antidepressants
    • Trazadone 50-100mg PO QHS
    • Mirtazapine 15mg PO QHS
BARRIERS TO PC

• Patient and clinician perceptions of PC
• Underestimation of the benefit of an honest discussion done well
• PAH-specific meds at EOL under hospice care
PATIENT AND CLINICIAN PERCEPTIONS OF PC

- Don’t really know what PC means
- High symptom burden, yet many believe “doing well,” or “not very sick”
- Assumption that hospice and PC are same thing
- Physician’s uncomfortable with addressing GOC to avoid perception of “giving up” or not being aggressive

Kimeu & Swetz, 2012
UNDERESTIMATION OF THE BENEFIT OF AN HONEST DISCUSSION DONE WELL

• Patients think discussion may impact ability to receive PAH-directed therapy
• Clinicians worry that discussion is demoralizing to patients and families
• Timing Challenge—when do you refer?

Kimeu & Swetz, 2012
PAH-SPECIFIC MEDS AT EOL UNDER HOSPICE CARE

• Patients resistant to discontinuing medications (IV/SC) as they view as “lifeline” even when multiple organ systems are failing or prognosis is grim

• Leads to dying in the ICU where meds are maintained through death

• Hospice difficult with cost of pharmacotherapy

Kimeu & Swetz, 2012
DISEASE PROJECTION AND PROGNOSIS

• COMPERA
  – Comparative, Prospective Registry of Newly Initiated Therapies for Pulmonary Hypertension

• FPHR
  – French Pulmonary Hypertension Registry

• REVEAL
  – Registry to Evaluate Early and Long-Term Pulmonary Arterial Hypertension Disease Management
  – Previously, the most versatile and validated

• REVEAL 2.0
REVEAL 2.0

- 12 variables
- Modifiable and nonmodifiable risk factors
  - Sex, race
  - Incorporates different types of PAH
  - Coexisting diseases
  - Six minute walk distance
  - Blood tests
  - PFTS
  - RHC
  - Previous Hospitalizations

- Score ≤ 6 classified as low risk (12 month mortality risk of ≤2.6%)
- Score 7-8 classified as intermediate risk (12 month mortality risk of 6-7%)
- Score ≥9 classified as high risk (12 month mortality ≥10%)

Benza, et al., 2019
**REVEAL 2.0 CALCULATOR**

### A. REVEAL 2.0 Risk Score

#### WHO Group I Subgroup

- Original risk score: [Formula]
- Updated risk score: [Formula]

#### Demographics

- Original risk score: [Formula]
- Updated risk score: [Formula]

#### Comorbidities

- Original risk score: [Formula]
- Updated risk score: [Formula]

#### NYHA/WHO Functional Class

- Original risk score: [Formula]
- Updated risk score: [Formula]

#### All-Cause Hospitalizations within 6 mo

- Original risk score: [Formula]
- Updated risk score: [Formula]

### B. Existing variables with unchanged risk points/cut-points

- PAH associated with connective tissue disease
- Heritable PAH
- Renal insufficiency
- Male age >50 years
- Systolic blood pressure <110 mm Hg
- Pericardial effusion
- Mean right atrial pressure >20 mm Hg within 1 year

### C. New/revised variables

- Hospitalizations within the last 6 mo
- eGFR <60 mL/min/1.73m² or renal insufficiency if missing eGFR

#### Updated PAH Risk Score

<table>
<thead>
<tr>
<th>Variable</th>
<th>Formula</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHO Group I Subgroup</td>
<td></td>
<td>+1</td>
</tr>
<tr>
<td>Demographics</td>
<td></td>
<td>+2</td>
</tr>
<tr>
<td>Comorbidities</td>
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<tr>
<td>NYHA/WHO Functional Class</td>
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<td>+1</td>
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<tr>
<td>All-Cause Hospitalizations</td>
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<td>+1</td>
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<tr>
<td>6-Minute Walk Test</td>
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<td>+1</td>
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<tr>
<td>Echocardiogram</td>
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<td>+1</td>
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<tr>
<td>Pulmonary Function Test</td>
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<td>+1</td>
</tr>
<tr>
<td>Right Heart Catheterization</td>
<td></td>
<td>+1</td>
</tr>
</tbody>
</table>

**SUM OF ABOVE**

**= RISK SCORE**

[Benza, et al., 2019]
REVEAL 2.0 vs Previous Tools

- **Low risk group**
  - COMPERA and FPHR **overestimated** risk in 51% and 60% of patient population

- **Intermediate risk group**
  - COMPERA and FPHR **underestimated** risk in 22% and 15% of patient population

- **High risk group**
  - COMPERA AND FPHR **underestimated** risk in 80% and 58% of patient population

<table>
<thead>
<tr>
<th>Risk score</th>
<th>12-mo mortality estimate (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low REVEAL 2.0</td>
<td>1.9% (1.1%–2.7%)</td>
</tr>
<tr>
<td>Low COMPERA</td>
<td>3.5% (2.2%–4.9%)</td>
</tr>
<tr>
<td>Low FPHR</td>
<td>4.2% (2.5%–5.9%)</td>
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<tr>
<td>Intermediate REVEAL 2.0</td>
<td>6.5% (4.7%–8.4%)</td>
</tr>
<tr>
<td>Intermediate COMPERA</td>
<td>11.3% (9.7%–12.8%)</td>
</tr>
<tr>
<td>Intermediate FPHR</td>
<td>10.3% (8.8%–11.9%)</td>
</tr>
<tr>
<td>High REVEAL 2.0</td>
<td>25.8% (22.7%–28.9%)</td>
</tr>
<tr>
<td>High COMPERA</td>
<td>29.1% (22.5%–35.6%)</td>
</tr>
<tr>
<td>High FPHR</td>
<td>17.0% (13.8%–20.3%)</td>
</tr>
</tbody>
</table>

Benza, et al., 2019
WE HAVE IT ALL FIGURED OUT

Diagnosis ✔

Palliative Care ✔

Prognosis ✔

Symptom Management ✔

Hospice ?
END-OF-LIFE OBSTACLES

• PAH-directed meds often exceeds reimbursement to hospice by at least DOUBLE, making it difficult for hospice to afford PAH patients
• ICU death likely related to prostacyclin infusion
• Patient’s perception that discontinuing or down titrating prostacyclin could hasten death or view as suicide
• Prognosis is difficult to determine and may lead to decreased utilization of hospice
• Difficulty in prognostication also could relate to in-hospital mortality
POST-DEATH SURVEY

• Most patient deaths related to PAH—not their comorbidities
• About 10% had PC involved
• 67% died in hospital—of those 83% in the ICU
• 27% had little to no knowledge of PC
• 19% had little to no knowledge of hospice resources

Grinnan, et al., 2012
REMEMBER CTEPH CINDY?

- Successful taper of pressors
- Complicated but successful taper of Remodulin in MICU
- Passed away with her family
BRIDGING THE PATHS

• No perfect course, timing remains challenging
  – CTEPH Cindy
  – Maria
  – Rosanna

• Established benefit of early PC

• Goal for QoL management
QUESTIONS?
REFERENCES