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The importance of teamwork in the diagnostic process: What's the evidence?

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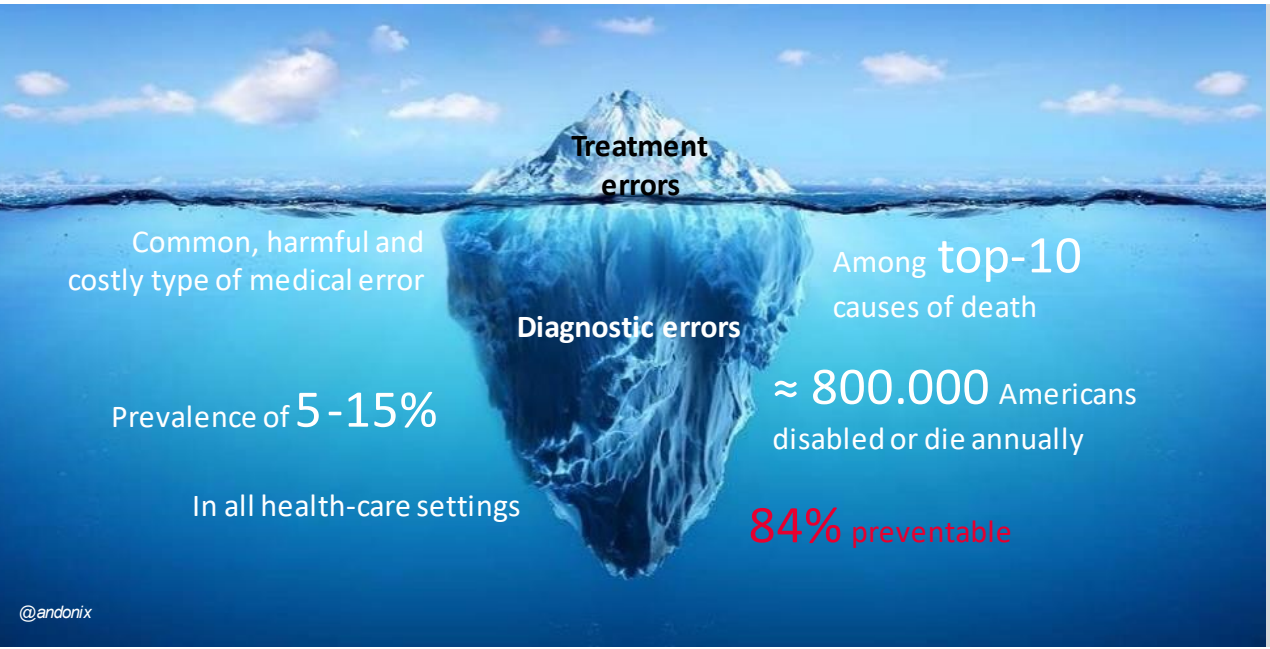
September 19, 2024

Diagnostic quality



Diagnostic errors

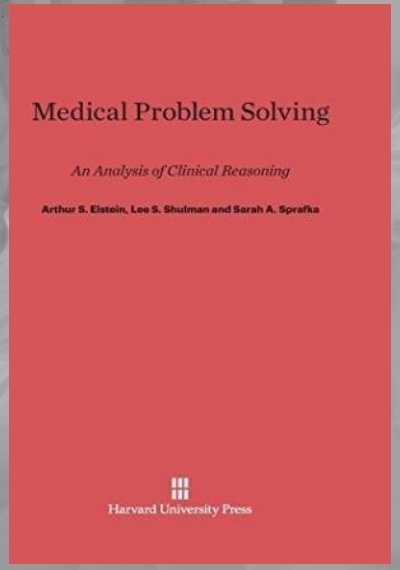
- Missed, delayed or wrong diagnoses
- Threat to patient safety and serious societal burden
- Blind spot in health care until recently
- Few interventions

