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MEDICINE



**University of Michigan
Health System**

Out of Breath: The Effect of Poor Health Literacy on Learning Inhaler Technique

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VM Arora, W Dale, E Naureckas, SR White, DO Meltzer, JA Krishnan, VG Press
Health Literacy Annual Research Conference, November 3rd, 2014

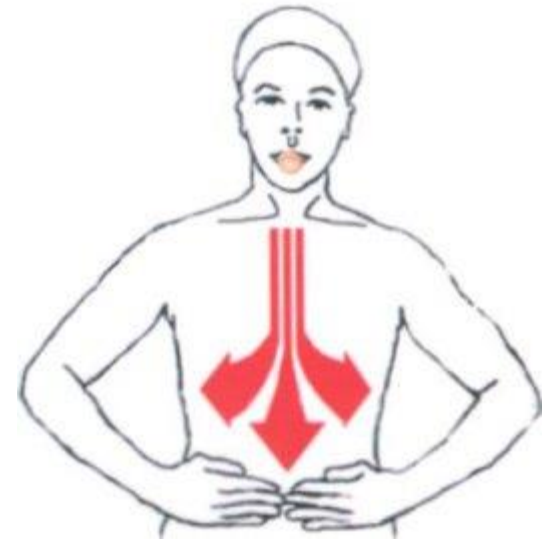
Disclosures

- None



Introduction

- Asthma & COPD are major causes of morbidity and mortality in US
 - COPD is 3rd leading cause of death & hospital readmissions
- Inhalers: mainstay of treatment
 - Prior work shows >80% of inpatients misuse their rescue inhalers



12 Steps

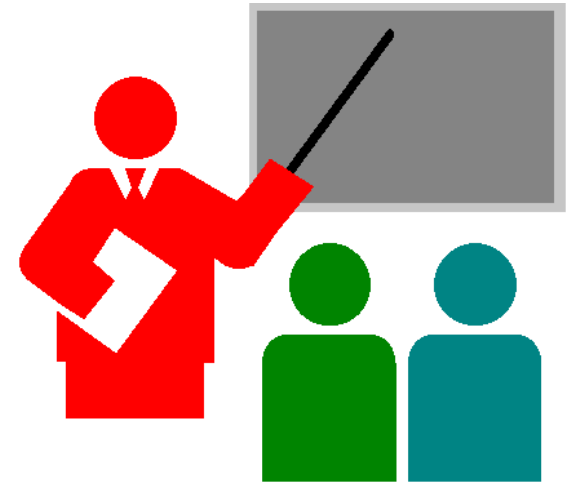


10 Steps



Introduction

- Studies show older patients with asthma or COPD have more difficulty with general self-management.
 - Is this true of respiratory inhalers too?
- Patient-centered Teach-to-Goal education method is associated with improved inhaler technique and improved outcomes post-discharge
 - Will it have similar effectiveness on older patients?



Central Question:

Could older people be at risk for inhaler misuse due to age-related factors such as poor health literacy?



Specific Aims

Aim 1: Assess if inpatients' ability to learn and use inhalers worsened with increasing age

Aim 2: Ascertain if insufficient health literacy is a barrier to older patients learning effective inhaler technique



Methods

- Secondary analysis
 - Data from 3 studies
 - Inhaler misuse/education
- Data
 - Demographics
 - Age dichotomized [$</\geq 65$])
 - Vision (Snellen Card)
 - Suf vis: 20/50 or better ≥ 1 eye)
 - Inhaler technique
 - Baseline
 - Post-education (if available) *
- Educational strategies*
 - Teach To Goal
 - Brief Instruction

*Conducted in 2 of 3 studies

Journal of General Internal Medicine
June 2011, Volume 26, Issue 6, pp 635-642

Date: 20 Jan 2011

Misuse of Respiratory Inhalers in Hospitalized Patients with Asthma or COPD

Valerie G. Press MD, MPH, Vineet M. Arora MD, MAPP, Lisa M. Shah MD, MA, Stephanie L. Lewis BA, Krystal Ivy BA, Jeffery Charbeneau MS, Sameer Badlani MD, Edward Naurekas MD, Antoinette Mazurek MS, Jerry A. Krishnan MD, PhD



Journal of General Internal Medicine
October 2012, Volume 27, Issue 10, pp 1317-1325

Date: 17 May 2012

Teaching the Use of Respiratory Inhalers to Hospitalized Patients with Asthma or COPD: a Randomized Trial

