Things We Do For No Reason (TWDFNR)

ACP Delaware Chapter Meeting
February 8, 2020
Disclosures

None
Choosing Wisely®: Things We Do for No Reason

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Division of General Internal Medicine, Departments of Internal Medicine and Pediatrics, Johns Hopkins Hospital, Baltimore, Maryland.

Things We Do For No Reason
@TWDFNR
Highlighting Low (and No) Value Care within medicine.
Two Objectives

1. Don’t use oxygen to treat acute illness without hypoxemia*.

2. Avoid PRN anti-hypertensives for asymptomatic severe hypertension
Mr. Herzman is a 67-year-old man with history of hypertension and diabetes. He was hospitalized for management of chest pain attributed to NSTEMI. He is chest pain free, vital signs are normal, and his SpO2 is 98% on RA. Cardiac catheterization is planned in the morning.

He arrives on the ward on supplemental oxygen, 2L NC, which was started “for comfort”
Use oxygen to treat hypoxemia,
Don’t use oxygen when hypoxemia is absent.
Use oxygen for hypoxemia, not for acute illness.

- Oxygen is life-saving in hypoxemia.
- Oxygen use, absent hypoxemia, is common and generally considered benign.
Liberal oxygen therapy doesn’t improve outcomes in patients with acute MI.
DETO2X-AMI

Registry-based RCT

- **P**: 6,629 adults
  - acute cardiac chest pain,
  - AND positive cardiac biomarkers
  - AND $\text{SpO}_2 > 90\%$
- **I**: 6L face mask x 6-12 hours
- **C**: ambient air
- **O**: death from any cause at 1 year

Hofmann et al NEJM 2017; 377:1240-1249
Oxygen doesn’t impact mortality or secondary outcomes

Table 3. End Points during and after Hospitalization.

<table>
<thead>
<tr>
<th>Timing and End Point</th>
<th>Oxygen Group (N=3311)</th>
<th>Ambient-Air Group (N=3318)</th>
<th>Hazard Ratio (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>365 Days after randomization</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death from any cause — no. (%)</td>
<td>166 (5.0)</td>
<td>168 (5.1)</td>
<td>0.97 (0.79–1.21)</td>
<td>0.80</td>
</tr>
<tr>
<td>Rehospitalization with myocardial infarction — no. (%)</td>
<td>126 (3.8)</td>
<td>111 (3.3)</td>
<td>1.13 (0.88–1.46)</td>
<td>0.33</td>
</tr>
<tr>
<td>Composite of death from any cause or rehospitalization with myocardial infarction — no. (%)</td>
<td>275 (8.3)</td>
<td>264 (8.0)</td>
<td>1.03 (0.87–1.22)</td>
<td>0.70</td>
</tr>
<tr>
<td><strong>30 Days after randomization</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death from any cause — no. (%)</td>
<td>73 (2.2)</td>
<td>67 (2.0)</td>
<td>1.07 (0.77–1.50)</td>
<td>0.67</td>
</tr>
<tr>
<td>Rehospitalization with myocardial infarction — no. (%)</td>
<td>45 (1.4)</td>
<td>31 (0.9)</td>
<td>1.46 (0.92–2.31)</td>
<td>0.11</td>
</tr>
<tr>
<td>Composite of death from any cause or rehospitalization with myocardial infarction — no. (%)</td>
<td>114 (3.4)</td>
<td>95 (2.9)</td>
<td>1.19 (0.91–1.56)</td>
<td>0.21</td>
</tr>
<tr>
<td><strong>During hospital stay</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median highest measured level of highly sensitive troponin T (IQR) — ng/liter*</td>
<td>946.5 (243.0–2884.0)</td>
<td>983.0 (225.0–2931.0)</td>
<td>—</td>
<td>0.97</td>
</tr>
</tbody>
</table>

Hofmann et al NEJM 2017; 377:1240-1249
Palliative oxygen therapy may not improve symptoms in breathless life-limited patients.
Effect of palliative oxygen versus room air in relief of breathlessness in patients with refractory dyspnoea: a double-blind, randomised controlled trial

Amy P Abernethy, Christine F McDonald, Peter A Frith, Katherine Clark, James E Herndon II, Jennifer Marcello, Iven H Young, Janet Bull, Andrew Wilcock, Sara Booth, Jane L Wheeler, James A Tulsky, Alan J Crockett, David C Currow

- **P:** 239 adults with life-limiting illness, refractory dyspnea & PaO2 > 55 mmHg
- **I:** 2L NC via concentrator
- **C:** Room air via concentrator
- **O:** Breathlessness right now [0-10 NRS]
Oxygen provides no additional relief of refractory dyspnea compared with room air.
Liberal oxygen therapy can hurt.
Effect of high flow oxygen on mortality in chronic obstructive pulmonary disease patients in prehospital setting: randomised controlled trial