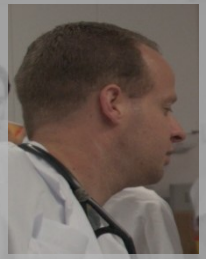
National Academy of Medicine, 2015

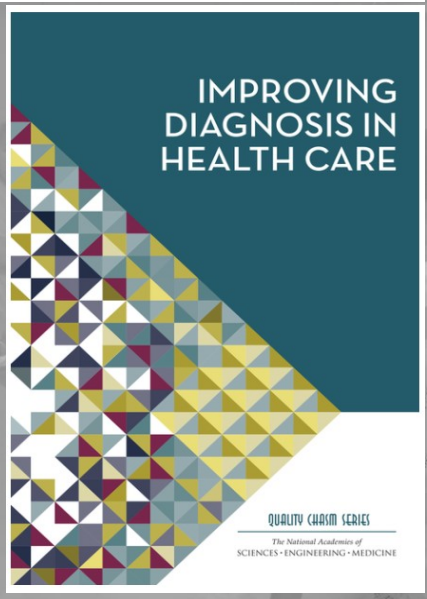
The American Journal of Medicine
Volume 121, Issue 5, Supplement, May 2008, Pages S2–S23
Diagnostic Error: Is Overconfidence the Problem

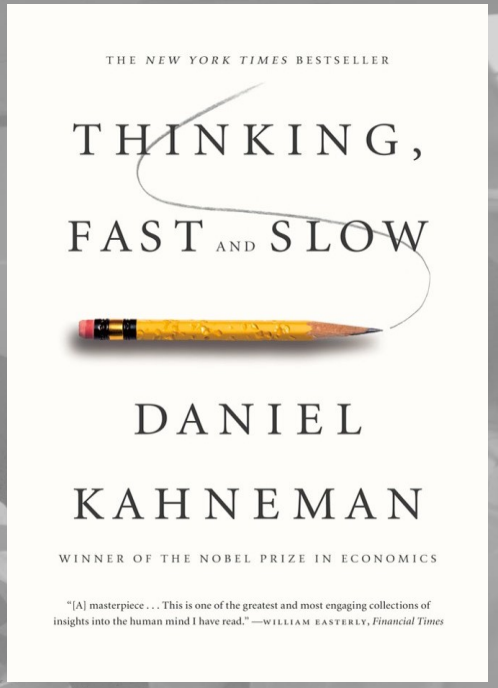
Overconfidence as a Cause of Diagnostic Error in Medicine

Eta S. Berner, EdD[a], Mark L. Graber, MD[b]