Valerie G. Press MD, MPH, Vineet M. Arora MD, MAPP, Lisa M. Shah MD, MAPP, Stephanie L. Lewis BA, Jeffery Charbeneau MS, Edward T. Naureckas MD, Jerry A. Krishnan MD, PhD



DEFPOTEC 8 20/20

9. **ClinicalTrials.gov**
A service of the U.S. National Institutes of Health

Find Studies About Clinical Studies Submit Studies

Home > Find Studies > Search Results > Study Record Detail

10. **Effectiveness of Interventions to Teach Respiratory Inhaler Technique (E-TRAIN)**

11. **This study has been completed.**

12. Sponsor: University of Chicago

Information provided by (Responsible Party): University of Chicago

ClinicalTrials.gov Identifier: NCT01426581

First received: August 29, 2011
Last updated: September 4, 2013
Last verified: September 2013
History of Changes

1 0 1

1 0 1

0 1

0 1


7/12

Teach-to-Goal



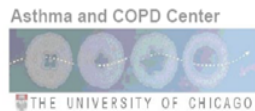
Testing Effect:

Memory is enhanced through act of *retrieving* information while *learning*



“Brief Instruction” [BI]

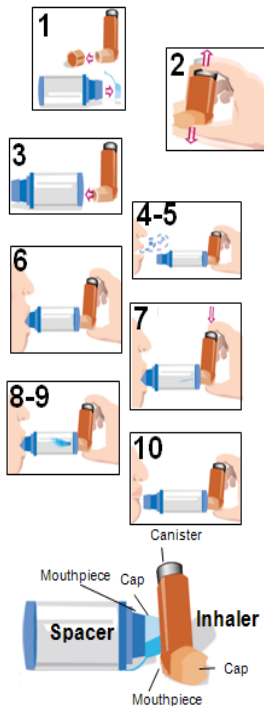
- Simple Verbal Instructions



Using your HFA Metered Dose Inhaler and Spacer (e.g., Ventolin® HFA):

Steps 1 to 12

(NOTE: The inhaler must be PRIMED before using for the first time, or if it has not been used in the last 14 days, or if it has been dropped.)



1. Remove cap from inhaler and spacer mouthpieces and look for loose objects in the devices
 2. Shake inhaler up and down 5 times
- IF PRIMING IS NEEDED: take the cap off the mouthpiece of the actuator. Then shake the inhaler well, and spray it into the air away from your face. Shake and spray the inhaler like this 3 more times to finish priming it.
3. Push the inhaler mouthpiece into the spacer so that it fits snugly.
 4. **Breathe OUT fully**
 5. When breathing out fully (step 4) do so away from the spacer. Don't breathe in until step #8.
 6. Put the spacer mouthpiece in your mouth in between your teeth. Close your lips around the spacer mouthpiece and keep your tongue out of the way of the mouthpiece.
 7. Press down on the inhaler canister **1 time**.
 8. **Breathe IN slowly to fill your lungs full of medicine.** If you hear a whistling sound, you are breathing in too fast and need to slow down.
 9. **Hold your breath for 5 to 10 seconds.** We want to keep your lungs filled with medicine for 5 to 10 seconds.
 10. **Take spacer out of your mouth**
 11. **Now breathe normally for 30-60 seconds**
 12. Repeating steps 1-11 for the **second puff**.



Data Analysis

- Chi-Squared and Fisher's exact for categorical comparisons (primary and secondary aim)
- Additional analyses used a GEE model



