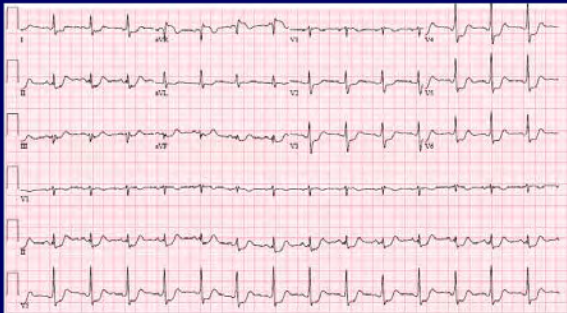


When Should the PCP order a Cardiac Test?

Robin W. Doroshow, MMS, MD, MEd

June 20, 2017



Goals & Objectives



THE LEARNER WILL:

- Identify the case factors, such as pretest probability, that contribute to this decision
- Become aware of local factors that may limit the quality of the test
- Be able to apply EBM to this decision (and to know when there is no evidence)
- See the ordering of the test as part of a strategy

Commonly Ordered Tests



Clinical setting: outpt, non-newborn

- **EKG**
- **Echocardiogram**
- **Chest x-ray**
- **Holter monitor, event detector**
- **Exercise stress test**
- **Cardiac MR**

Common indications for cardiac tests in kids



- Chest pain
- Syncope
- Heart murmur
- Risk of sudden cardiac death
 - Sports participation; ADHD meds
- + Family history
- “Routine,” “Pre-op,” etc.



Questions to ask yourself



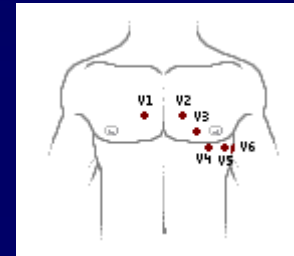
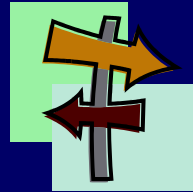
- **What is the purpose?**
 - Looking for specific dx? Ruling out? Screening?
- **What are the alternatives?**
 - no test, different test, consultation
- **Where/who to do the test?**
 - Quality control--operator dependent
 - Peds lab v. general lab
 - Who will interpret it?

EKGs—sources of error



- **Poor technique**

- Incorrect lead placement
- Switcheroo
- Touching leads



- **Artifact**

- Noise
- Movement—e.g., vent, hiccups, butt-pat



Echoes—sources of error



TNTC!

- Especially false negatives
- Important variables
 - Highly operator-dependent
 - Highly equipment-dependent
 - Highly interpreter-dependent
- What are you looking for?