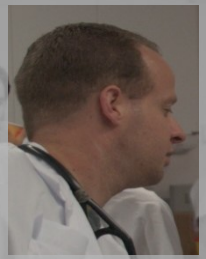


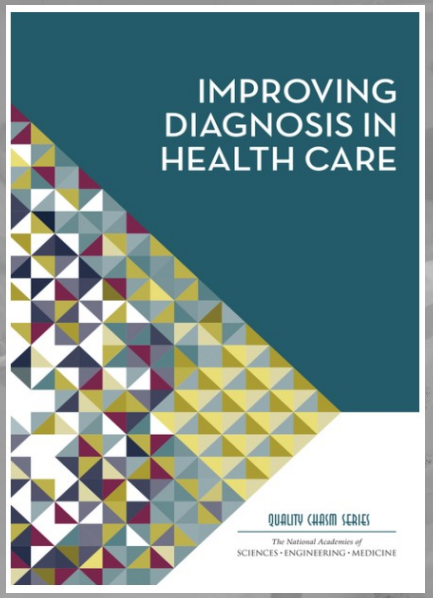




Diagnostic error and clinical reasoning

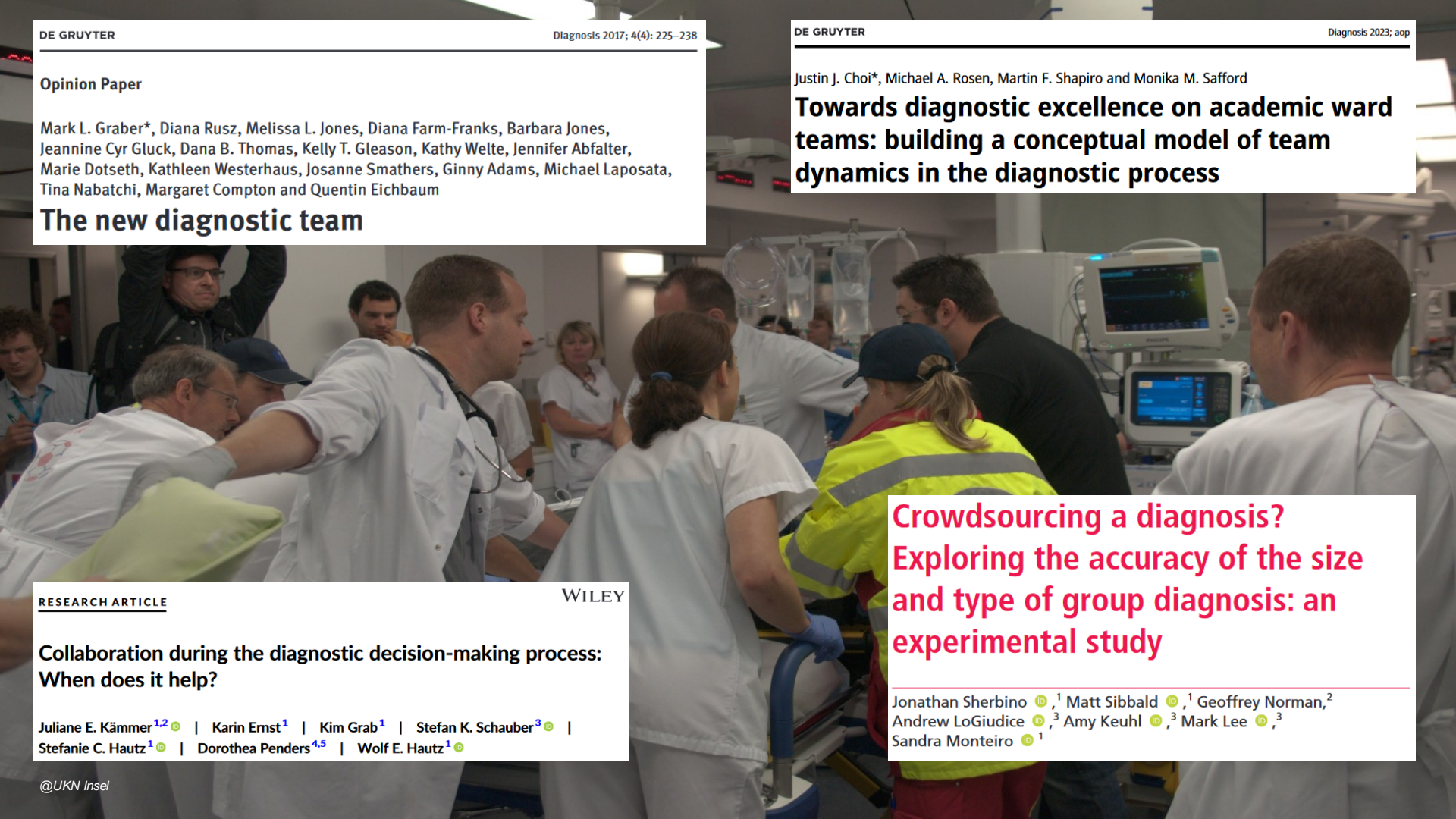
Geoffrey R Norman & Kevin W Eva





"… arriving at accurate and timely diagnoses—even those made by an individual clinician working with a single patient—involves teamwork."

