HumanIC - Human - Centric Indoor Climate for Healthcare Facilities
Project 101119726

Individualized support to the doctoral student

INTRODUCTION

Patricia Muñoz, MD PhD

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Clinical Microbiology and Infectious diseases

Hospital General Universitario Gregorio Marañón

Research institute Gregorio Marañón

Centro de investigación biomédica en red en Enfermedades Respiratorias (CIBERES)

University Complutense of Madrid, Spain

HumanIC project has received funding from the European Union's Horizon Europe research and innovation program under the Marie Sklodowska-Curie (HORIZON-MSCA-2022-DN-01, project no 101119726

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Welcome & Objectives

- **Meeting objectives:** personalized mentorship. Support supervisors and doctoral graduates integrate:
  - in clinical settings
  - into different future workplaces
- The experience of Clinical Microbiology/Infectious Diseases physicians.

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Why This Topic Matters

- Importance of mentorship for **academic success**
  - **Identifying** and building on each student's **unique competences**
  - **Encouraging** self-assessment and reflection
- Increasing **diversity** in doctoral pathways
- **Clinical** **settings** present unique supervision challenges

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Impact of individualized support

Academic success

Emotional well-being

Professional growth

If not....

Higher levels of stress

Isolation

High dropout rates in PhD programs

Which doctoral students need more individualized support?

- Doctoral candidates with **nontraditional paths**
  - **Diverse** academic, cultural or professional backgrounds
  - **More interdisciplinary**, **flexible**, or **clinical-academic** tracks
- Trend towards **customized supervision** approaches
  - **Competency-based** vs. time-based progress
  - **Individualized learning plans** in doctoral education

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Hospital and University

Facultad Medicina, Universidad Complutense Madrid. UCM

Hospital General Universitario Gregorio Marañón

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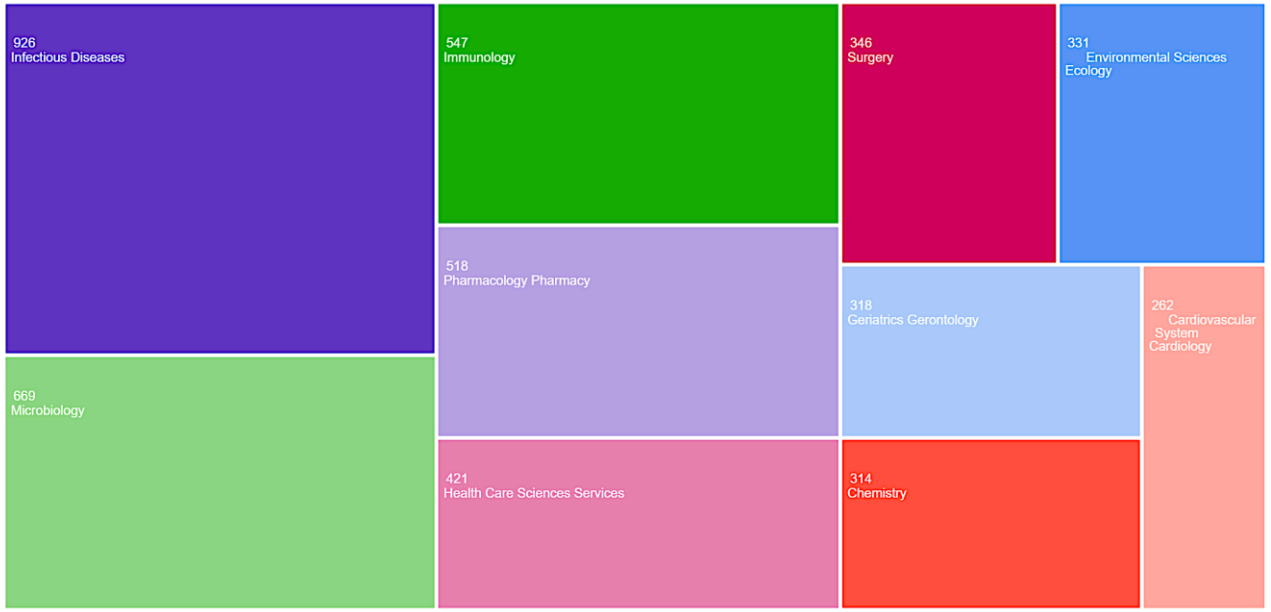
Multidisciplinary research

- Co-authors institutions

- Co-authors speciality



Web of Science

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Individual Development Plans

Communication Styles & Tools

- Transparent, respectful, timely dialogue
- Use of logs, shared calendars, supervision contracts

Expectations & Boundaries

- Clarifying roles
- Time commitments, meeting norms, availability

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Mentoring in Clinical Microbiology