Prehospital unblinded RCT

- **P:** 405 adults with presumed AECOPD
- **I:** Titrated O2 via NC - target SpO2 88-92%
- **C:** Fixed 8-10L via facemask
- **O:** Mortality
<table>
<thead>
<tr>
<th>Mortality</th>
<th>Fixed</th>
<th>Titrated</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Patients</td>
<td>21 / 226 (9%)</td>
<td>7 / 179 (4%)</td>
<td>0.02</td>
</tr>
<tr>
<td>Confirmed COPD</td>
<td>11 / 117 (9%)</td>
<td>2 / 97 (2%)</td>
<td>0.04</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COPD</th>
<th>Fixed</th>
<th>Titrated</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.29 (0.15)</td>
<td>7.41 (0.09)</td>
<td>0.01</td>
</tr>
<tr>
<td>pCO2</td>
<td>76.5 (50.2)</td>
<td>42.9 (14.2)</td>
<td>0.02</td>
</tr>
</tbody>
</table>
Liberal oxygen therapy can hurt. Not just patients with COPD.
Mortality and morbidity in acutely ill adults treated with liberal versus conservative oxygen therapy (IOTA): a systematic review and meta-analysis

Derek K Chu*,†, Lisa H-Y Kim*†, Paul J Young, Nima Zamiri, Saleh A Almenawer, Roman Jaeschke, Wojciech Szczeklik, Holger J Schünemann, John D Neary, Waleed Alhazzani

- 25 RCTs,
- 16,037 adults
- diverse illnesses:
  - MI, cardiac arrest
  - stroke
  - sepsis, critical illness
  - trauma, surgery

- **Liberal O$_2$**:
  - Median FiO$_2$: 0.52
  - Median duration: 8 hours

- **Conservative O$_2$**:
  - Median FiO$_2$: 0.21
Liberal O2 ↑ in-hospital mortality.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Liberal (n/N)</th>
<th>Conservative (n/N)</th>
<th>RR (95% CI)</th>
<th>% weight</th>
</tr>
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<tbody>
<tr>
<td>Neurological (stroke-traumatic brain injury)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Ali et al (2014)</td>
<td>Stroke</td>
<td>5/155</td>
<td>4/146</td>
<td>1.18 (0.32-4.30)</td>
</tr>
<tr>
<td>Roffe et al (2017)</td>
<td>Stroke</td>
<td>50/2668</td>
<td>45/2568</td>
<td>1.11 (0.75-1.66)</td>
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<td>Ronning et al (1999)</td>
<td>Stroke</td>
<td>35/292</td>
<td>29/258</td>
<td>1.18 (0.74-1.89)</td>
</tr>
<tr>
<td>Singhal et al (2005)</td>
<td>Stroke (ischaemic)</td>
<td>0/9</td>
<td>0/9</td>
<td></td>
</tr>
<tr>
<td>NCT00414726</td>
<td>Stroke (ischaemic)</td>
<td>14/43</td>
<td>4/42</td>
<td>3.42 (1.22-9.54)</td>
</tr>
<tr>
<td>Shi et al (2017)</td>
<td>Stroke (ischaemic)</td>
<td>0/9</td>
<td>0/9</td>
<td></td>
</tr>
<tr>
<td>Sepsis</td>
<td>NCT023785145 (2015)</td>
<td>Sepsis</td>
<td>3/25</td>
<td>2/25</td>
</tr>
<tr>
<td>Emergency surgery</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Butler et al (1987)</td>
<td>Limb ischaemia</td>
<td>1/17</td>
<td>0/22</td>
<td>3.83 (0.17-88.62)</td>
</tr>
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<td>Schietroma et al (2016)</td>
<td>Perforated peptic ulcer</td>
<td>2/119</td>
<td>4/120</td>
<td>0.50 (0.09-2.70)</td>
</tr>
<tr>
<td>NCT02687217</td>
<td>Acute appendicitis</td>
<td>0/30</td>
<td>0/30</td>
<td></td>
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<tr>
<td>Cardiac (myocardial infarction-cardiac arrest)</td>
<td>Hofmann et al (2017)</td>
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<td>44/3318</td>
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<td>3/85</td>
<td>3/75</td>
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\[ P_{\text{overall}} = 0.097 \]

In-hospital mortality, overall (\( i^2 = 0\% , \ p = 0.020 \))

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\[ P_{\text{overall}} = 0.097 \]

In-hospital mortality, overall (\( i^2 = 0\% , \ p = 0.020 \))

In-hospital Mortality:

RR 1.21
[1.03-1.43]
• Use oxygen to correct hypoxemia,
• Don’t routinely* use oxygen to treat acute illness without hypoxemia.
Mr. Feldzke is a 59 year-old man with a history of hypertension (on CCB and thiazide) who is hospitalized with CAP. He is doing well.

