

# What has Literacy to Do with Health Outcomes?

**Dean Schillinger, MD UCSF Professor of Medicine  
Director, Center for Vulnerable Populations SF General Hospital  
Chief, California Diabetes Prevention and Control Program  
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# Objectives: A Call to Action

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- Review US literacy statistics as they relate to health demands and relate them to international statistics
- Describe research on relationship between literacy and chronic illness, implications for public health and health care delivery
- Explore explanatory models for associations between literacy and health
- Describe characteristics of the healthcare system that exacerbate literacy-related disparities that could serve as targets for systems interventions
- \* In afternoon, I will describe a framework for improving chronic disease-related health communication for populations with limited literacy

# **What is the relevance of health communication in chronic diseases care ?**

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- **High self-management demands**
- **Increasing reliance on technology**
- **Large mismatch in training between health professionals and target populations (“health literacy”)**
- **Counterbalance role of mass media in consumerist society**
- **Strong inverse relationship between educational attainment and chronic illness burden**
- **Relatively little research about communication and chronic disease care**
- **Communication can be powerful motivator for change**

CURRENTLY ON

EXIT 58A-B



Zoloft



Prozac



Paxil



LAST EXIT  
BEFORE TOLL



Buspar  
↖

Wellbutrin  
↕

Celexa  
↕

Yanox  
↕



# What is Health Literacy?

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“The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make [informed] health decisions.”

-Institute of Medicine, 2004

# 1<sup>st</sup> National Assessment of Health

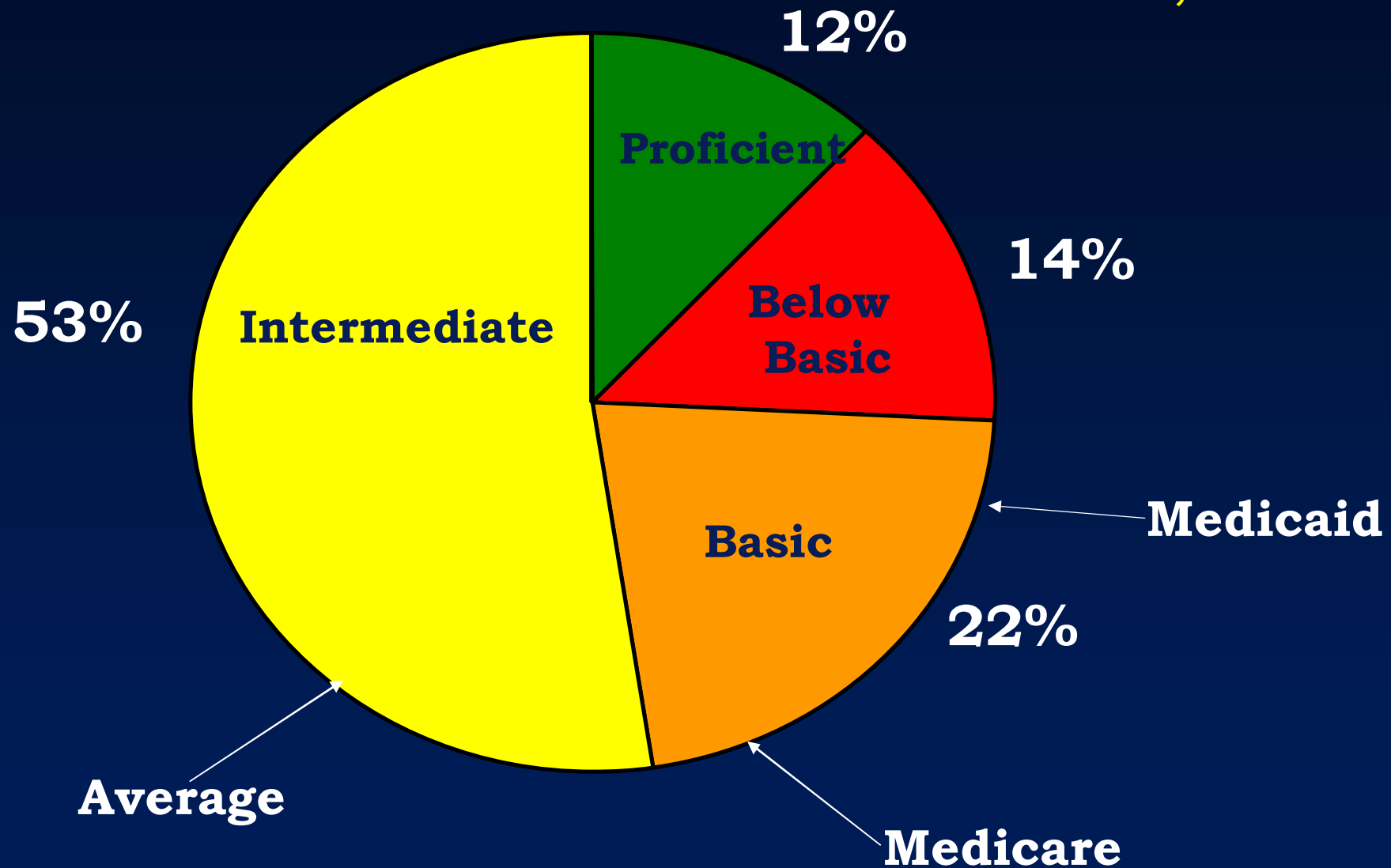
## Literacy

n=19,714

- **Below Basic:** Circle date on doctor's appointment slip
- **Basic:** Give 2 reasons a person with no symptoms should get tested for cancer based on a clearly written pamphlet
- **Intermediate:** Determine what time to take Rx medicine based on label
- **Proficient:** Calculate employee share of health insurance costs using table

# 1<sup>st</sup> Health Literacy Assessment

n=19,000 U.S. Adults



National Assessment of Adult Literacy (NAAL): National Center for Educational Statistics, U.S. Department of Education, 2003.

# International Adult Literacy Survey

- Carried out in 1994-6
- Involved 12 nations: Canada, New Zealand, Germany, Netherlands, Poland, Sweden, Switzerland, US, Australia, Belgium, UK, Ireland
- Mean literacy scores similar, but differences observed in distribution of literacy levels (clustering in middle literacy vs. wider distributions)
- Age, minority status, lower socioeconomic status associated with lower literacy

# Literacy and health

- People with limited literacy skills not only have problems with reading, but more likely to have difficulties with:
  - » calculations, numeric problem solving
  - » oral communication (less understanding, lower knowledge , restricted vocabulary, and less active speakers)
  - » Short-term memory
  - » Carrying out medical instructions or learn new skills
  - » Communication on internet
  - » This combination of characteristics is what many refer to as “low health literacy”

# Low Literacy Rates By County



% Adults with Level 1  
Literacy Skills

- > 30%
- 20% to 30%
- 15% to 20%
- 10% to 15%
- < 10%

**24% California Adults are Level 1**



# Literacy and health in high income countries (US exemplar)

- **Limited literacy associated with**
  - » lower self-rated health
  - » higher rates of some chronic diseases
  - » Higher hospitalization rates
  - » higher adjusted mortality
- **In diabetes, limited literacy associated with poor blood sugar control, diabetes complications, and mediates the relationship between education and diabetes outcomes**