National Academy of Medicine, 2015



DE GRUYTER Diagnosis 2017; 4(4): 225–238

Opinion Paper

Mark L. Graber*, Diana Rusz, Melissa L. Jones, Diana Farm-Franks, Barbara Jones, Jeannine Cyr Gluck, Dana B. Thomas, Kelly T. Gleason, Kathy Welte, Jennifer Abfalter, Marie Dotseth, Kathleen Westerhaus, Josanne Smathers, Ginny Adams, Michael Laposata, Tina Nabatchi, Margaret Compton and Quentin Eichbaum

The new diagnostic team

DE GRUYTER Diagnosis 2023; aop

Justin J. Choi*, Michael A. Rosen, Martin F. Shapiro and Monika M. Safford

Towards diagnostic excellence on academic ward teams: building a conceptual model of team dynamics in the diagnostic process

RESEARCH ARTICLE WILEY

Collaboration during the diagnostic decision-making process: When does it help?

Juliane E. Kämmer[1,2] | Karin Ernst[1] | Kim Grab[1] | Stefan K. Schauber[3] | Stefanie C. Hautz[1] | Dorothea Penders[4,5] | Wolf E. Hautz[1]

Crowdsourcing a diagnosis? Exploring the accuracy of the size and type of group diagnosis: an experimental study

Jonathan Sherbino,[1] Matt Sibbald,[1] Geoffrey Norman,[2] Andrew LoGiudice,[3] Amy Keuhl,[3] Mark Lee,[3] Sandra Monteiro[1]

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BOX S-1
Goals for Improving Diagnosis and Reducing Diagnostic Error

- Facilitate more effective teamwork in the diagnostic process among health care professionals, patients, and their families
- Enhance health care professional education and training in the diagnostic process
- Ensure that health information technologies support patients and health care professionals in the diagnostic process
- Develop and deploy approaches to identify, learn from, and reduce diagnostic errors and near misses in clinical practice
- Establish a work system and culture that supports the diagnostic process and improvements in diagnostic performance
- Develop a reporting environment and medical liability system that facilitates improved diagnosis by learning from diagnostic errors and near misses
- Design a payment and care delivery environment that supports the diagnostic process
- Provide dedicated funding for research on the diagnostic process and diagnostic errors