His 4 am blood pressure is 190 / 91. He has no new symptoms or concerns, except “what’s all this about?”

Nursing anxiously awaits your plan; the medicine shift coordinator is en route.
At what BP would you begin acute treatment?

- 160/90
- 170/95
- 180/100
- 190/105
- 200/110
- 210/115
- 220/120
We order as-needed and one time doses of antihypertensives to treat inpatient hypertensive “urgency”.
We order as needed antihypertensives to treat inpatient hypertension.
Hypertensive “urgency”

SBP ≥ 180 mmHg
DBP ≥ 110 mmHg
No s/sx of acute end organ damage
i.e., none of this stuff (acutely)
Elevated BP is very common in hospitalized adults.

Number of Patients by BP (Systolic) Range
Between 4/1/2018 and 4/1/2019

- <119: 4,791
- ≥120 <149: 4,977
- ≥150 <179: 3,989
- ≥180: 2,061

40.1% [2061 / 5032]
A not uncommon approach:
7.4%  
[2,189 out of 29,545 hospitalizations]  
Large single center academic medical center.

Weder and Erickson, J Clin Hypertens 2010:12(1): 29-33
Why do we do this?

• It’s what I learned in residency / perceived standard of care

• HTN is a fixable risk factor for heart, brain and kidney disease.

• We assume that treatment now avoids imminent damage to end-organs.
Hypertensive “urgency”
(and the systems built around it)
tickles the amygdala
another reason….

(we get paged about elevated BP)

NHO:

SBP ≥ 180 mmHg

DBP ≥ 110 mmHg
### Table. Attitudes of UMHS Physicians Toward Transferring Patients to ICU for Acute Hypertension

<table>
<thead>
<tr>
<th>Response</th>
<th>Physician Group</th>
<th>Percentage</th>
<th>Systolic BP (Mean±SD)</th>
<th>Diastolic BP (Mean±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>House officers</td>
<td>38%</td>
<td>210±18</td>
<td>117±13</td>
</tr>
<tr>
<td></td>
<td>Hospitalists</td>
<td>32%</td>
<td>193±17</td>
<td>110±10</td>
</tr>
<tr>
<td>No</td>
<td>House officers</td>
<td>62%</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>Hospitalists</td>
<td>68%</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

Responses of UMHS house officers (n=130) and hospitalists (n=31) to the questions: “Would you transfer an asymptomatic patient to an intensive care unit because of high BP even in the absence of target organ damage?” And “If ‘yes,’ what is the BP that would prompt the transfer?”
11.2. Hypertensive Crises—Emergencies and Urgencies

Recommendations for Hypertensive Crises and Emergencies

- SBP >180 mm Hg and/or DBP >120 mm Hg
- Target organ damage new/progressive/worsening
- Markedly elevated BP

Reinstitute/intensify oral antihypertensive drug therapy and arrange follow-up

“Unfortunately, the term “urgency” has led to overly aggressive management of many patients with severe, uncomplicated hypertension. Aggressive dosing with intravenous drugs or even oral agents to rapidly lower BP is not without risk.”

Bad things DO happen to patients with uncontrolled hypertension. This occurs on the time scale of months-to-years, not hours.
Double-blind placebo controlled RCT

- **P:** 143 adult men with clinic DBP 115-129 mmHg
- **I:** hctz + reserpine + hydralazine
- **C:** placebo
- **O:** severe complicating events*

*Death, stroke/bleed, CHF, MI, renal failure, retinopathy/papilledema, persistent ↑↑ DBP, treatment failure
<table>
<thead>
<tr>
<th>Event</th>
<th>Treatment (n=73)</th>
<th>Placebo (n=70)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary outcome*</td>
<td>2 (2.7%)</td>
<td>27 (38.5%)</td>
</tr>
<tr>
<td>Death/Stroke/CHF/AMI</td>
<td>1 (1.3%)</td>
<td>14 (20%)</td>
</tr>
<tr>
<td>Death</td>
<td>0 (0%)</td>
<td>4 (5.7%)</td>
</tr>
<tr>
<td>Stroke/TIA</td>
<td>1 (1.3%)</td>
<td>4 (5.7%)</td>
</tr>
<tr>
<td>CHF</td>
<td>0 (0%)</td>
<td>4 (5.7%)</td>
</tr>
<tr>
<td>AMI</td>
<td>0 (0%)</td>
<td>2 (2.8%)</td>
</tr>
</tbody>
</table>