Sudore, Schillinger 2006 JGIM

Schillinger et al. 2002 JAMA; 2006 Pub Health Rep

**Self-rated health and self-reported access  
among an elderly cohort, by literacy\* (N=2,512)**

	<b>Limited literacy</b>	<b>Adequate literacy</b>	<b>P-value</b>
Fair/poor self-rated health	37.6%	13.9%	<.0001
Lack usual source of care	7.2%	4.8%	.02
No flu shot prior year	31.2%	19.2%	<.0001
Lack medication insurance	45.4%	33.1%	<.0001

**Self-reported chronic conditions among an elderly cohort,  
by literacy\* (N=2, 512)**

	<b>Limited literacy</b>	<b>Adequate literacy</b>	<b>P-value</b>
<b>Hypertension</b>	62.7%	54.7%	<.0001
<b>Diabetes</b>	25.2%	14.6%	<.0001
<b>Obesity</b>	31.1%	23.0%	<.0001

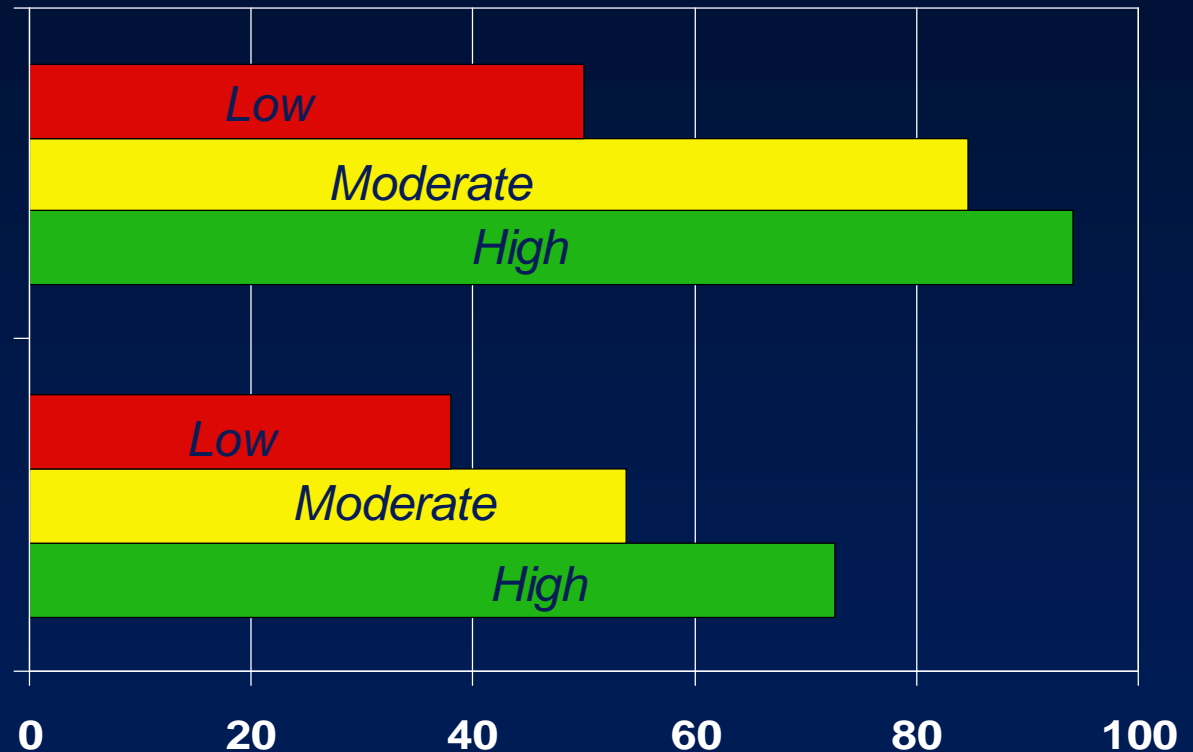
# Patients with Diabetes and Low Literacy Less Likely to Know Correct Management

## ***Need to Know:***

symptoms of low blood sugar (hypoglycemia)

## ***Need to Do:***

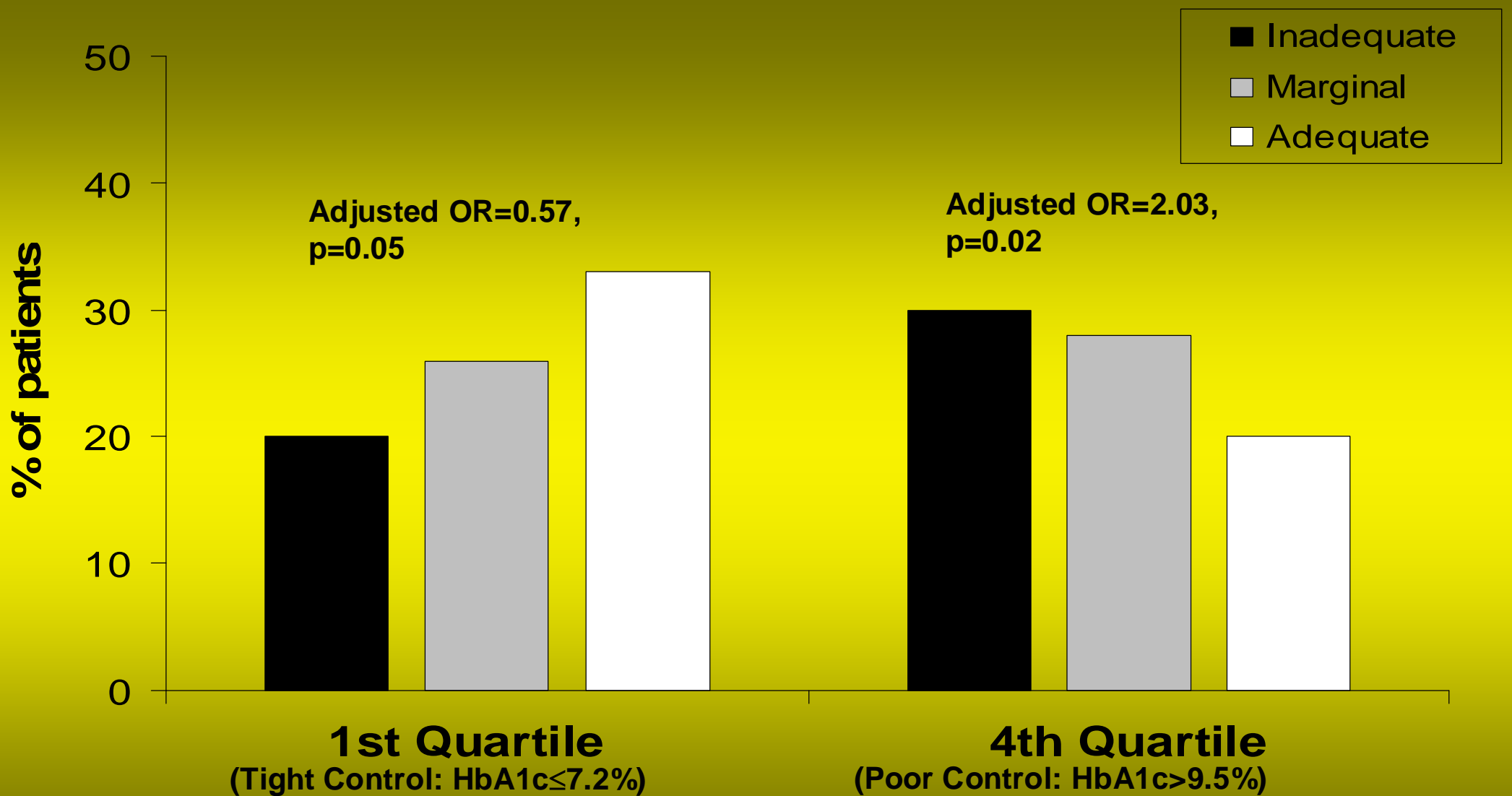
correct action for hypoglycemic symptoms