National Academy of Medicine, 2015

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The diagnostic setting

Teams …

@UKN


@Unispital-Basel


@Tumorzentrum-Aarau

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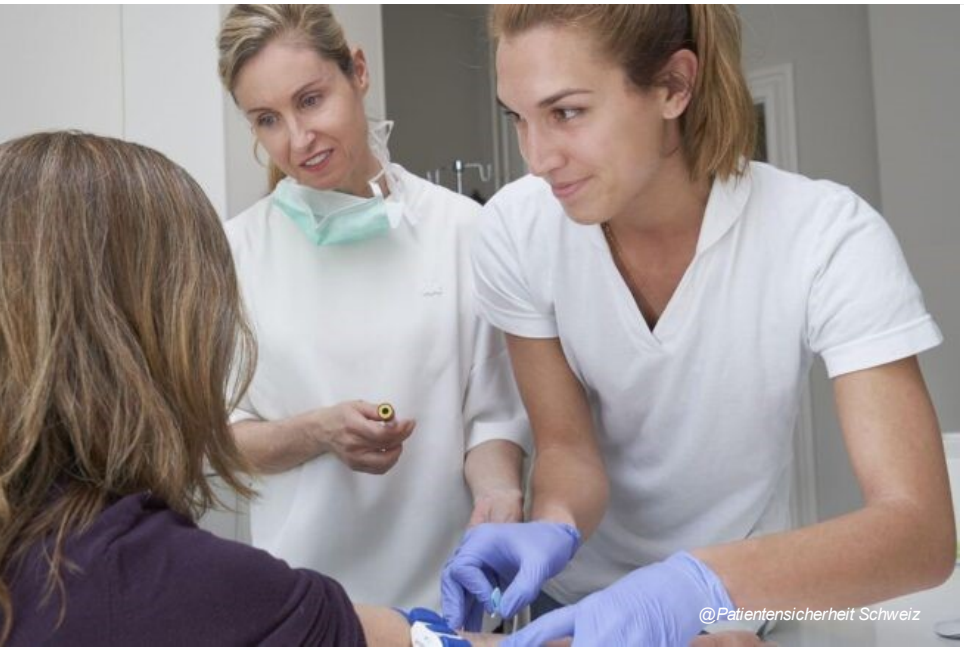
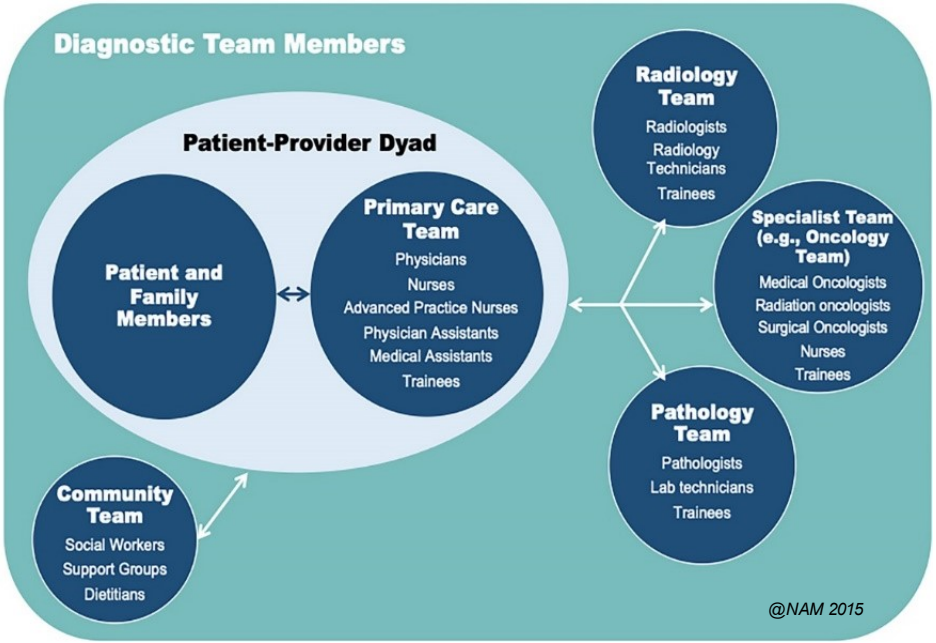
The diagnostic setting

Teams of teams in diagnosis





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What do we know about teamwork?

Benefits of teamwork

+ Larger knowledge base
+ Split tasks
+ Feedback
+ Social support
+ Better acceptance of decisions

Tschan et al.: Small Group Res 2009;40:271-300 // Kaba et al: Med Educ 2016; 50:400-8 // Hautz et al.: Med Educ 2017 51:229

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What do we know about teamwork?

… and pitfalls

- Common knowledge effect
- Group cohesion and confirmation bias
- Conflicts
- Social loafing
- Diffusion of responsibility
- Effort for coordination

Tschan et al.: Small Group Res 2009;40:271-300 // Kaba et al: Med Educ 2016; 50:400-8 // Hautz et al.: Med Educ 2017 51:229

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Teamwork in diagnosis

Summary (I)

- Key role of diagnostic quality
- Shared patient care and team-based diagnosis common
- Potential benefits and pitfalls of teamwork

➢ What are the benefits of teamwork during the diagnostic process?

➢ What distinguishes "good" from "bad" teams?

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Benefits of team-based diagnosis

Not all teams are the same.

- ad hoc / stable teams
- synchronous / asynchronous
- shared / different information
- same / different professions
- with / without personal interaction
- same / different expertise, status, …
- primarily (non-) educational
- …
- even shared / different goals

➢ What are the benefits of teamwork during the diagnostic process?