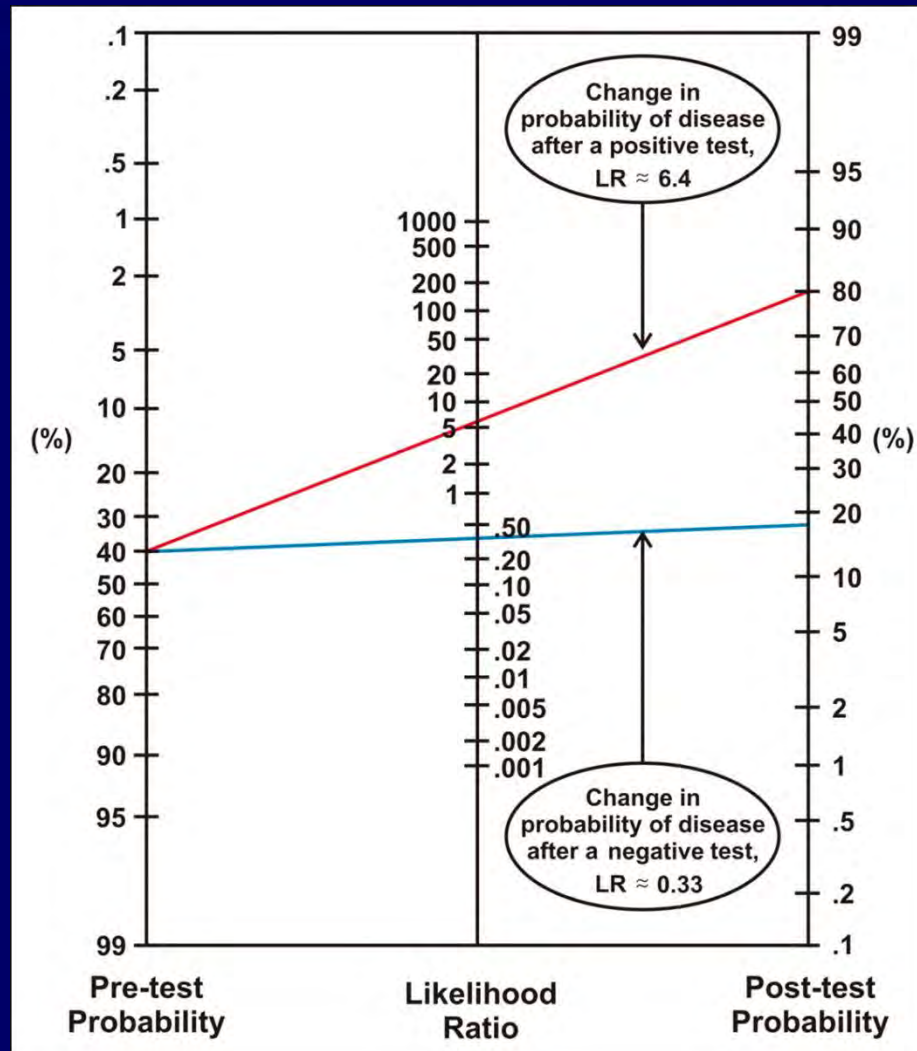


Questions to ask yourself



- **What is the purpose?**
 - Looking for specific dx? Ruling out? Screening?
- **Where to do the test?**
 - Quality control--operator dependent
 - Peds lab v. general lab
 - Who will interpret it?
- **What are the alternatives?**
 - no test, different test, consultation
- **What is the pretest probability? Likelihood ratio? Cost? Accessibility?**

Likelihood Ratio



Questions to ask yourself



- **What will I do with the results?**
 - Explain them?
 - Explain the limitations of the test?
 - Next steps?



% Yield of Echo by Ordering MD



<u>Indication</u>	<u>PCP</u>	<u>PedCard</u>
Murmur	16	32
Palpitations	3	12
Systemic d/o	8	9
Chest pain	5	5
Syncope	5	5

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Heart Murmur as Indication



- **EKG has low sensitivity and specificity**
- **Echo has high sensitivity and specificity but is expensive/resource-heavy**
 - Do you really need it to answer the question?
 - Don't assume the cardiologist would do one.