# Literacy and knowledge of anticoagulation (warfarin) care

- **Limited literacy the strongest predictor of poor knowledge of:**
  - » **Understanding goal of warfarin treatment**
  - » **Understanding target blood levels and need for monitoring**
  - » **Understanding side effects**
  - » **Understanding what is a stroke**

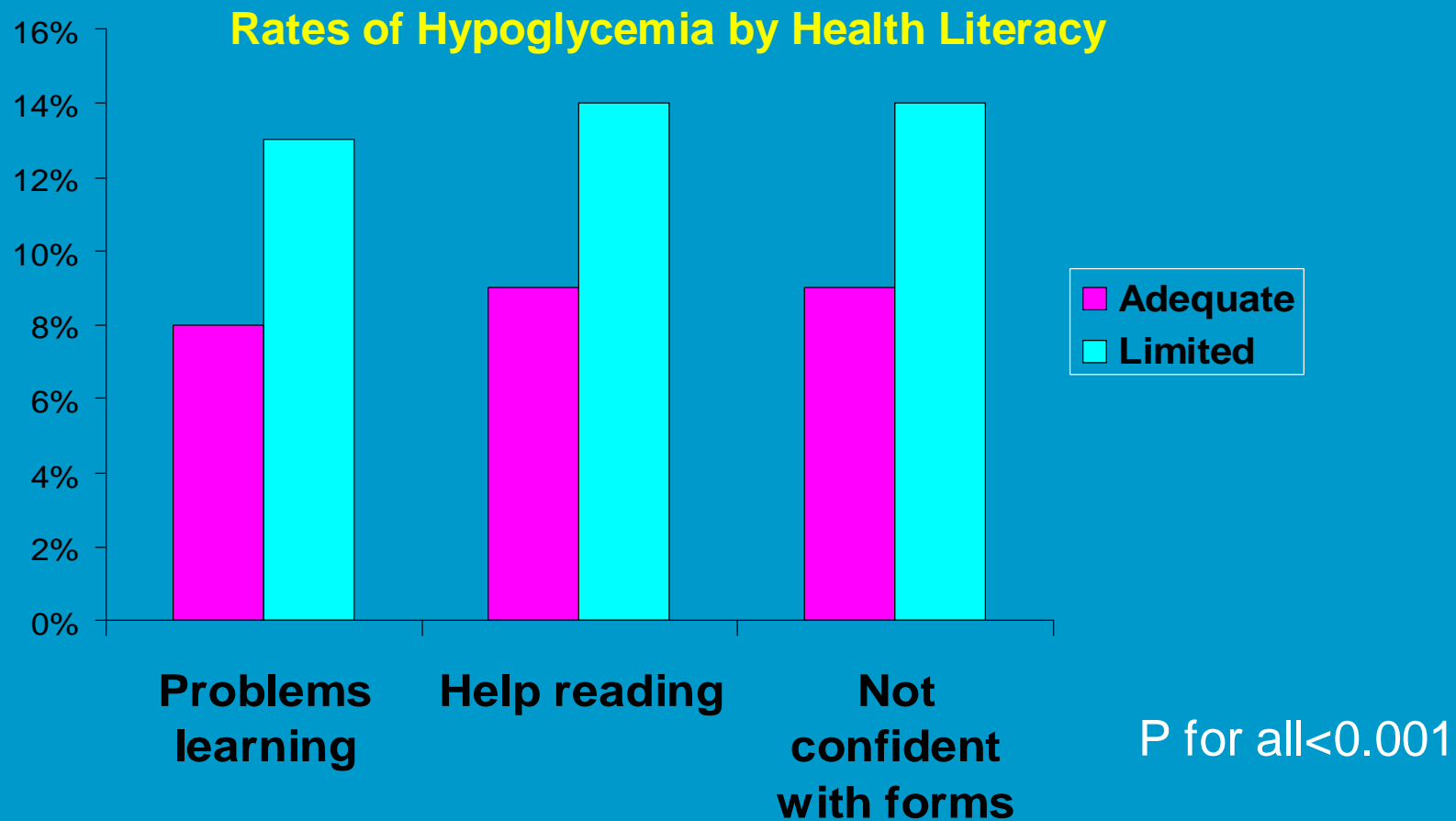
# Literacy is Associated with Blood Sugar Control, N=408