Jesús Guinea
Clinical Microbiology and Infectious Diseases
jguineaortega@yahoo.es

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Mentoring in Clinical Microbiology

- Jesús Guinea:
  - Degree in Pharmacy (1996)
  - Clinical Microbiology Training (2002)
  - PhD in Microbiology (2005)
  - Research activity on Clinical Mycology (2002-present)
  - Gregorio Marañón teaching hospital

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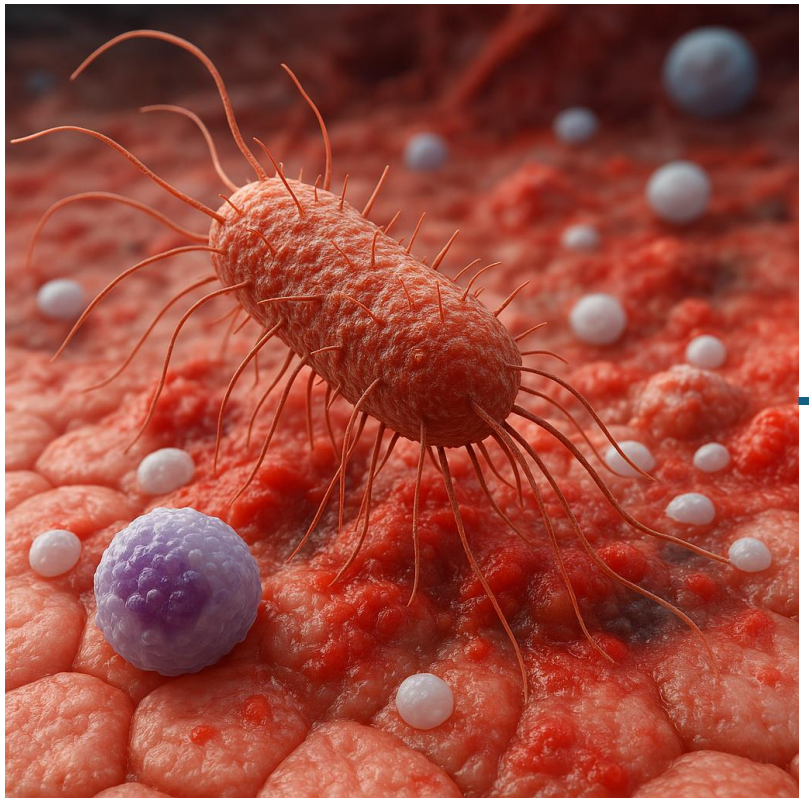
Mentoring in Clinical Microbiology



TRANSLATIONAL RESEARCH

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Mentoring in Clinical Microbiology

Why do we need to research on clinical microbiology?

- Epidemiology of infections
- Diagnosis of infections
- Factors predisposing to infections
- Species involved in infections
- Detection of resistance
- Clinical outcomes (treatment and management)
- Environmental sources (niches of pathogens, outbreaks)

We firmly believe that by doing that, we can offer a better care to patients in the long term