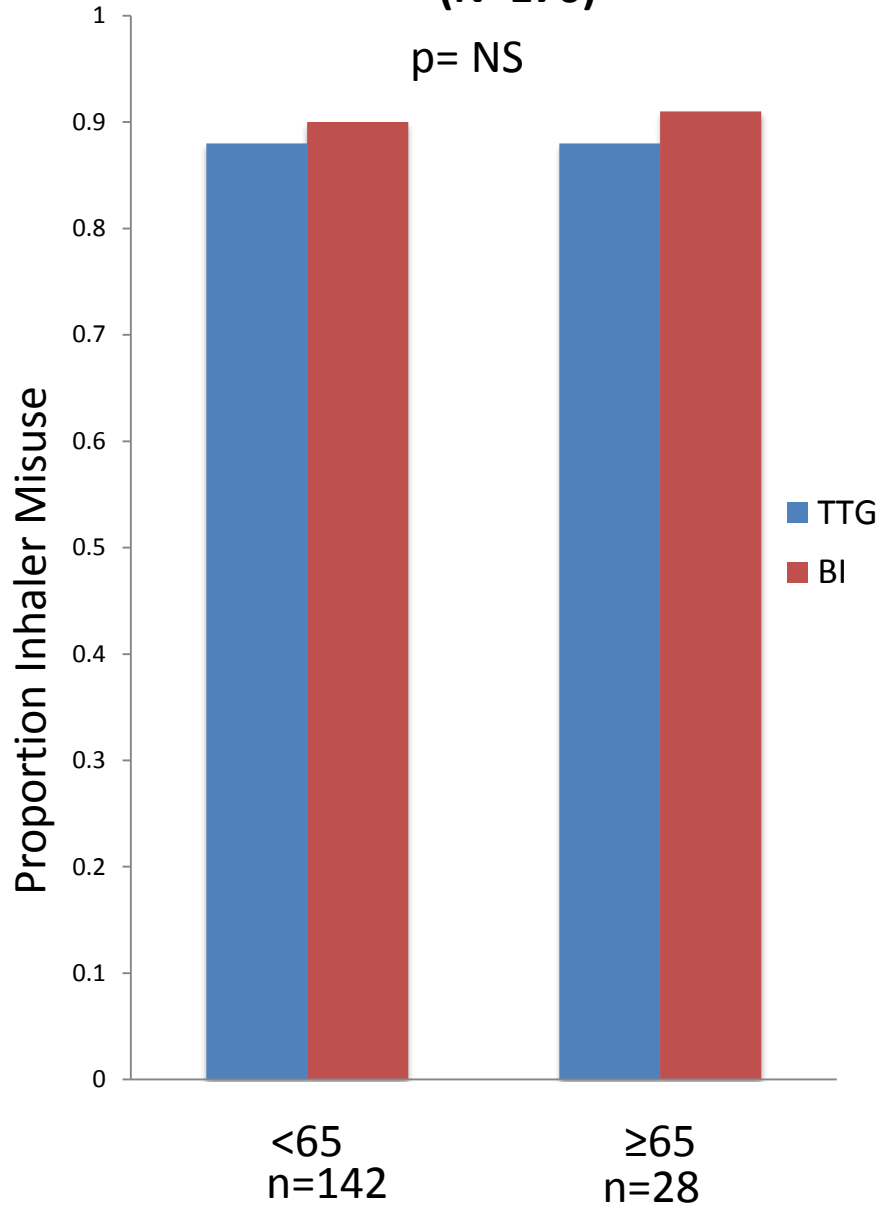
Results

Characteristic	All Enrolled (n=268)
Age, mean \pm SD	50.1 \pm 16.2
Female sex, n (%)	193 (72.0)
Non-White Race, n (%)	236 (88.1)
Insufficient Vision, n (%)	70 (26.1)
Less-Than-Adequate Health Literacy (n=198)	50 (25.3)
MDI Misuse at baseline (<75% correct)	236 (88.1)