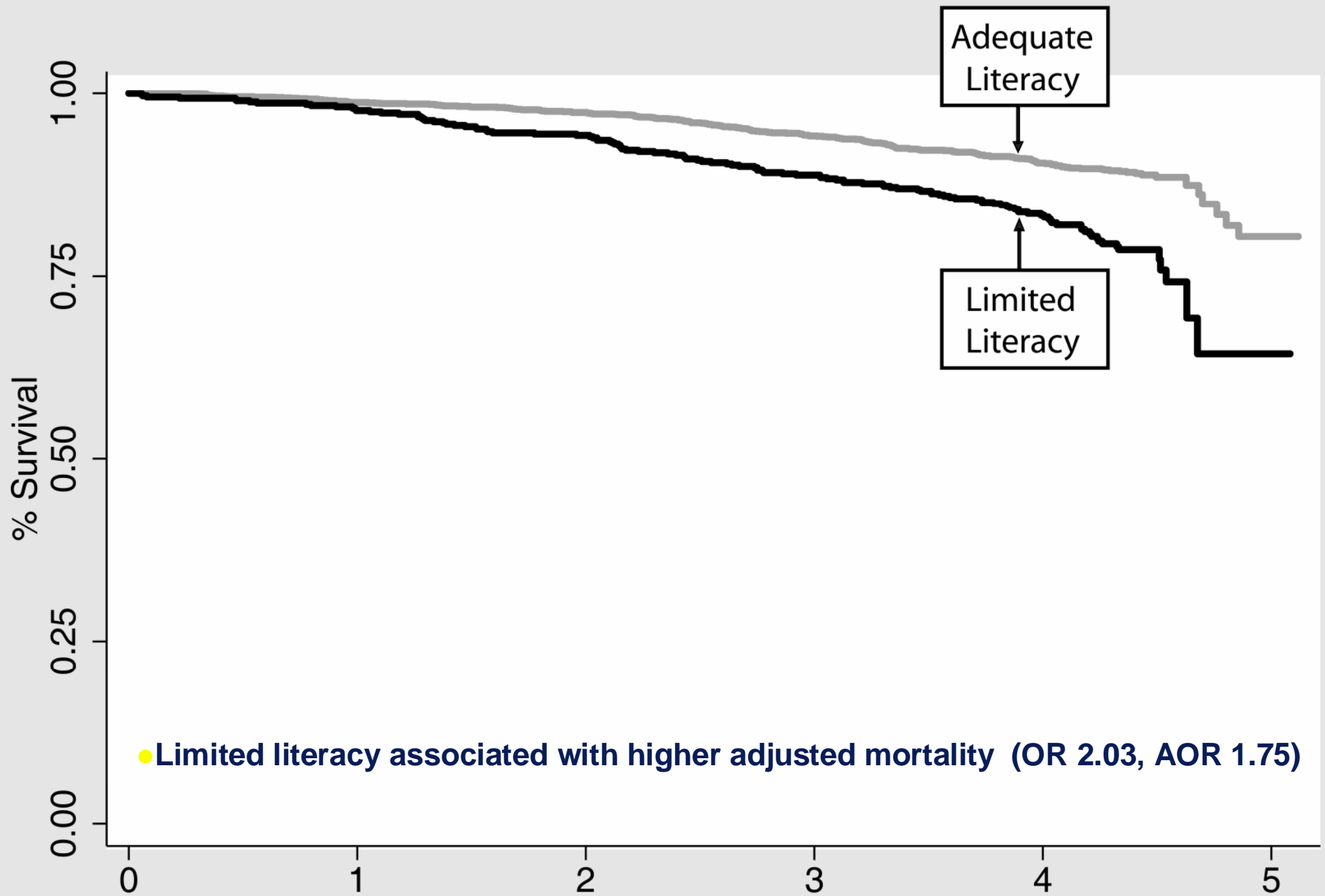


## Adjusted odds of self-reported diabetes complications, for patients with inadequate vs. adequate literacy (N=408)

<b>Complication</b>	<b>N</b>	<b>AOR</b>
Eye Disease	111	<b>2.33</b>
Kidney Disease	62	1.71
Amputation	27	2.48
Stroke	46	<b>2.71</b>
Heart Disease	93	1.73

# Limited Health Literacy Patients Experience more Hypoglycemia





● Limited literacy associated with higher adjusted mortality (OR 2.03, AOR 1.75)

# How is Literacy Linked to Health Outcomes? 4 hypotheses

## 1. **Confounding**

Limited literacy → confounders → illness

## 2. **Mediation at individual or community level**

Limited literacy → health mediators (behavior and exposure) → illness

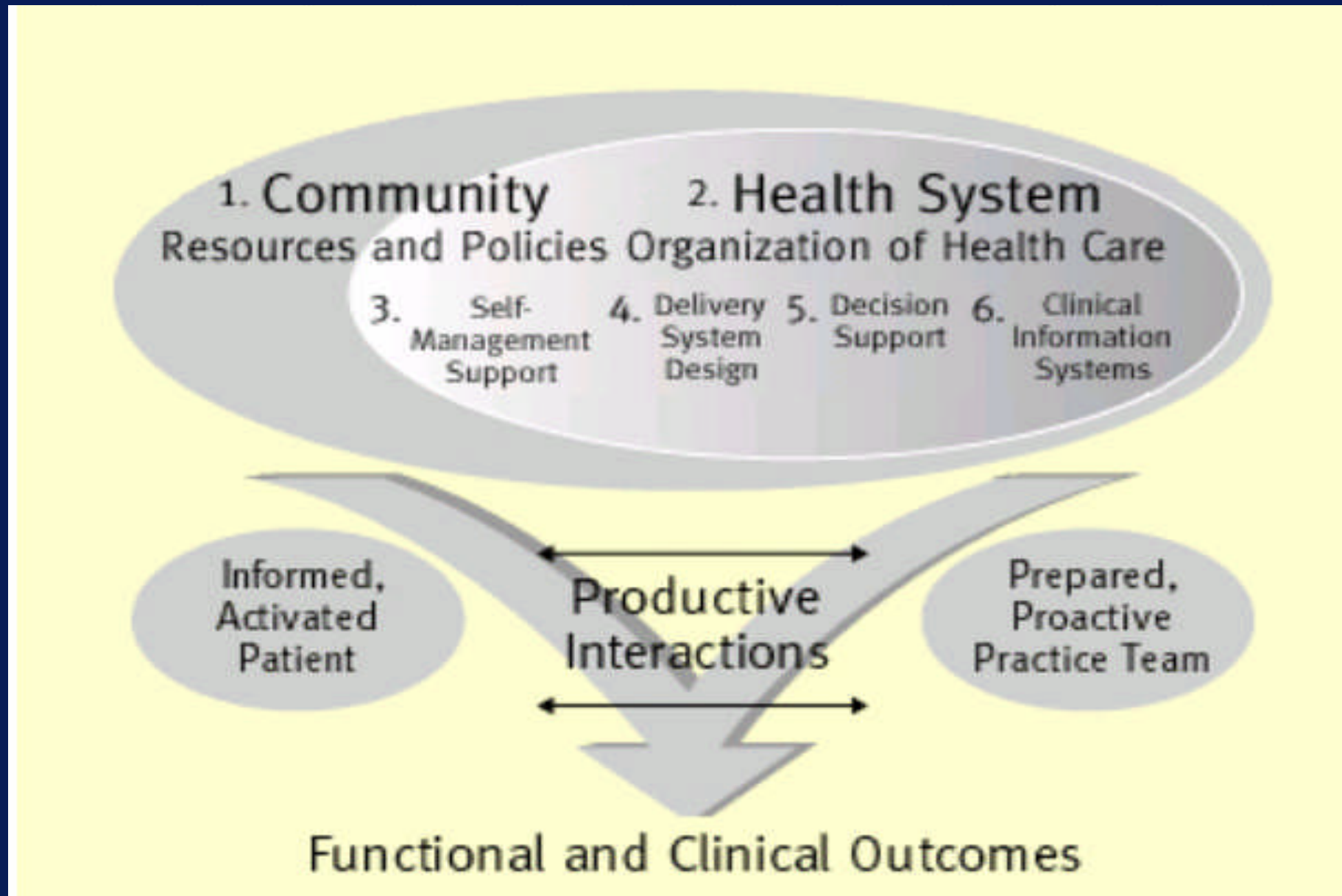
## 3. **Reverse Causation/cyclical**

Illness → limited literacy → worse health trajectory

## 4. **Effect Modification at Health Care System Level**

Limited literacy → poor quality of care → illness and premature death/morbidity

# The Chronic Care Model



# How Does Limited Literacy Affect (Verbal) Clinical Interactions?

- Impedes understanding of technical information and explanations of self-care
- Impairs shared decision-making
- Speed of dialogue, extent of jargon, lack of interactivity determinants of effectiveness of communication
- Impairs medication communication, jeopardizing patient safety (medication “discordance”)
- Interaction between limited English proficiency and limited literacy

