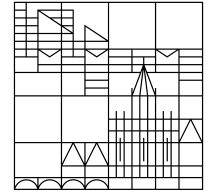


I am dying from the treatment
of too many physicians.

Alexander the Great

Universität
Konstanz



Diagnostic performance by medical students working individually or in teams

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, 303-304. doi:10.1001/jama.2014.15770

Wolfgang Gaissmaier, PhD

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Social Psychology and Decision Sciences

Diagnostic Errors in Medicine

**Rate of diagnostic error is estimated to be about 15%
(Elstein, 1995)**

**Cognitive errors contribute to 74% of these errors
(Graber, Franklin, & Gordon, 2005)**

Faulty knowledge

Faulty data gathering

Faulty synthesis

⇒ **Can teamwork reduce diagnostic errors?**

⇒ **How does teamwork change the diagnostic process?**

Method

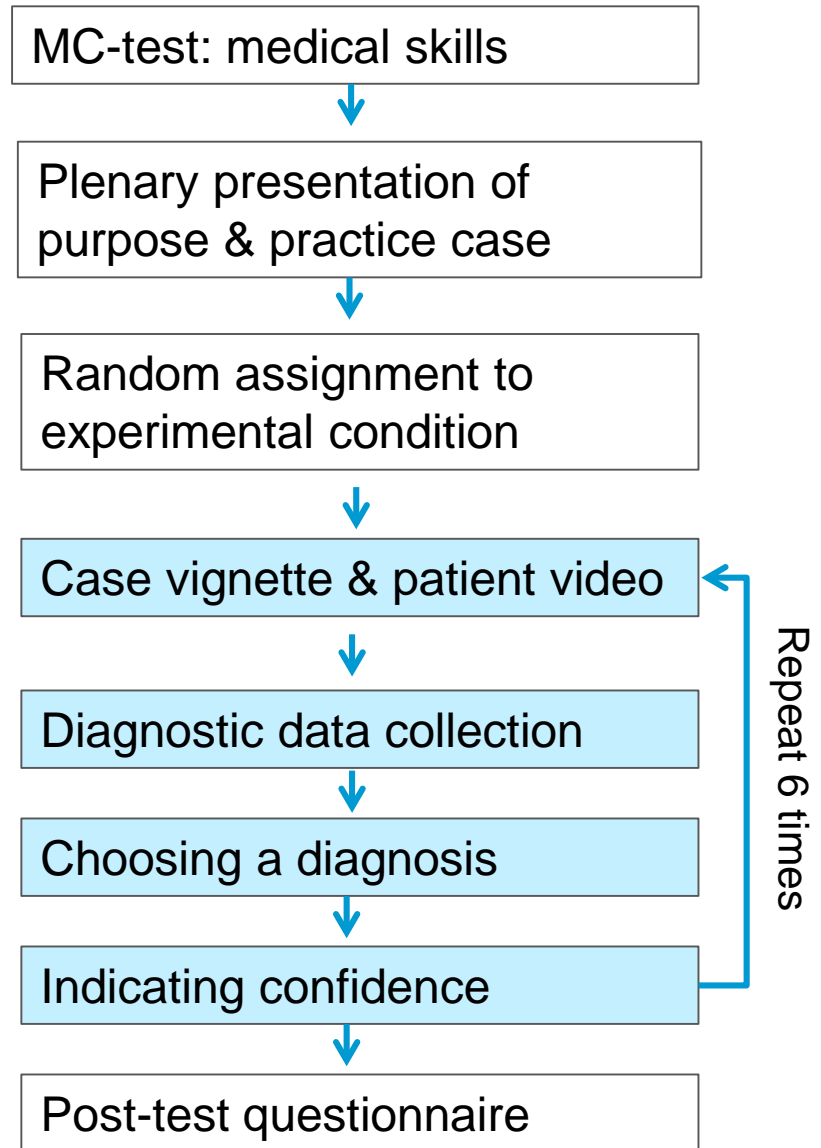
Experimental task:
Diagnose six patients with respiratory problems

Experimental conditions:

- alone (n=28 individuals)
- in dyads (n = 30 dyads)

N = 88 medical students (4th semester)

flat- fee of €25



Case vignette & patient video



Diagnostic data collection



Choosing a diagnosis



Indicating confidence



Video of patient with respiratory problems

PRIMÄRE DIAGNOSTIK
IM ZIMMER

WEITERFÜHRENDE
DIAGNOSTIK

PATIENTENGESPRÄCH

AKTE EINSEHEN

KURVE EINSEHEN

ERSTMAßNAHMEN

>WEITERFÜHRENDE DIAGNOSTIK

RÖNTGEN THORAX

ARTERIELLE BGA

SONOGRAPHIE DES
THORAX

TRANSTHORAKALES
HERZECHO

CT-THORAX OHNE
KONTRASTMITTEL

CT-THORAX MIT
KONTRASTMITTEL

DIAGNOSE

The screenshot displays a medical software interface for a preoperative visit. The top section shows an ECG with three leads (I, II, III) and their corresponding chest leads (AUR, AUL, AUF). The heart rate is indicated as HF 131/min. The right side of the interface contains a checklist for the preoperative visit, including fields for patient status, date, and various clinical parameters. The bottom section shows a 'Stations-Checkliste' (Station Checklist) with handwritten notes and a signature.

Präoperative Visite / Konsil
Kliniken für Anästhesiologie und operative Intensivmedizin der Charité Universitätsmedizin Berlin

HF 131/min

Stations-Checkliste

Vorlag	Freigegeben	Fehlende Befunde	Blutentfernung
11. Plan	<input type="checkbox"/>	<input checked="" type="checkbox"/> Blutgruppe	<input checked="" type="checkbox"/> FFP
11. Plan	<input type="checkbox"/>	<input type="checkbox"/> EKG	<input type="checkbox"/> in den OP
11. Plan	<input type="checkbox"/>	<input type="checkbox"/> Rb-Thorax	
11. Plan	<input type="checkbox"/>	<input type="checkbox"/> Abt. Asten	
11. Plan	<input type="checkbox"/>	<input type="checkbox"/> Labor	
11. Plan	<input type="checkbox"/>	<input type="checkbox"/> Sonogramm	
11. Plan	<input type="checkbox"/>	<input type="checkbox"/> Nahrung bis 6h vor OP	<input type="checkbox"/> Keine Flüssigkeit bis 2h vor OP
11. Plan	<input type="checkbox"/>	<input type="checkbox"/> Anamnese (Kartex) + Unterschrift	<input type="checkbox"/> Patient in den OP

Case vignette & patient video



Diagnostic data collection



Choosing a diagnosis



Indicating confidence

Bitte stellen Sie Ihre Diagnose! Wählen Sie genau eine Option aus der folgenden Liste.

Diagnoseoptionen

akut exazerbierte COPD
Anaphylaxie
Aortenaneurysma
apoplektischer Insult
Aspiration
AV-Block III°
Endokarditis
Herzinfarkt
hypertensives Lungenödem
hypoglykämischer Schock
intracerebrale Blutung
Lungenarterienembolie
Opiatüberdosierung
paroxysmale supraventrikuläre Tachykardie
Pneumonie
Pneumothorax
Subarachnoidalblutung
Tachyarrhythmia absoluta bei Vorhofflimmern
ventrikuläre Tachykardie, instabil
ventrikuläre Tachykardie, stabil

Weiter

Dependent Variables

Number of correct diagnoses (max. 6)