**Time to First Events:**

1-2 months

**Average time to event:**

11 months
R-cohort w/ propensity matching

• **Who:** 59,836 non-pregnant adults; SBP ≥180 and/or DBP ≥110mmHg

• **What:** stroke/TIA, heart attack

• **If:** sent to hospital versus home
Nearly all do fine in near term (unadjusted analysis)

182.5 / 96.4 (mean BP)

<table>
<thead>
<tr>
<th>MACE</th>
<th>Referred to Hospital (n=426)</th>
<th>Sent Home from Clinic (n=58,109)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>@ 7d</td>
<td>2 (0.5)</td>
<td>61 (0.1)</td>
<td>0.02</td>
</tr>
<tr>
<td>@ 8-30d</td>
<td>2 (0.5)</td>
<td>119 (0.2)</td>
<td>0.23</td>
</tr>
<tr>
<td>@ 1-6mo</td>
<td>4 (0.9)</td>
<td>492 (0.8)</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Patel et al., JAMA Intern Med. 2016;176(7):981-988
Even with really high SBP.

<table>
<thead>
<tr>
<th>7-d MACE</th>
<th>Referred</th>
<th>Sent Home</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥200 mmHg</td>
<td>0 / 218 (0%)</td>
<td>13 / 5745 (0.2%)</td>
<td>1.00</td>
</tr>
<tr>
<td>≥220 mmHg</td>
<td>0 / 81 (0%)</td>
<td>2 / 977 (0.2%)</td>
<td>0.23</td>
</tr>
</tbody>
</table>

Patel et al., JAMA Intern Med. 2016;176(7):981-988
Aggressive drug therapy frequently lowers blood pressure more than is intended.
Overshoot is common.

- Increase in BP: 3%
- No Improvement: 12%
- <10% reduction: 13%
- 10-25% reduction: 50%
- >25% reduction: 22%
BP falls more than is intended or desired

↓ BP > 25% within 6 hours

Too fast!

56 of 172

33%

Autoregulation of blood flow in important vascular beds is “right shifted”

Acutely lowering MAP can compromise blood flow to the brain, (or heart or kidney)
Stroke precipitated by moderate blood pressure reduction

Glenn M. Fischberg, MD, Edward Lozano, MD, Kumar Rajamani, MD, Sebastian Ameriso, MD, Mark J. Fisher, MD

Teachable Moment | Less Is More
May 2018

Overtreatment of Asymptomatic Hypertension—Urgency Is Not an Emergency
A Teachable Moment
There are other things we can do:

- Rest
- Remeasure
- Reassess
- Restart
  (Ramp up)
- Return for follow-up
Rest with or without drug therapy may effectively lower BP.
Hypertensive Urgencies in the Emergency Department: Evaluating Blood Pressure Response to Rest and to Antihypertensive Drugs With Different Profiles

Rest alone
31.9%
satisfactory reduction in BP
Comparing the clinical efficacy of resting and antihypertensive medication in patients of hypertensive urgency: a randomized, control trial

Open-label RCT

P: 138 adults w/ SBP ≥180 and/or DBP ≥110 mmHg
I: rest
C: telmisartan
O: 10-35% ↓ MBP @ 2h

68.5% vs 69.1%

Park et al., J Hypertens 2017; 35(7)-1474-1480
Blood pressure measurement technique is imperfect
Seek and mitigate treatable causes of reactive hypertension
No antihypertensives can fix this stubborn cause of ↑ BP
Home antihypertensives are often held or delayed.

60%
R-cohort w/ propensity matching

**Who:** 4,056 adults > 65y w/ HTN hospitalized with non-cardiac conditions from 2011-2013

**What:** hospital readmission, 30-d serious adverse events and 1-y CV events

**If:** ↑ BP meds @ DC
Figure. Cumulative Hazard Plots Comparing Outcomes With Exposure to Antihypertensive Regimen Intensifications at Hospital Discharge

A Readmission

HR, 1.23 (95% CI, 1.07-1.42)

NNH = 27

30-d readmission

21.4% versus 17.7%
30-d serious adverse events
4.5% versus 3.1%

HR, 1.41 (95% CI, 1.06-1.88)

NNH = 63
Change is possible
Assess Before Rx: Reducing the Overtreatment of Asymptomatic Blood Pressure Elevation in the Inpatient Setting

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<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inappropriate Orders per 1000 p-d</td>
<td>8.3</td>
<td>3.3</td>
</tr>
<tr>
<td>Adverse events due to inappropriate orders Per 1000 p-d</td>
<td>3.7</td>
<td>0.8</td>
</tr>
</tbody>
</table>
1. Join the discussion @TWDFNR

2. Don’t use oxygen to treat acute illness without hypoxemia.

3. Avoid PRN anti-hypertensives for blood pressure management