Fang et al. 2006 JGIM

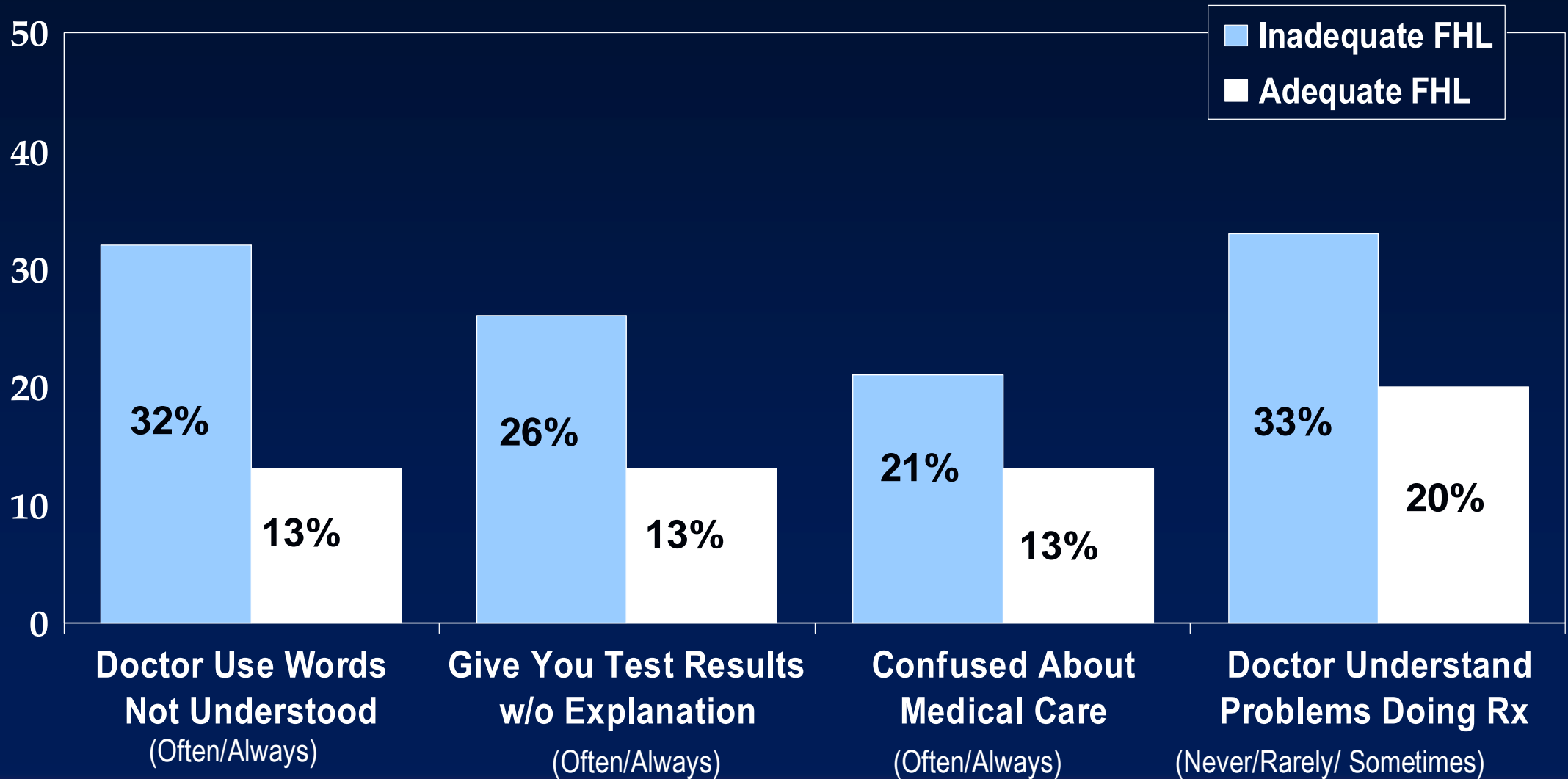
Schillinger et al. 2004 Pt Ed and Counseling

Castro et al, Am J Health Beh 2007

Schillinger et al. 2003 Arch Int Med

Schillinger et al 2004. AHRQ Advances in Patient Safety

# Diabetes Patients with Limited Literacy Experience Poorer Quality Communication, N=408



# Medical Jargon

GLUCOMETER

HEMOGLOBIN A1c

DIALYSIS

ANGINA

RISK FACTORS

CREATININE



# Jargon Terms

## *...unclarified*

- Glucometer
- Immunizations
- Weight is stable
- Microvascular complication
- System of nerves
- HbA1c
- EKG abnormalities
- Dialysis
- Wide Range
- Risk factors
- Kidney function
- Interact

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## *...from Patient's own visit:*

- benign
- blood drawn
- blood count

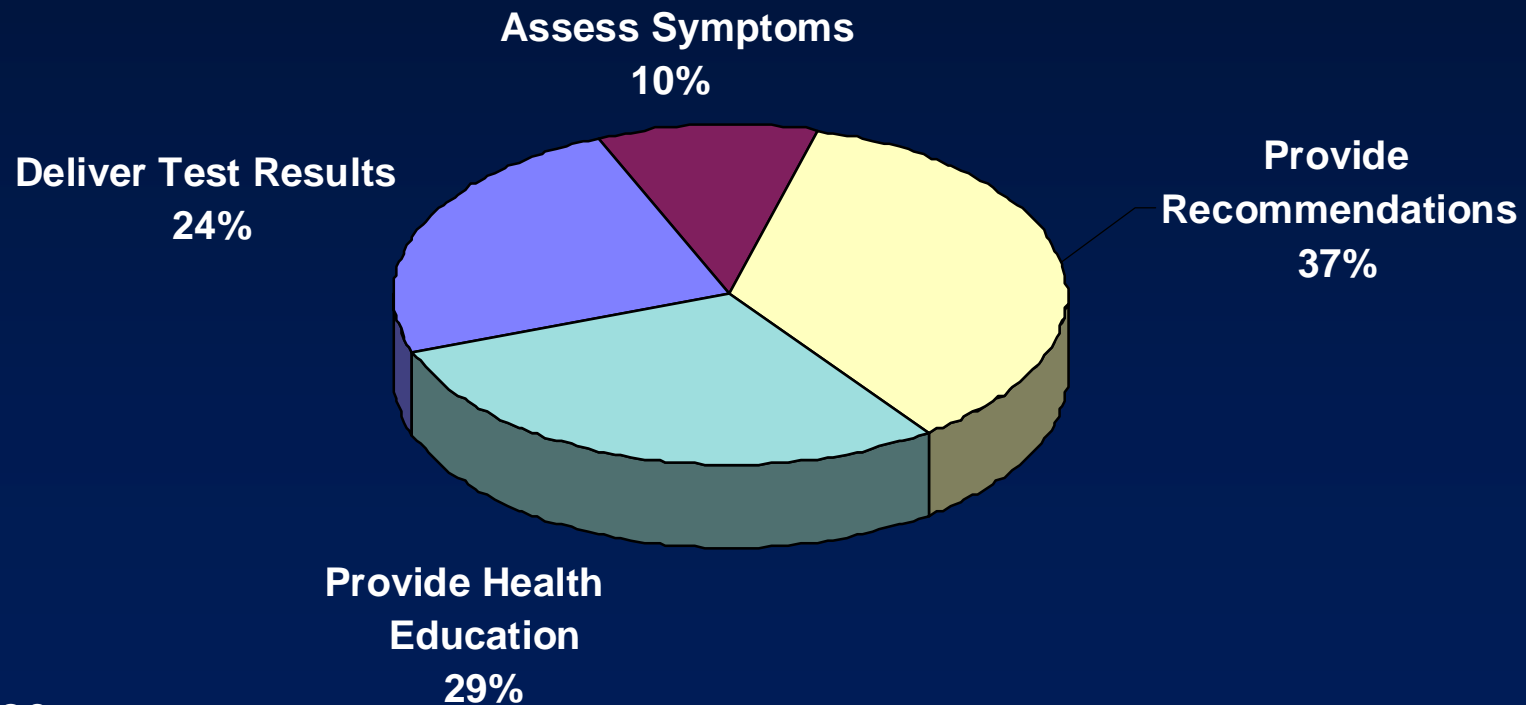
## *...clarified*

- Angina
- Microalbuminuria
- Ophthalmology
- Genetic
- Creatinine
- Symptoms

- CAT scan
- blood count
- correlate
- stool was negative
- stool
- baseline
- respiratory tract
- polyp