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Benefits of team-based diagnosis

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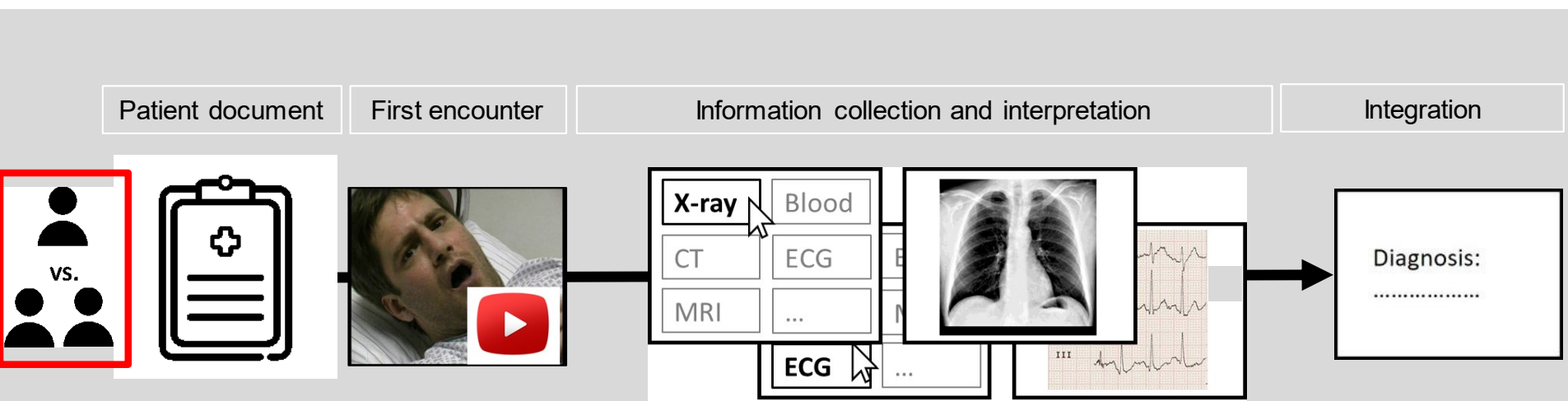
Benefits of team-based diagnosis

Empirical evidence (I)



Hautz et al. JAMA. 2015;313(3):303-304 // Kunina-Habenicht et al.: Adv Health Sci Educ Theory Pract. 2015; 20(5):1205-24 // see also Kämmer et al. J Behav Decis Mak. 2024;(37):e2357 // Sherbino et al. BMJ Qual Saf. 2024;bmjqs-2023-016695

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Benefits of team-based diagnosis

Empirical evidence (II)

Table. Accuracy, Background Knowledge, Information Search Measures, and Confidence of Medical Students, Across Cases[a]

	Mean (95% CI)		Test Statistics				
	Individuals	Pairs	*t* Score[b]	*d* Value	*F* Score[b]	η_p^2	*P* Value
Accuracy							
No. of correct cases, mean (median) [IQR]	3.00 (3) [2-4]	4.07 (4) [3-5]	$t_{56} = -2.98$	0.78			.004
Percentage	50.00 (40.53 to 59.47)	67.78 (59.95 to 75.60)					
Background knowledge measured by No. of correct items out of 25, %	75.15 (70.19 to 80.12)	73.26 (69.98 to 76.55)	$t_{86} = 0.65$	0.14			.52
Information Search Measures							
Tests selected							
No.	15.41 (14.57 to 16.24)	15.02 (14.21 to 15.82)			$F_{1,5} = 1.36$[c]	0.21	.30
Relevance[d]	59.83 (58.41 to 61.25)	62.26 (60.89 to 63.63)			$F_{1,5} = 16.74$[c]	0.77	.01
When correct	61.11 (57.93 to 64.29)	61.71 (58.53 to 64.89)			$F_{1,50} = 0.86$[e]	0.02	.36
When incorrect	59.54 (56.75 to 62.32)	64.95 (62.16 to 67.73)			$F_{1,50} = 7.23$[f]	0.13	.01
Time, min:sec							
To diagnosis	2:25 (2:07 to 2:42)	4:27 (4:10 to 4:44)			$F_{1,5} = 44.07$[c]	0.90	.001
For tests in reality	37:26 (33:14 to 41:38)	31:11 (27:08 to 35:14)			$F_{1,5} = 8.42$[c]	0.63	.03