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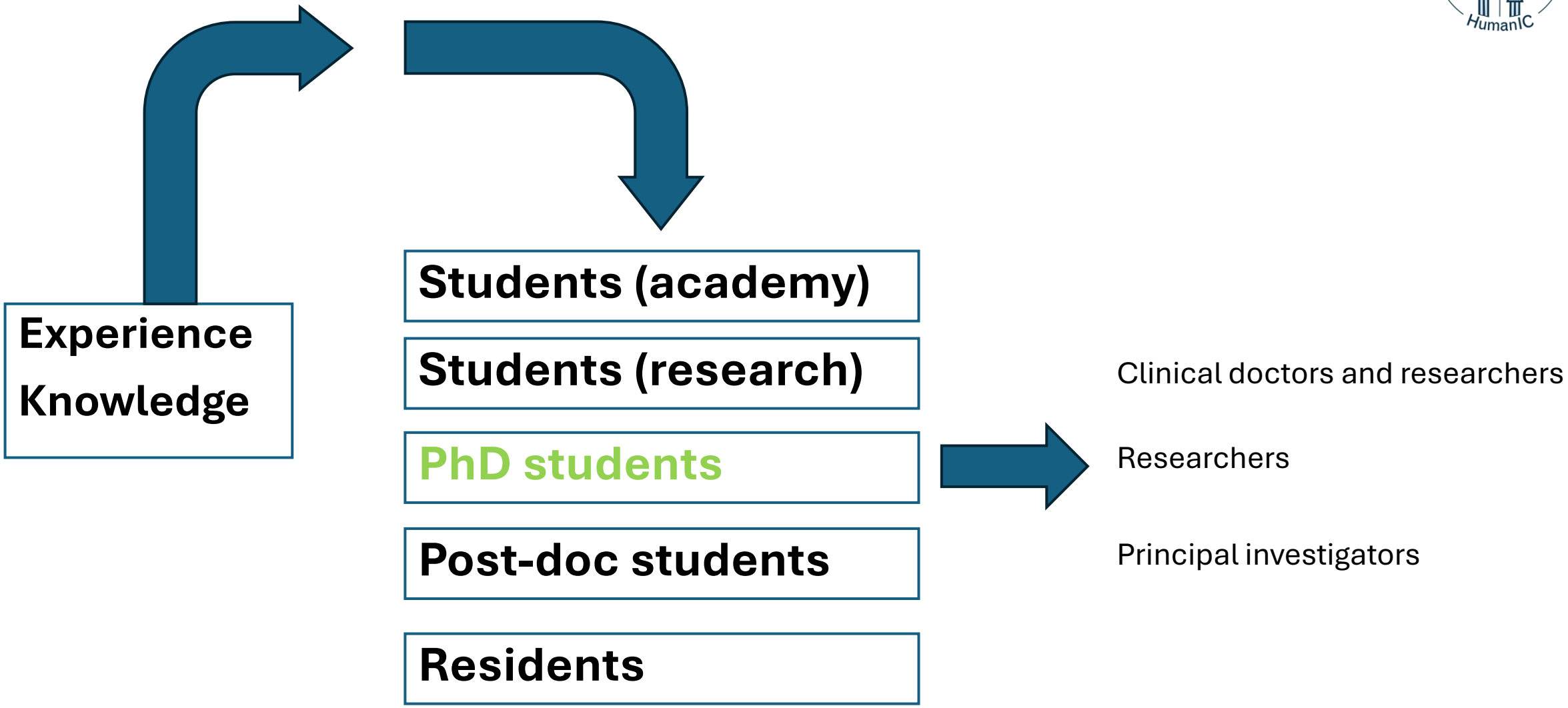
Mentoring in Clinical Microbiology



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Mentoring in Clinical Microbiology

Getting a PhD takes a lot of effort
You will have to work extra-hours
You will get frustrated
You will be tempted to give up

And you may ask yourself, "Well, how did I get here?"
Once in a lifetime (Talking Heads)

But it is really worth doing and inspiring
It's like crossing the finish line after a marathon

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What a student must have learnt when completing their PhD

Let's do not forget that we are training new scientists

CORE COMPETENCES

How to read a paper on clinical microbiology
How to detect an area or topic of potential interest
How to elaborate a scientific question
How to engineer and design a scientific study
How to perform data analysis (including statistics)
How to transform raw data into deliverable information (tables, graphs, etc.)
How to prepare an abstract for a scientific meeting (and present at the meeting if accepted)
How to write a paper (and get it accepted in a journal!)
How to write the PhD document
How to give a speech (particularly important to defend the PhD)
How to draft a scientific project
Paperwork (ethics committee, hospital permissions, funder follow-up, etc)

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Steps in guiding a PhD student

The importance of the topic

- Why is it important/relevant?
- Define well the subject to study on
- Basic bibliography
- Survey the literature and update relevant articles

Engineering the PhD project

- Outline the study objectives
- Assessment of resources
- Weaknesses and strengths
- Chronology of the project

Demand to mentor 95%

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Steps in guiding a PhD student

Initial training (1-6 months)

- Learn basic laboratory tools to carry out the project
- Get familiar with the team dynamics
- Problem solving (promote independence to find out solutions)
- Demand to mentor 80%

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Steps in guiding a PhD student

Mid training (7-36 months). Experimental part

- Carry out the experimental part of the project
- Data analysis
- Periodic supervising (to detect potential deviations)
- Demand to mentor 20%

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Steps in guiding a PhD student

Mid training (7-36 months). Data delivery. Scientific meetings

- Opportunity to report preliminary data:
  - Training in poster drafting
  - Training in oral presentations
- Opportunity to discuss your results with colleagues
- Meeting with relevant scientists on your field
- Update your knowledge and news about your topic

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Steps in guiding a PhD student

Mid training (7-36 months). Data delivery. Scientific meetings

- Set policy of (outstanding) meetings attendance

- Our PhD students attend at least one international meeting during their training period (commonly three times)

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E0234

Rezafungin showed high *in vitro* activity and very low resistance rate against a collection of yeasts causing fungaemia in patients admitted to a tertiary hospital in Madrid from 2014 to 2024

Pilar Escribano[1,2,3], Ana Gómez[1,2], Almudena Burillo[1,2,4], Patricia Muñoz[1,2,4,5], Jesús Guinea[1,2,3,5]