- washed out of your system
- receptors
- short course
- renal clinic
- blood cells
- increase your R
- screening
- vaccine

# Function of Jargon

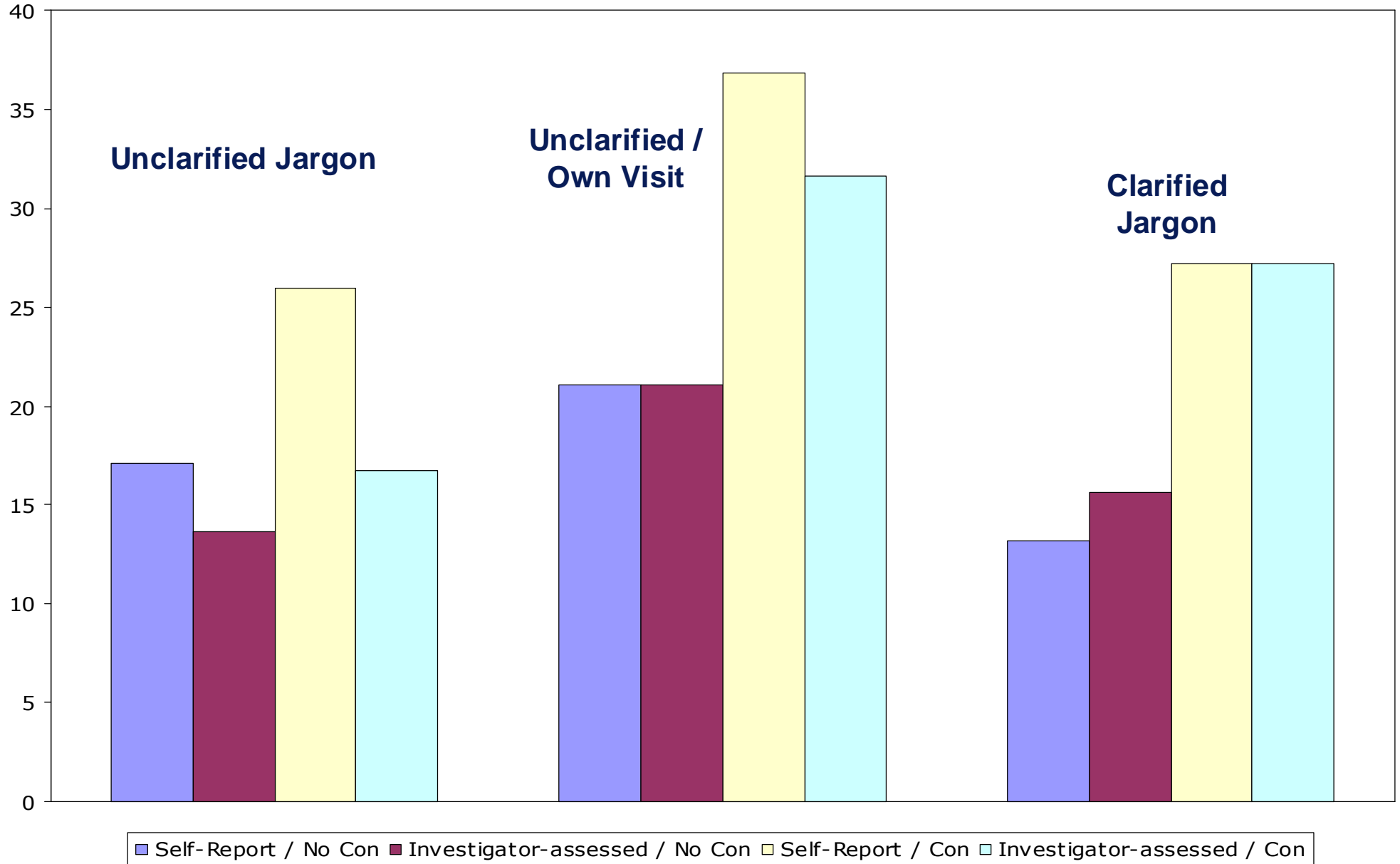


n = 60

# Dialysis “Do you know what the number one cause for people in this country being on dialysis is? Diabetes”

Would you please tell me in your own words what <u>dialysis</u> means?		In your own words, what do you think the doctor was trying to tell the patient?	
“Check something every day.”	1	“Sugar is too high.”	1
“What? Is that about you toes?”	1	“I can't say it.”	1
“It means that your diabetes is going worse that you have to exercise to make diabetes.”	1	“Means that more people are getting diabetes.”	1
“You got to get on machine to pump.. redo blood to come up to par.”	4	“That the sugar was not...hmm.”	1
“...regarding kidney.”	2	“Diabetes is one cause of kidney problems.”	3
“That is a warning...about the kidney...my doctor told me about those side effects of the diabetes.”	3	“About dialysis, because they are warning us, they are telling me about the complications...that if I'm having problems in my kidney, I'm going to have dialysis.”	4
“It's a way to clean blood get off toxins out the blood.”	4	“That you need to be on dialysis to cleanse blood or gonna die.”	4

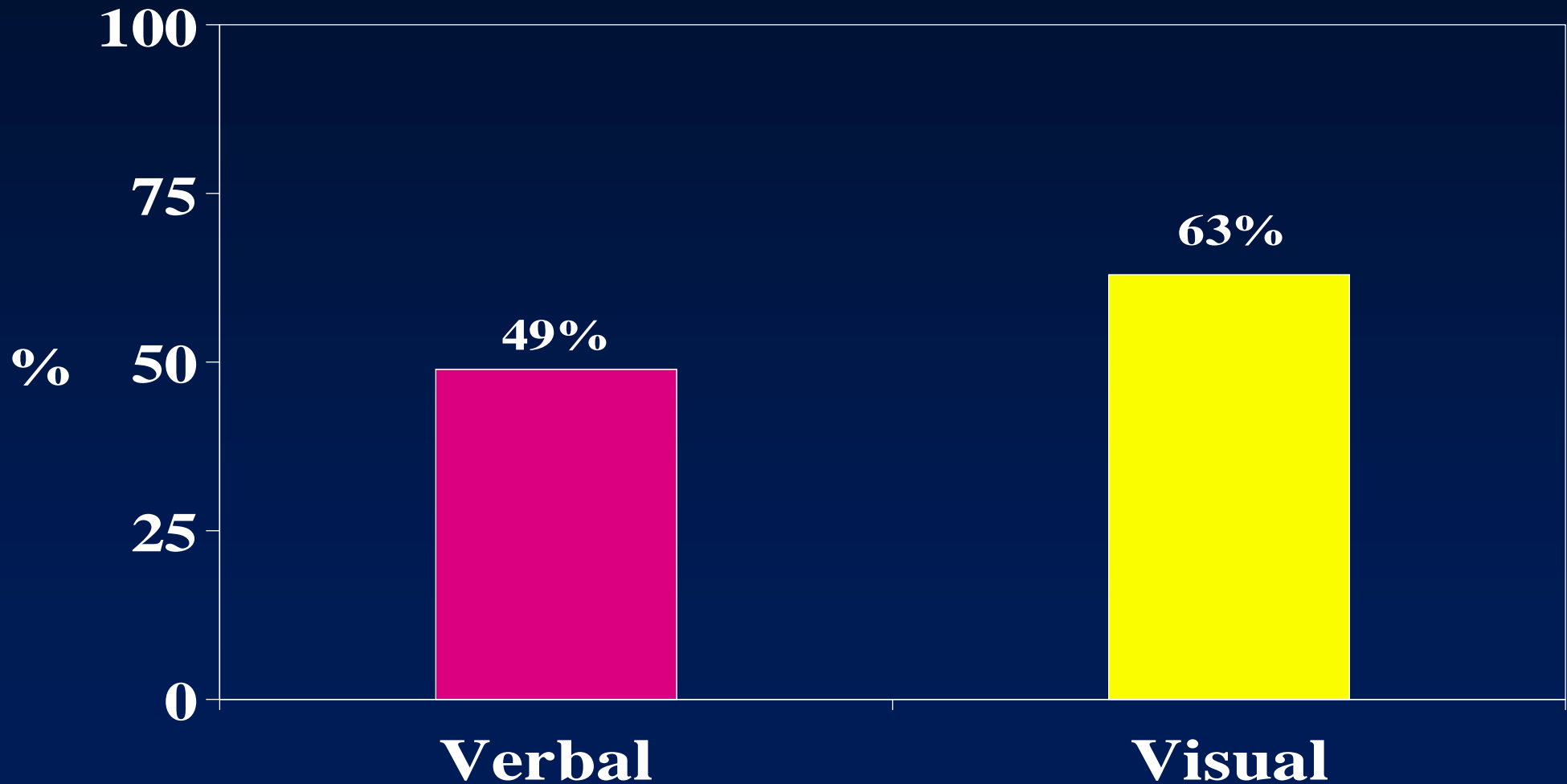
# Patient Comprehension of Jargon (% Some /Total Understanding)