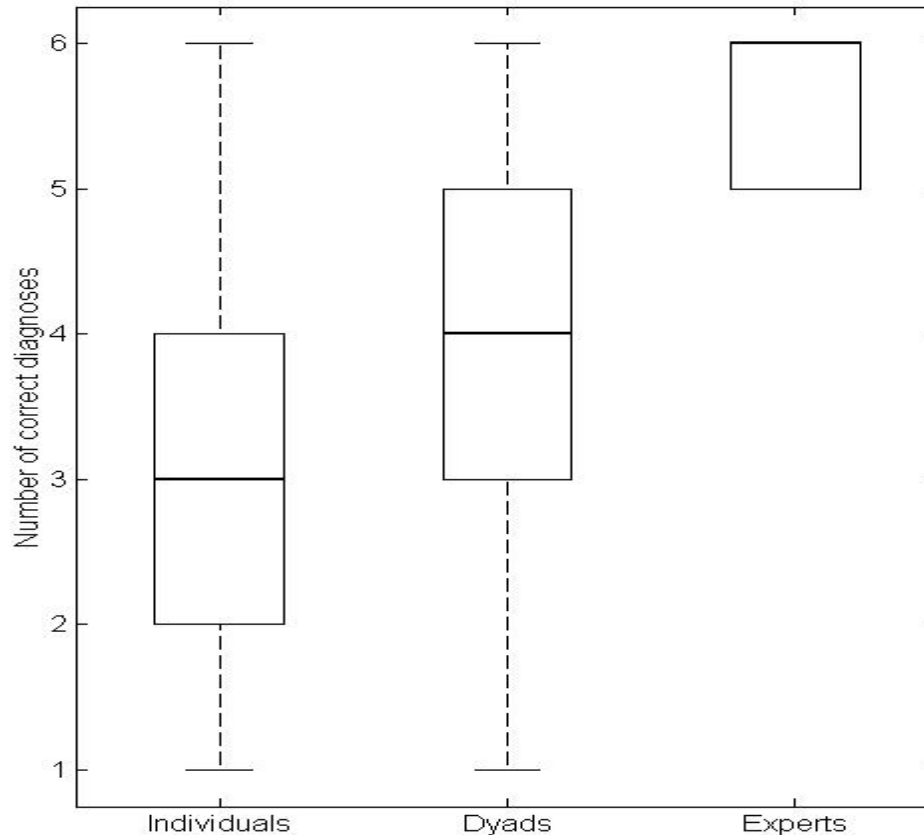
Measures of information search:

- Number of acquired diagnostic tests (max. 30)
- Relevance of acquired diagnostic tests (based on validation study with 20 experts)
- Duration of diagnoses in experiment and how long tests would have taken in reality

Confidence judgments (1-10)

Results: Diagnostic Errors

**Dyads had more correct diagnoses than individuals
(4/6 vs. 3/6; $d = 0.78$)**



Results: Diagnostic Errors

**Dyads had more correct diagnoses than individuals
(4/6 vs. 3/6; $d = 0.78$)**

Not a statistical artifact due to the higher probability of having a competent individual in a team:

Simulation of nominal dyads

Diagnosis based on „better“ team member – „better“ defined in 3 ways:

- more confident
- higher medical knowledge
- acquired tests more relevant

Result: nominal dyads = individuals < real dyads

Results: Diagnostic Process

Same number of acquired diagnostic tests (approx. 15 out of 30)

Same relevance of acquired diagnostic tests

Dyads slower than individuals in experiment (per diagnosis 4.5 vs. 2.4 min, $\eta_p^2 = .90$)

Dyads' acquired tests would be faster in reality than those of individuals (per diagnosis 30 vs. 37 min, $\eta_p^2 = .63$)

Results: Confidence Judgments

Confidence judgments (1-10)

dyads > individuals (7.01 vs. 5.92, $\eta_p^2 = .84$)

if correct > if incorrect ($\eta_p^2 = .28$)

dyads not better calibrated than individuals

When dyads were incorrect, there was a larger difference between the confidence judgments of the two members than when they were correct

⇒ could this be harvested as cue for incorrect diagnoses?

Discussion

Teamwork reduces diagnostic errors without altering the diagnostic process

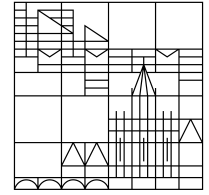
Not an artefact of the better member

- ⇒ **Collaboration seems to yield better interpretation: it may have helped correct errors, fill knowledge gaps, and counteract reasoning flaws.**
- ⇒ **Future studies should examine whether a difference in confidence between members could indicate incorrect diagnoses and thus further reduce diagnostic errors, as results suggest**

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