Murmur Evaluations— consult v. echo



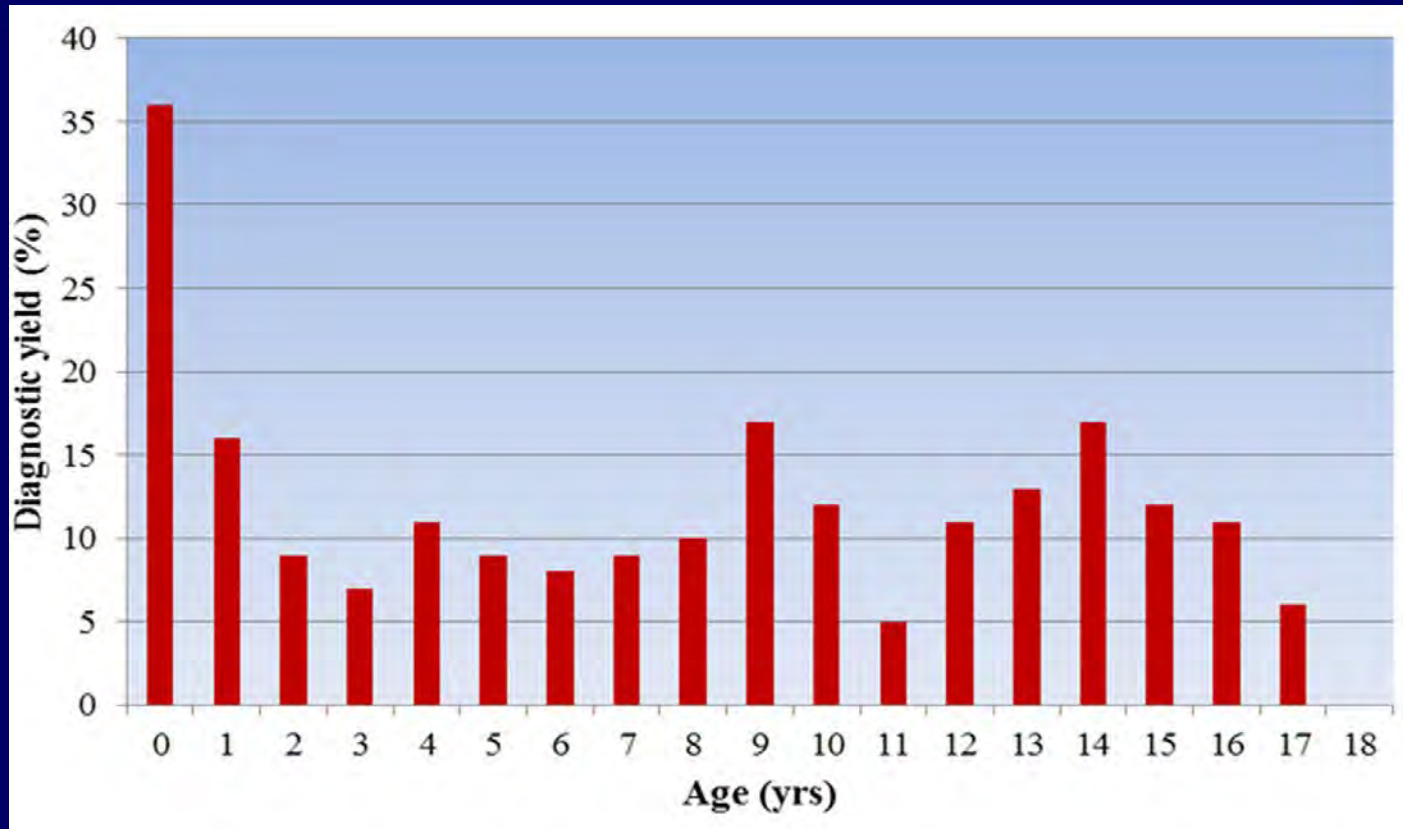
	Referral Group, %	Echocardiography Group, %
Age		
<2 mo	15	15
2-3 mo	14	3
4-12 mo	13	8
13-36 mo	20	7
3-6 y	24	24
≥7 y	14	41
Male/female	56/44	61/39
Asymptomatic	87	...
Had echocardiogram	40	100
Innocent	63	77
Trivial	24	15
Significant	13	8

Danford 1993 Results



- “Echocardiography-first strategy costs were \$257/pt greater than referral-strategy costs.”
- To even it out, hypothetically:
 - Echo cheap (but still as accurate)
 - Consult expensive
 - Cardiologists not selective in ordering echoes