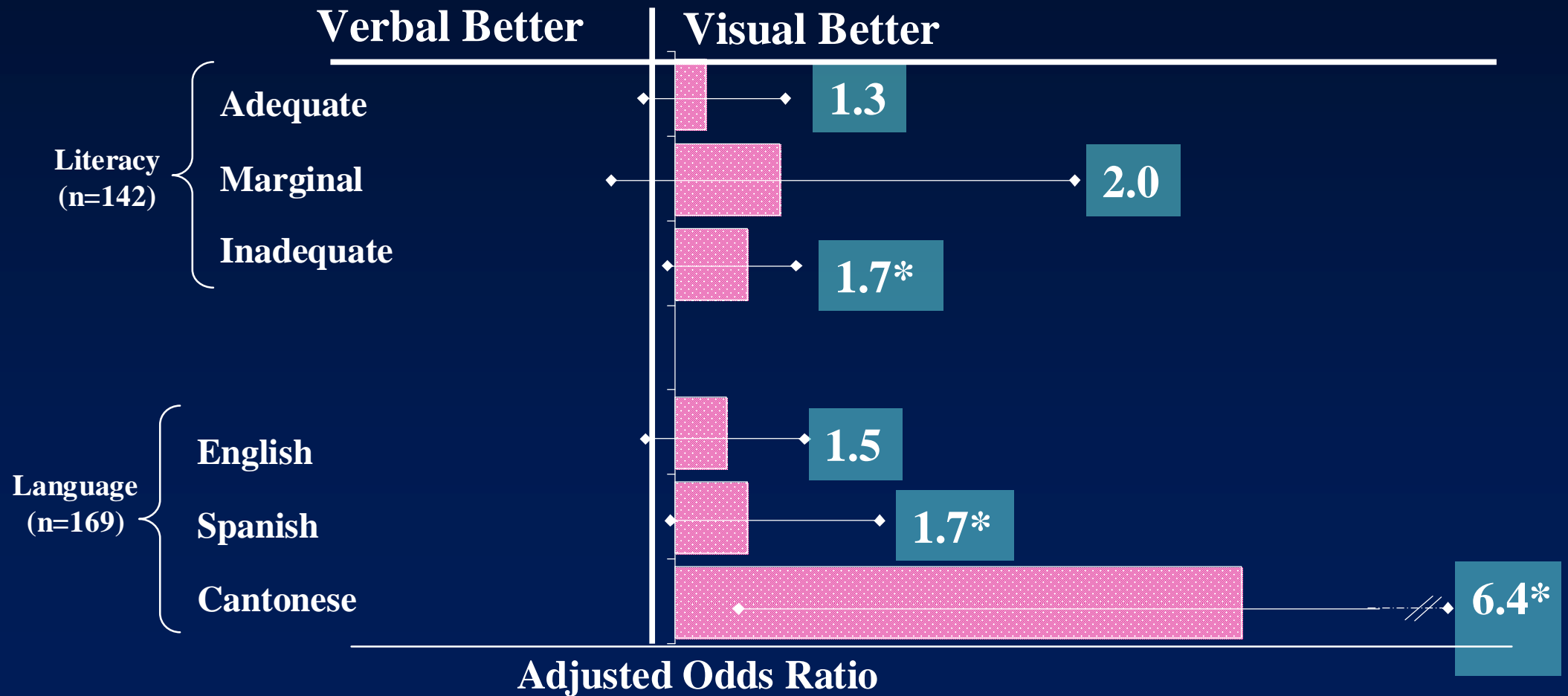


*“I’m sorry, but I can’t carry on an intelligent conversation. I’m visual.”*

# Patient-Provider Regimen Concordance is Low, but Improves When Regimen Assessed with Visual Aid, N=220



# Assessing Medication Regimen Using Visual Mode Superior to Verbal Mode for Limited Literacy and Non-English Speakers



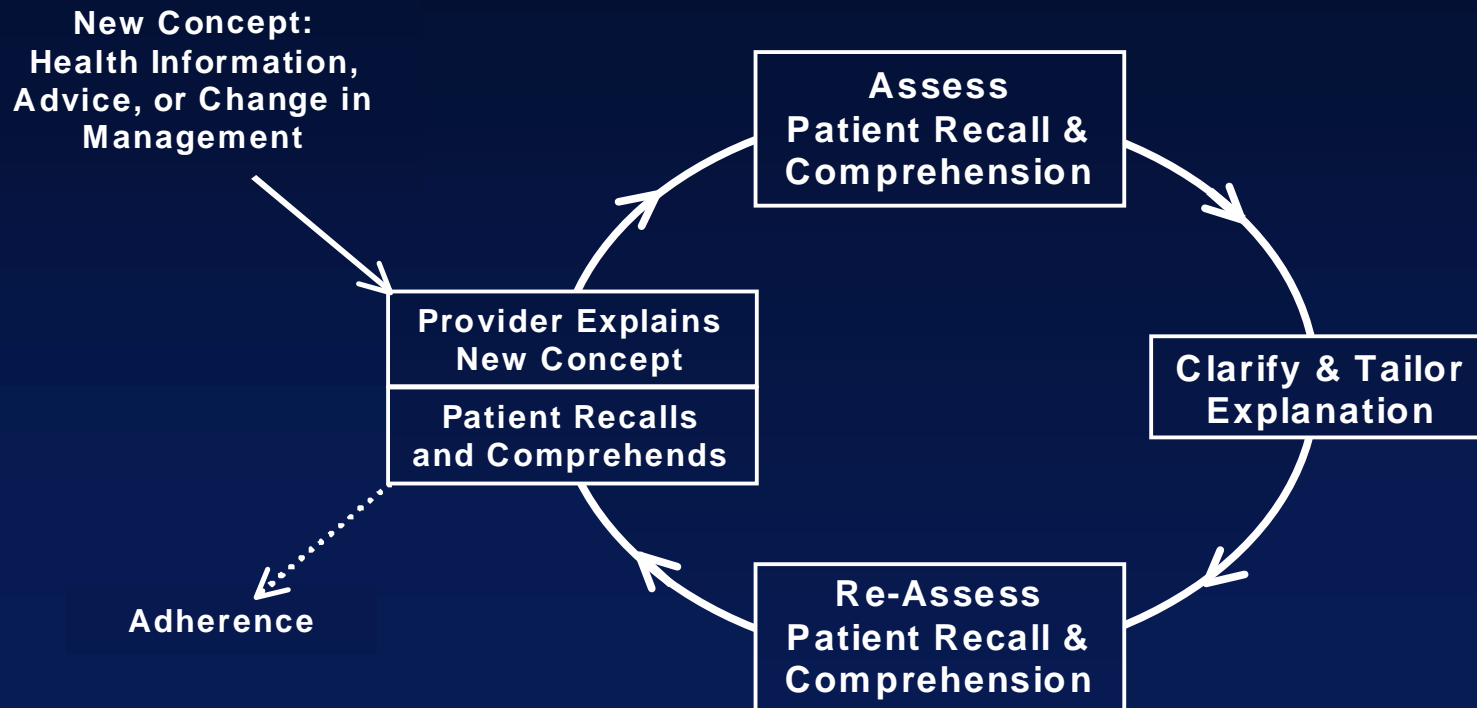


# Literacy, Discordance and Safety

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- Anticoagulant regimen concordance lower for patients with inadequate vs adequate literacy (42 % vs 64 %),
- Anticoagulant discordance associated with being out of therapeutic range:
  - » under-anticoagulation
  - » over-anticoagulation

# Closing the Loop: Interactive Communication to Enhance Recall & Comprehension



- Ensures info understood/integrated into memory; checks for lapses
- Opens dialogue re health beliefs; reinforces and tailors health messages
- Promotes a common understanding; elicits patient participation

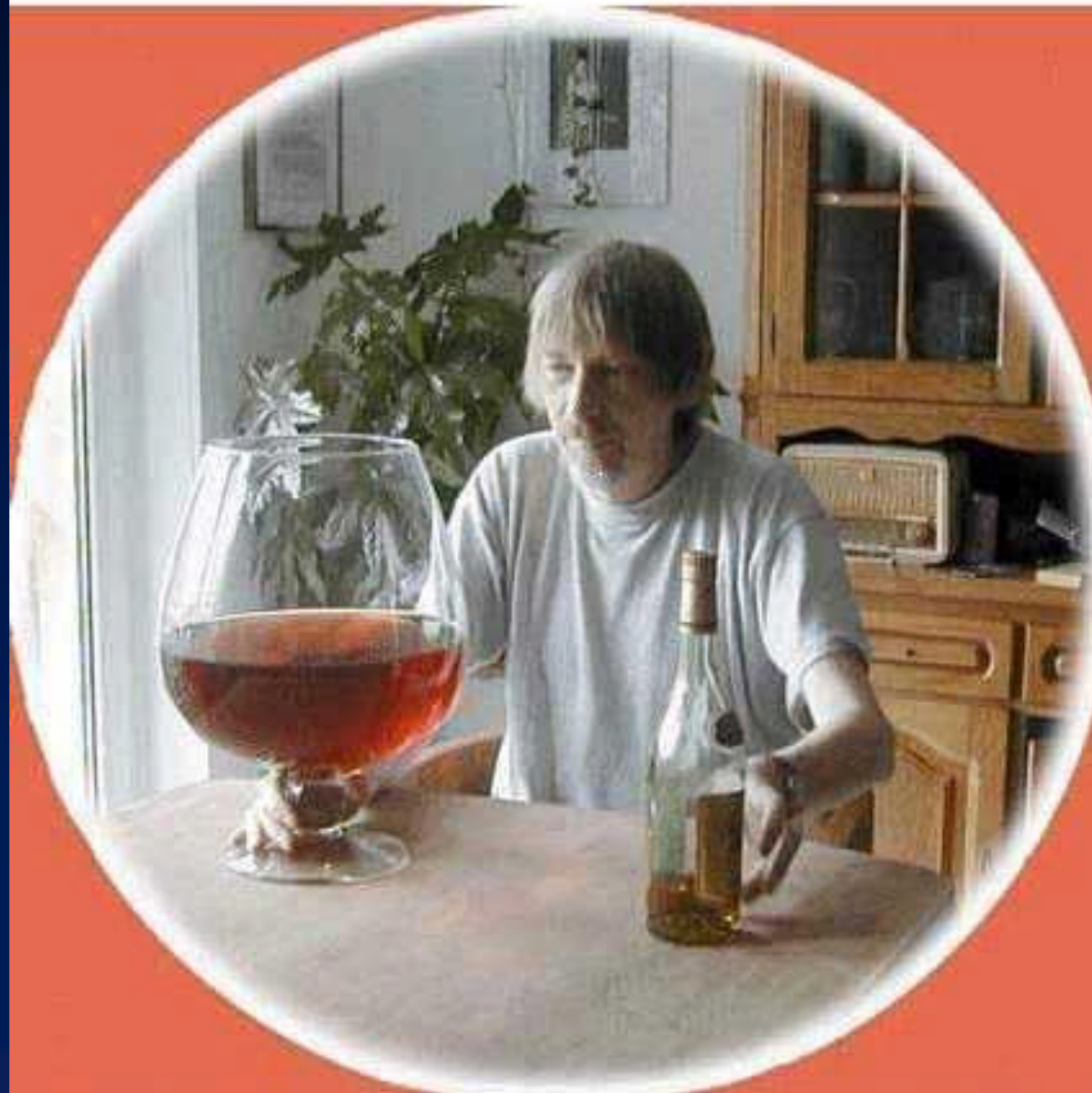
# Closing the Loop

- Physicians assessed recall or comprehension for 15/124 new concepts (12%)
- When new concepts included patient assessment, patient provided incorrect response half the time (7/15=47%)
- Visits using interactive communication loop not longer (20.3 min. vs. 22.1 min)
- Application of loop associated with better HbA1c (AOR 9.0,  $p=.02$ )