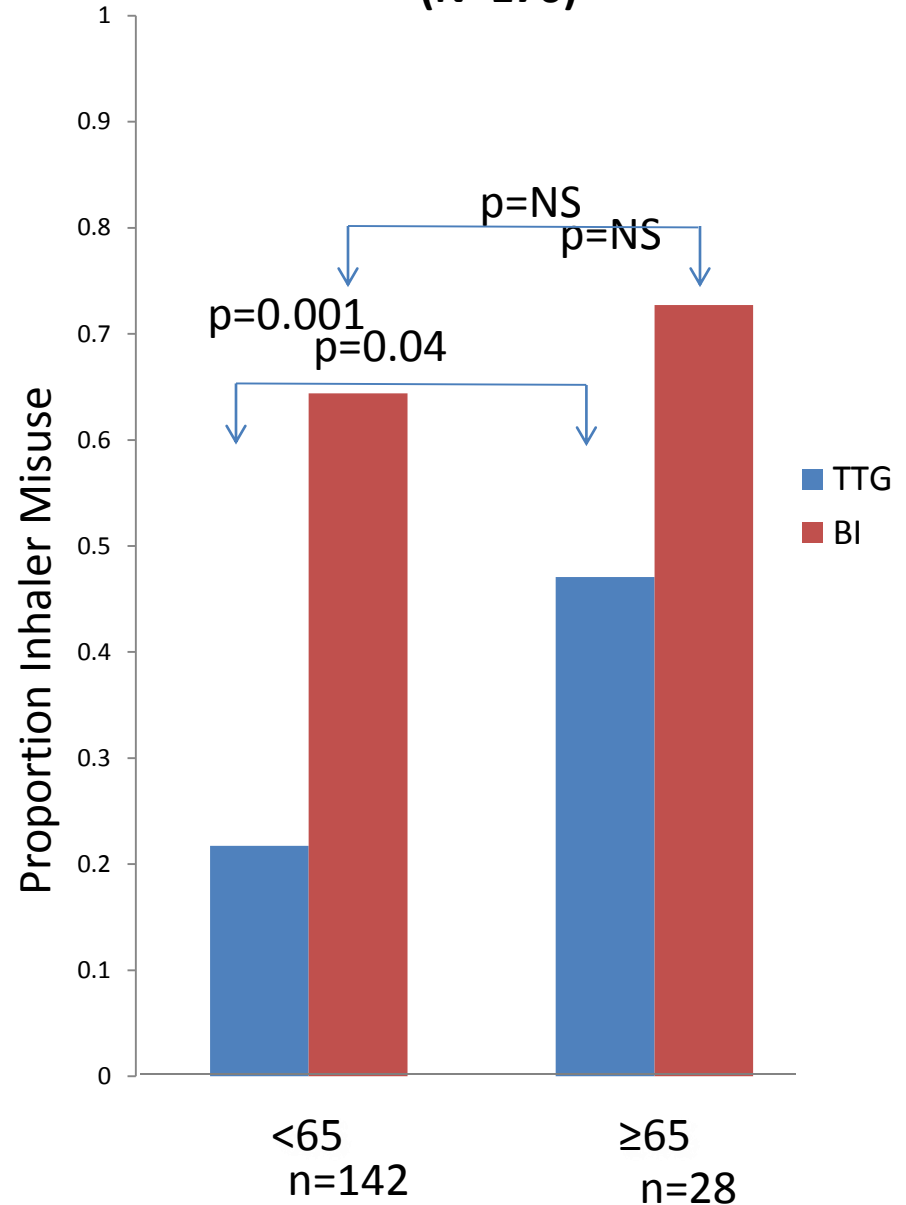


Is Age a Barrier to Learning Inhaler Technique?

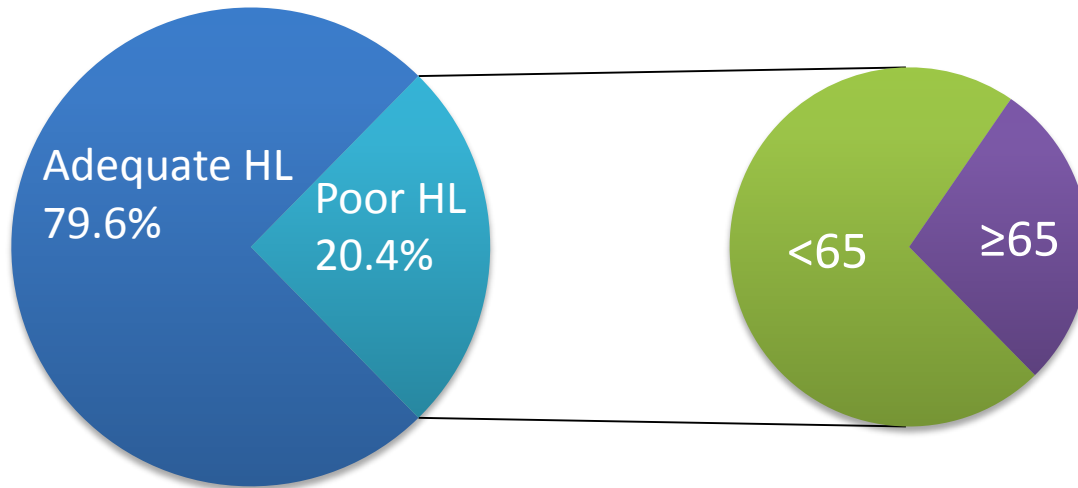
Prevalence of misuse at baseline
(N=170)