Echo Yield for Murmurs



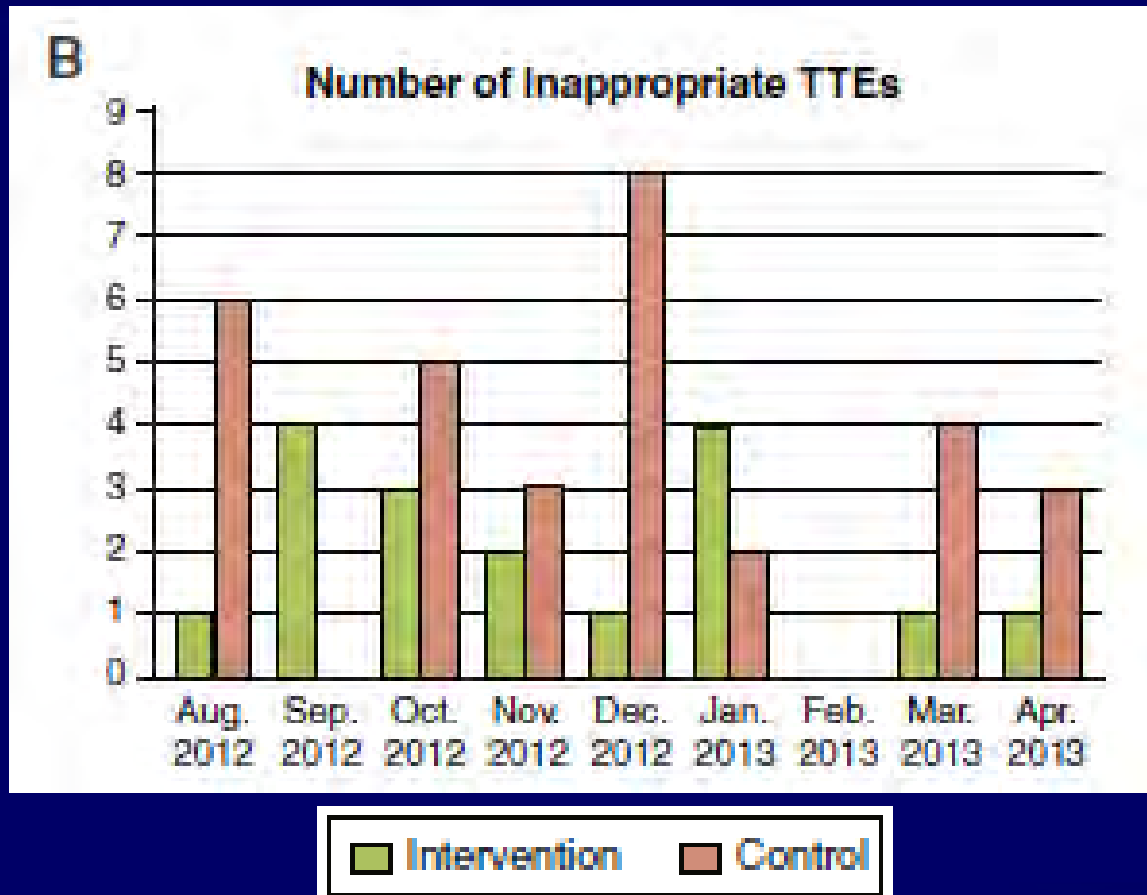
Appropriate Use Criteria



- **Echocardiogram for Murmur**
 - Presumptively innocent murmur, asx, rest of PE normal, FH unremarkable: RARE
 - Presumptively innocent murmur with s/s of heart dz: APPROPRIATE
 - Pathologic murmur: APPROPRIATE