# 12 Characteristics of Health System that Contribute to Poor Communication for Patients with Limited Literacy

- “High bar“ communication objectives (mastery of self-care skills, informed/shared decision-making)
- Lack of interactivity
- Lack of time, incentives
- Reliance on “activated patient”/Reactive vs. proactive system
- Unprepared, untrained workforce
- Reliance on physicians, rather than allied health professionals, teams
- Reliance on single modes of communication (written, verbal)
- Provider-population mismatch/deficiency across language, culture
- Highly bureaucratic system
- High concentration of patients in under-resourced safety net
- Undeveloped technology platforms to support communication (pre-visit, visit, post-visit, inter-visit)
- Competing demands of multiple chronic conditions

My Doctor said "Only 1 glass of alcohol a day". I can live with that.



# Literacy and Chronic Disease Care: Conclusions

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- Mechanisms by which limited literacy affect health still unclear, but likely multiple
- Improving literacy levels can achieve public health objectives
- At least 25% of those with chronic disease have literacy skills inadequate to meet the demands of contemporary healthcare
- Communication characteristics of healthcare systems contribute to sub-optimal health care
- Re-structuring health care system (increasing interactivity, expanding communication channels, employing appropriate technology) can improve reach and effectiveness of health care, improving quality, and promoting safety