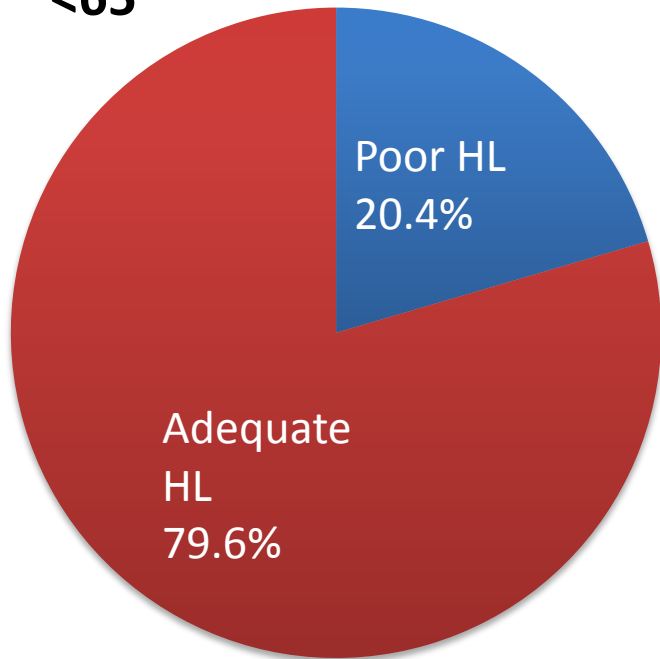
Prevalence of misuse post education
(N=170)