ACC/AAP/AHA/ASE...
Campbell, JACC 2014

Effect of Teaching Appropriate Use Criteria



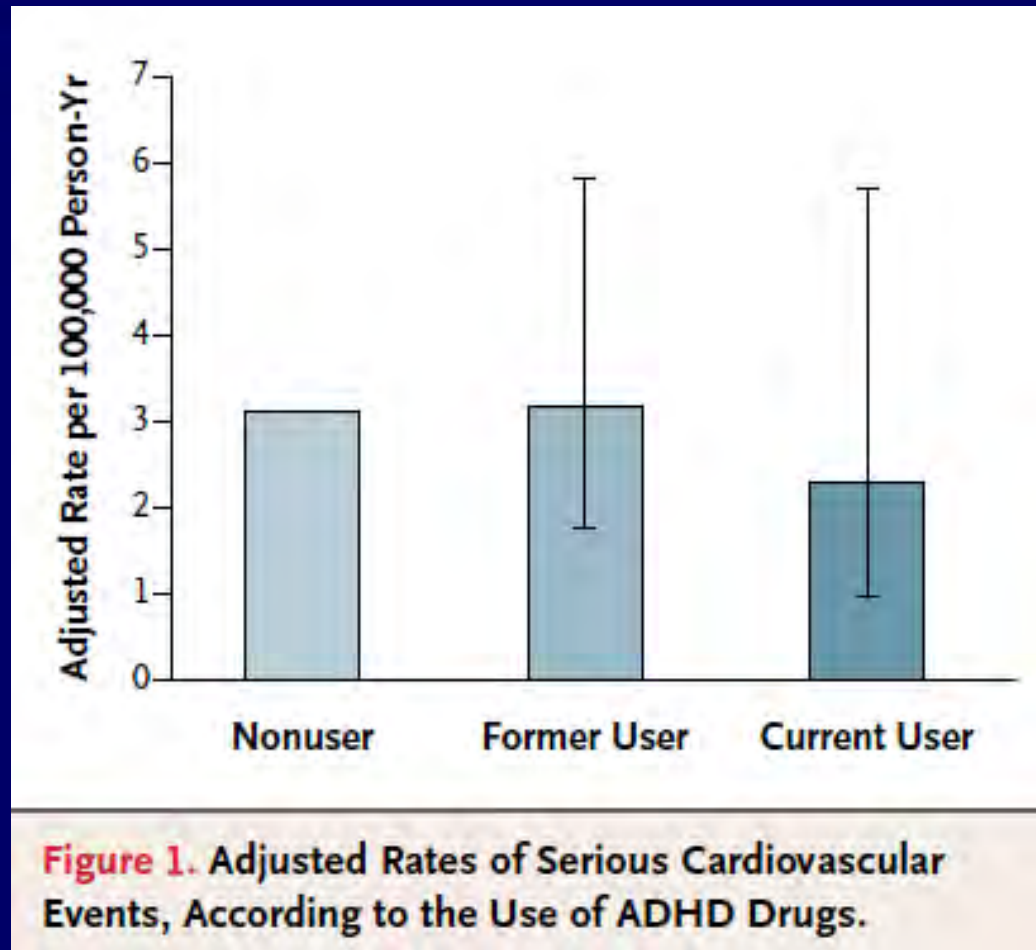
dribbleglass.com



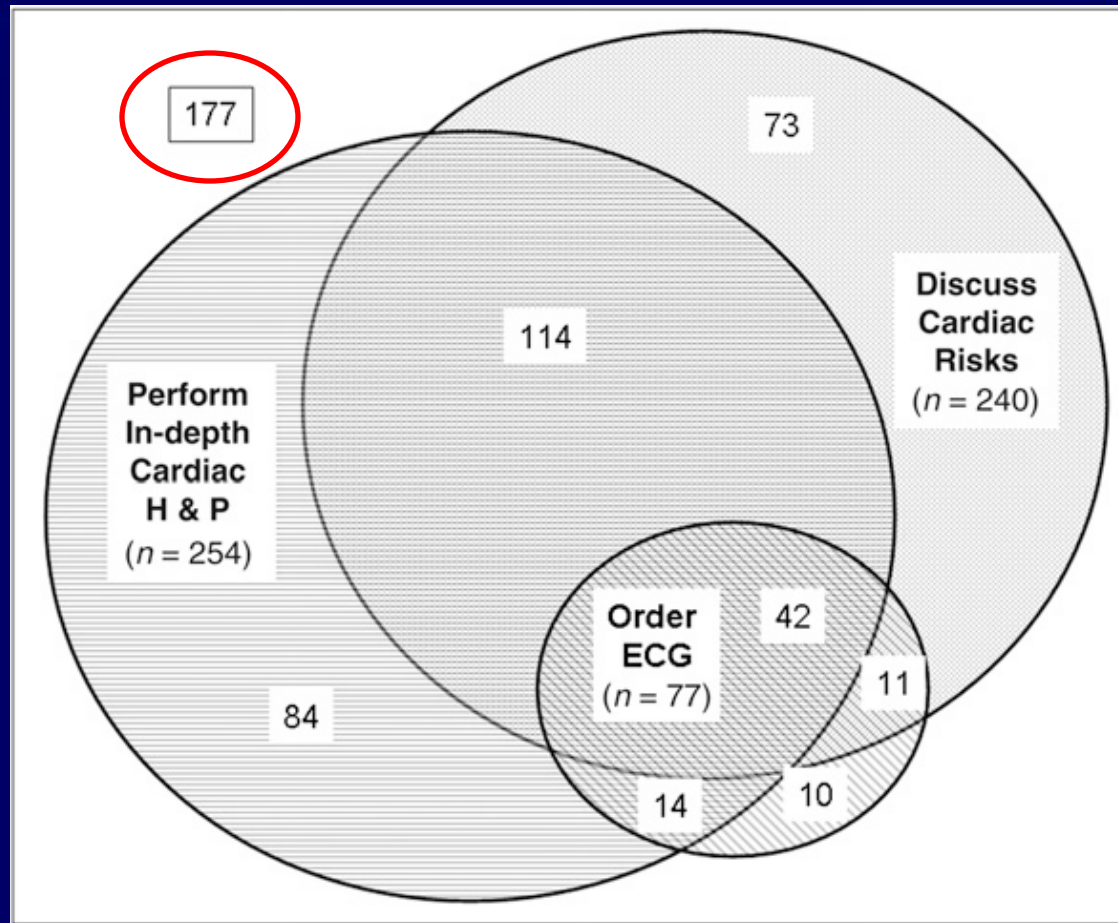
*So much easier
than parenting.*

RITALIN

Cardiac Events and ADHD Rx



Screening practices in ADHD Pts: most recent patient seen



“High School Star Dies Soon After Hitting Winning Shot”