Hautz et al. JAMA. 2015;313(3):303-304

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Benefits of team-based diagnosis

Summary

- Interacting with a *colleague* (or two) outperforms individual decision making
  - Activation of knowledge, deliberate reflection, error detection
- No further benefits with larger interacting teams (Sherbino et al., 2024)

→ Dedicated team phases to improve diagnostic quality?

➢ What distinguishes "good" from "bad" teams?

“Good“ vs. “bad“ teams

- ad hoc / stable teams
- synchronous / asynchronous
- shared / different information
- same / different professions
- with / without personal interaction
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- even shared / different goals

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“Good“ vs. “bad“ teams

Effective communication

Diagnosis = ambiguous situation

- Task requirements:
  - Data collection, interpretation, integration, hypotheses generation
  - Information and knowledge sharing in team

→ Talking to the room, participative leadership, joint deliberation

→ Psychological safety, speak up

Tschan et al: Small Group Res 2009;40:271-300

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“Good“ vs. “bad“ teams

Effective communication

Action teams (e.g., resuscitation)

- Task requirements:
  - Coordinated and rapid changes between different activities
  - Coordinate roles

→ Directive leadership and clear task distribution beneficial

→ Closed-loop communication

Ford et al: WestJEM 2016;17:549-56 // Härgestam et al: BMJ Open 2016;6:e009911 // Tschan et al: Hum Perf 2006;19:277-304

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“Good“ vs. “bad“ teams

Summary

- Effective communication contingent on the task, expertise, task phase, …
- Coordination of *action* → directive leadership, closed-loop communication

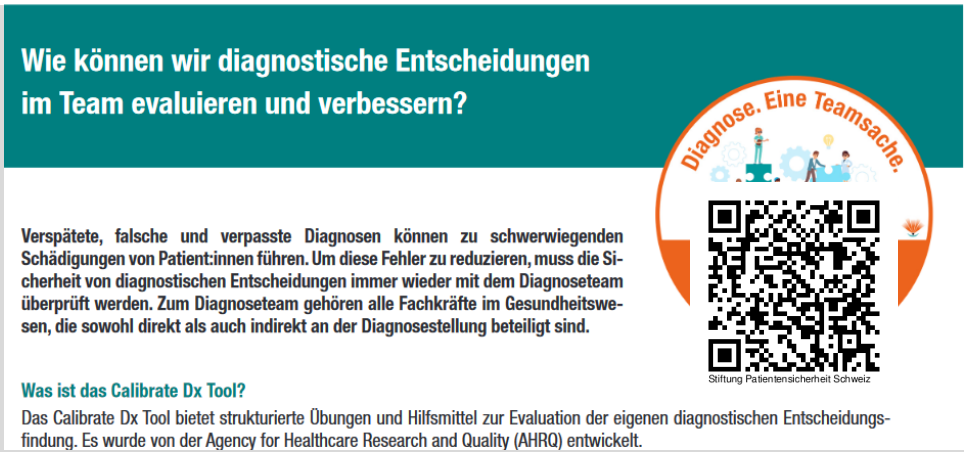
→ Need to train different situations in safe environment

→ Coordination of *thought* → participative leadership, talking to the room, joint deliberation

Teamwork in diagnosis

Summary (II)

- Diagnostic quality is key to patient safety, diagnosis is a team-based activity
- Implications for
  - **research**: develop team-based, system-level support
  - **practice**: consult colleagues
  - **training**: train adaptive communication, interprofessional education, learn from errors



More about diagnostic quality: https://dxq.ch/; https://www.improvediagnosis.org/; https://www.humandx.org/

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Teamwork in diagnosis

Your team was not in here?