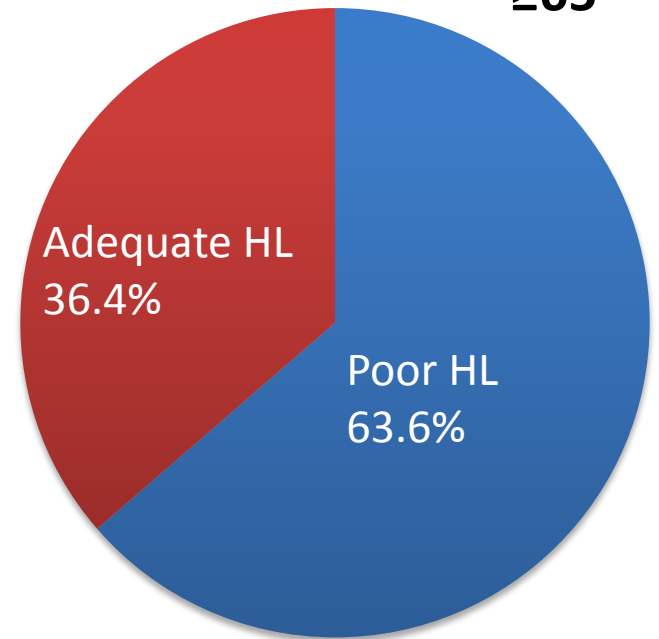
Prevalence of Poor Health Literacy



<65



≥65

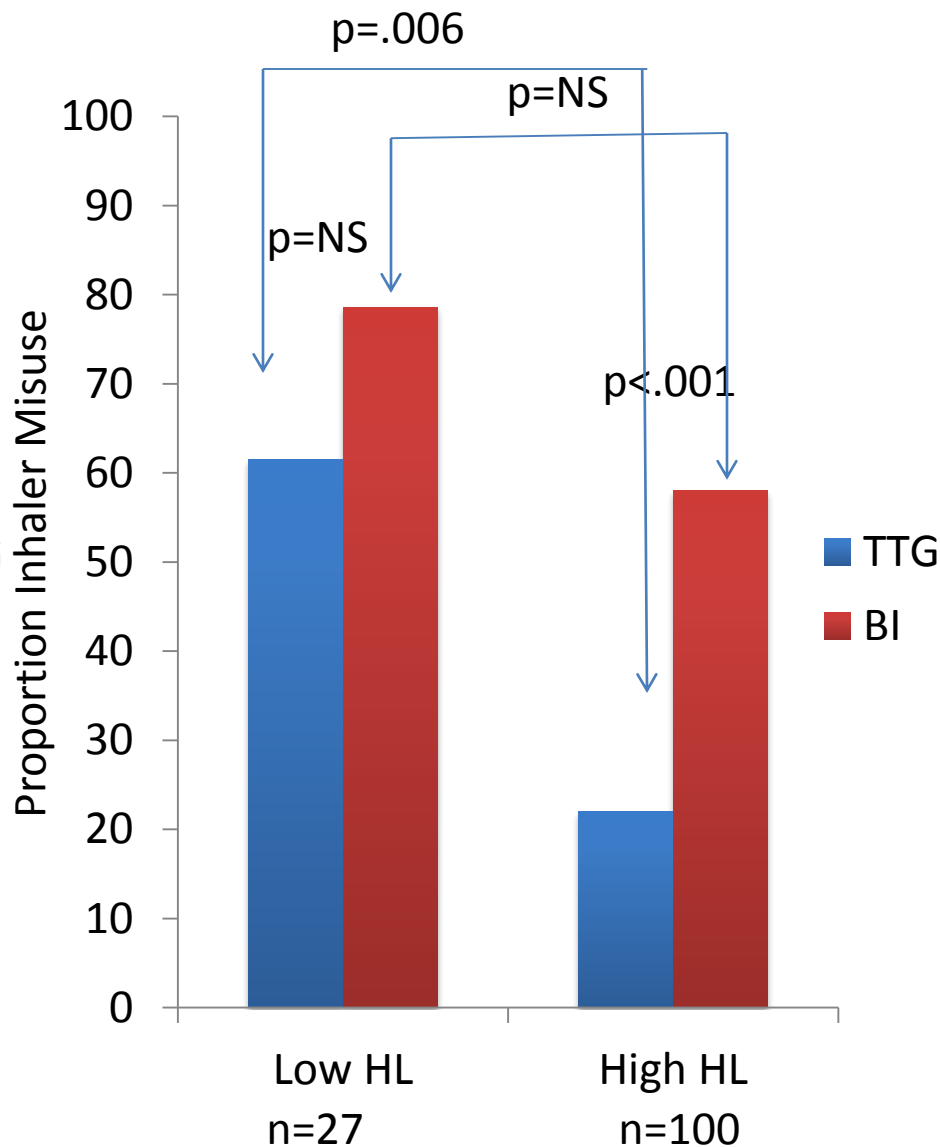
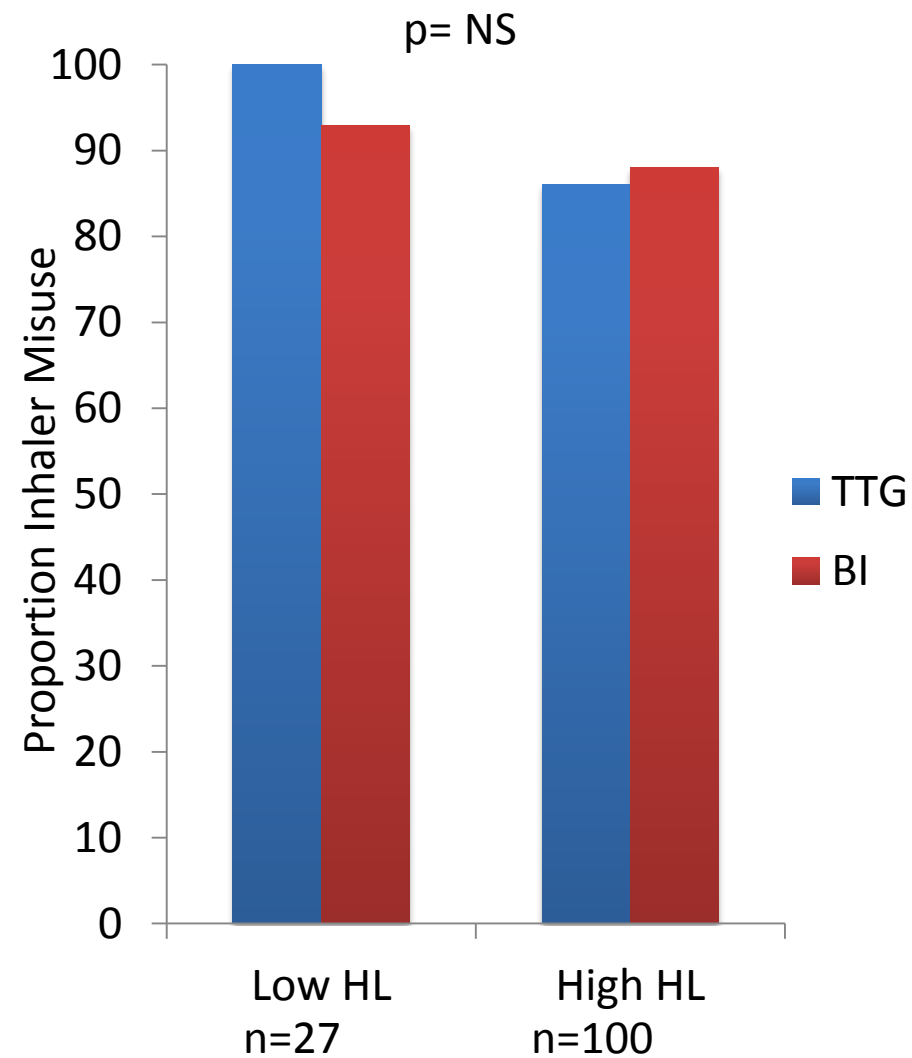