THE ASSOCIATED PRESS

MARCH 4, 2011

Screening for SCDY



Special Report

Screening for Sudden Cardiac Death in the Young Report From a National Heart, Lung, and Blood Institute Working Group

Jonathan R. Kaltman, MD; Paul D. Thompson, MD; John Lantos, MD; Charles I. Berul, MD;
Jeffrey Botkin, MD, MPH; Joshua T. Cohen, PhD; Nancy R. Cook, ScD;
Domenico Corrado, MD, PhD; Jonathan Drezner, MD; Kevin D. Frick, PhD; Stuart Goldman, MD;
Mark Hlatky, MD; Prince J. Kannankeril, MD; Laurel Leslie, MD, MPH; Silvia Priori, MD, PhD;
J. Philip Saul, MD; Carrie K. Shapiro-Mendoza, PhD, MPH; David Siscovick, MD, MPH;
Victoria L. Vetter, MD; Robin Boineau, MD; Kristin M. Burns, MD; Richard A. Friedman, MD

“The broad ethical challenge is to balance the potential benefits and risks of preventing SCD in an environment in which there is uncertainty about its causes, measures to evaluate risk, and the effectiveness of interventions to reduce risk.”

Pre-participation Screening AHA recommendations



- **Personal history**
 - Exertional chest pain
 - Unexplained syncope
 - Excessive fatigue
 - History of murmur
 - History of HTN
- **Family history**
 - Premature death
 - Cardiac disability <50y
 - Syndromes (~LQTS)
- **Physical exam**
 - Murmur
 - Femoral pulses
 - Marfan stigmata
 - BP
- **EKG???**
 - Only if above is positive!**

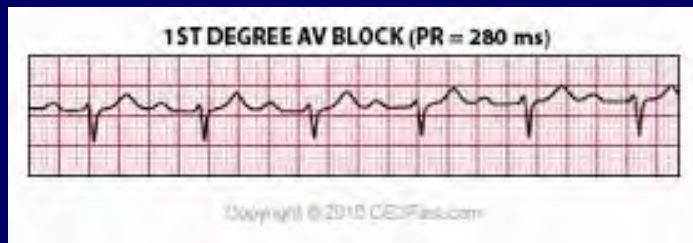
Maron, *Circulation* 2007

Good Ideas for Cardiac Tests

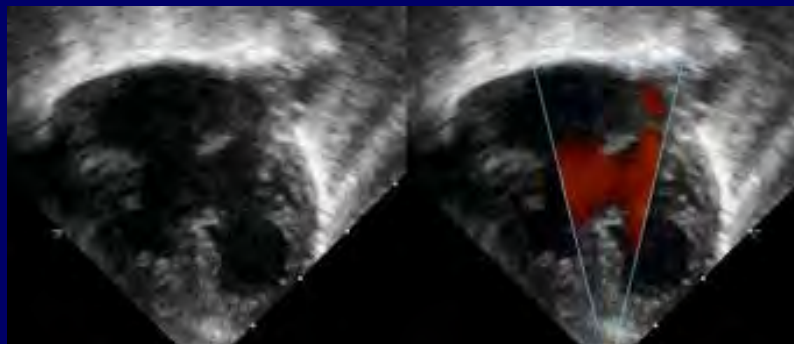


Examples:

- EKG in infant whose mother has lupus



- Echocardiogram in baby with Down syndrome



Bad Ideas for Cardiac Tests



- EKG in ADHD patient with CV evaluation and FH both negative



- Repeat EKG in ADHD patient with CV evaluation and FH both negative for Rx change
- Echocardiogram for recurrent chest pain at rest



When you DO order the test...



Ask yourself

- What is the purpose?
- What are the alternatives?
- Where/who to do the test?
- Who will interpret it?
- What will I do with the results?

References



rdorosho@childrensnational.org (no W!)

Subject line: “References from CNHN 2017”