- ad hoc / stable teams
- synchronous / asynchronous
- shared / different information
- same / different professions
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- same / different expertise, status, …
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→ Please share your thoughts, questions and experiences with different diagnostic team settings with us!

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References (I)

Committee on Diagnostic Error in Health Care, Board on Health Care Services, Institute of Medicine, & The National Academies of Sciences, Engineering, and Medicine. (2015). *Improving diagnosis in health care* (E. P. Balogh, B. T. Miller, & J. R. Ball, Eds.). National Academies Press. https://doi.org/10.17226/21794

Ford, K., Menchine, M., Burner, E., Arora, S., Inaba, K., Demetriades, D., & Yersin, B. (2016). Leadership and Teamwork in Trauma and Resuscitation. *Western Journal of Emergency Medicine*, *5*, 8.

Härgestam, M., Lindkvist, M., Jacobsson, M., Brulin, C., & Hultin, M. (2016). Trauma teams and time to early management during in situ trauma team training. *BMJ Open*, *6*(1), e009911. https://doi.org/10.1136/bmjopen-2015-009911

Hautz, W. E., Kämmer, J. E., Exadaktylos, A., & Hautz, S. C. (2017). How thinking about groups is different from groupthink. *Medical Education*, *51*(2), 229–229. https://doi.org/10.1111/medu.13137

Hautz, W. E., Kämmer, J. E., Schauber, S. K., Spies, C. D., & Gaissmaier, W. (2015). Diagnostic performance by medical students working individually or in teams. *JAMA*, *313*(3), 303–304. https://doi.org/10.1001/jama.2014.15770

Kaba, A., Wishart, I., Fraser, K., Coderre, S., & McLaughlin, K. (2016). Are we at risk of groupthink in our approach to teamwork interventions in health care? *Medical Education*, *50*(4), 400–408. https://doi.org/10.1111/medu.12943

Kämmer, J. E., Ernst, K., Grab, K., Schauber, S. K., Hautz, S. C., Penders, D., & Hautz, W. E. (2024). Collaboration during the diagnostic decision-making process: When does it help? *Journal of Behavioral Decision Making*, *37*, e2357. https://doi.org/10.1002/bdm.2357

Kunina-Habenicht, O., Hautz, W. E., Knigge, M., Spies, C., & Ahlers, O. (2015). Assessing clinical reasoning (ASCLIRE): Instrument development and validation. *Advances in Health Sciences Education*, *20*(5), 1205–1224. https://doi.org/10.1007/s10459-015-9596-y

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References (II)

Sherbino, J., Sibbald, M., Norman, G., LoGiudice, A., Keuhl, A., Lee, M., & Monteiro, S. (2024). Crowdsourcing a diagnosis? Exploring the accuracy of the size and type of group diagnosis: an experimental study. *BMJ Quality & Safety*, bmjqs-2023-016695. https://doi.org/10.1136/bmjqs-2023-016695

Tschan, F., Semmer, N. K., Gautschi, D., Hunziker, P., Spychiger, M., & Marsch, S. U. (2006). Leading to recovery: Group performance and coordinative activities in medical emergency driven groups. *Human Performance*, *19*(3), 277–304. https://doi.org/10.1207/s15327043hup1903_5

Tschan, F., Semmer, N. K., Gurtner, A., Bizzari, L., Spychiger, M., Breuer, M., & Marsch, S. U. (2009). Explicit Reasoning, Confirmation Bias, and Illusory Transactive Memory: A Simulation Study of Group Medical Decision Making. *Small Group Research*, *40*(3), 271–300. https://doi.org/10.1177/1046496409332928

Tschan, F., Semmer, N. K., Hunziker, S., & Marsch, S. (2011). Decisive action vs. Joint deliberation: Different medical tasks imply different coordination requirements. *Advances in Human Factors and Ergonomics in Healthcare*, *211*, 191–200.