p<0.001

Is Poor Health Literacy a Barrier to Learning Inhaler Technique?

Prevalence of Pre-Education Misuse (n=170)

Prevalence of Post-Education Misuse (n=170)



GEE Analysis

- A preliminary multivariate analysis
- A dichotomous health literacy variable (poor or adequate) predicted inhaler misuse after education ($p=0.03$)
- Teach-to-Goal education was associated positively with lower rates of inhaler misuse ($p=.006$)
- Age, race, gender, and vision did not predict rates of inhaler misuse
- While age itself is not a risk factor for inhaler misuse after education, this implies that older patients could be at risk for misuse due to higher rates of low health literacy



Limitations

- Generalizability
 - 1-2 sites
 - Predominantly black, urban, female participants
- Study not powered by age
 - Insufficient sample size for some age-related analyses
 - E.g., If patients ≥ 65 and have insufficient vision, how did misuse compare with each intervention?



Discussion/Future Directions

- Misuse occurs at high rate, regardless of age
 - Almost everyone can benefit from inhaler education
- Disparity exists between older and younger patients in ability to learn proper inhaler technique
- Health literacy is a large risk factor for misuse or difficulty learning technique
 - However, other risk factors should be explored
- Future work should enroll a much larger number of patients over 65 to do age-related analyses



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- David Meltzer, MD, PhD

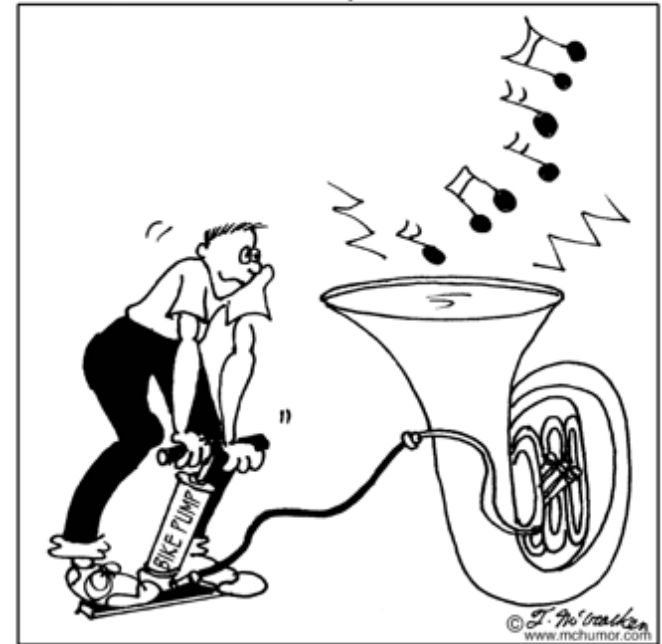
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- ALA Social Behavioral Grant

McHUMOR.com by T. McCracken



George doesn't let his asthma get in the way of his playing the tuba in the school band.

QUESTIONS?
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Curing Respiratory Diseases Through Research & Education

 **NIH** National Institutes of Health

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EXTRA SLIDES



Set-up of Clinical Trials

- “Misuse of Respiratory Inhalers in Hospitalized Patients with Asthma or COPD” Press, 2011 (SARI)
 - How prevalent is misuse?
 - Demographics, Baseline technique, questionnaires, no teaching
- “Teaching Use of Respiratory Inhalers to Hospitalized Patients with Asthma or COPD” Press, 2012 (TURI)
 - How effective is patient-centered education v. brief intervention
 - 50 patients enrolled with teaching
- Effectiveness of Teaching Respiratory Inhaler TechNique to Patients with Asthma or COPD” Press—to be submitted this year (E-TRaIN)
 - How effective is patient-centered education v. brief intervention over time?
 - 120 patients enrolled with teaching



Misuse by Continuous Age