[1]Clinical Microbiology and Infectious Diseases, Hospital General Universitario Gregorio Marañón, Madrid, Spain; [2]Instituto de Investigación Sanitaria Gregorio Marañón, Madrid, Spain; [3]Faculty of Health Science - HM Hospitals, Universidad Camilo José Cela, Madrid, Spain; [4]Medicine Department, Faculty of Medicine, Universidad Complutense de Madrid, Madrid, Spain; [5]CIBER Enfermedades Respiratorias - CIBERES (CB06/06/0058), Madrid, Spain

Background

Rezafungin is a new echinocandin recently launched and approved for the treatment of invasive candidiasis/candidemia

EUCAST has recently released specific recommendations for rezafungin susceptibility testing and set clinical breakpoints, but data generated at different institutions is needed, particularly before the drug use in the hospital setting

Objective

We studied the susceptibility of a collection of blood culture fungaemia isolates to rezafungin and assessed the rate of antifungal resistance to the drug

Materials and Methods

Incident fungaemia yeasts isolates (n=537)

525 patients; 12 patients had mixed fungaemia

Gregorio Marañón Hospital (Madrid, Spain)

January 2014 to October 2024

Rezafungin activity was studied by the EUCAST E.Def 7.4 procedure; Tween 20 was added into the broth medium

Minimum inhibitory concentration (MIC) was defined as the lowest concentration reaching ≥ 50% of fungal growth inhibition compared to the drug-free control well; breakpoints were used to assess the percentage of resistance (Table 1)

Results

Species distribution of isolates and rezafungin MIC distributions against the isolates studied are shown in Table 1

Table 1. Isolates tested and rezafungin MIC distributions

Species (no. of isolates)	Rezafungin MICs (mg/L)																
	≤0.0002	0.0005	0.001	0.002	0.004	0.008	0.016	0.03	0.06	0.125	0.25	0.5	1	2	4	8	16	≥32
C. albicans complex (n=232)	25	60	134	8	3	2	0	0	0	0	0	0	0	0	0	0	0	-
C. parapsilosis complex (n=141)	0	0	0	0	0	0	0	0	0	0	4	24	53	57	3	0	0	-
C. glabrata complex (n=82)	0	0	0	0	10	69	0	0	2	0	0	0	0	1	0	0	0	-
C. tropicalis (n=37)	0	0	0	0	1	30	6	0	0	0	0	0	0	0	0	0	0	-
C. krusei (n=18)	0	0	0	1	1	7	9	0	0	0	0	0	0	0	0	0	0	-
C. dubliniensis (n=4)	0	0	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0	
Other *Candida* spp (n=11)	1	0	0	0	2	1	1	0	0	0	2	4	0	0	0	0	0	-
Non-Candida spp (n=12)	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	4	5	1

Cells with the "-" symbol indicate non-tested antifungal concentrations; Underlined values indicate non-wild-type isolates according to clinical breakpoints; Values in bold indicate modal MIC values

Rezafungin MIC values against *C. albicans* were very low and many isolates showed MIC values equal to or lower than the lowest concentration tested (0.0002 mg/L)

MIC values against *C. parapsilosis* were higher, whereas MIC values against *C. glabrata*, *C. tropicalis*, and *C. krusei* were in between

In vitro activity against non-Candida spp isolates was very limited

Considering the clinical breakpoints, all *C. albicans*, *C. parapsilosis*, *C. tropicalis*, *C. krusei*, and *C. dubliniensis* isolates were rezafungin-susceptible

Only three *C. glabrata* isolates were rezafungin-resistant, which represented 3.7% of *C. glabrata* isolates tested, were also anidulafungin and micafungin resistant, and harboured *FKS* gene substitutions (Table 2)

Table 2. Rezafungin-resistant *C. glabrata* isolates

C. glabrata isolates	MIC (mg/L)			*FKS2* gene substitution
	REZA	MICA	ANID	
1	0.06	0.25	2	F708S
2	0.06	0.06	0.25	L662W
3	2	0.5	1	S663P

Conclusions

Rezafungin showed a high *in vitro* activity against most of isolates in which clinical breakpoints are available. We only detected resistance in a small proportion of FKS-mutant *C. glabrata* isolates which showed cross resistance with the older echinocandins

The study was supported by grant PI22/00005 and an unrestricted grant from Mundipharma Ltd
The study was co-funded by the European Regional Development Fund (FEDER) 'A way of making Europe'

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P2907

National survey on azole-resistant clinical *Aspergillus fumigatus* collected in 2023: environmentally generated azole resistant isolates (TR_{34}-L98H and TR_{46}-Y121F-T289A substitutions) are expanding across Spain

Pilar Escribano[1,2,3], Jesús Moraga[1,2], Ana Gómez[1,2], Patricia Muñoz[1,2,4,5], Jesús Guinea[1,2,3,4] on behalf of the *ASPE*IN study group

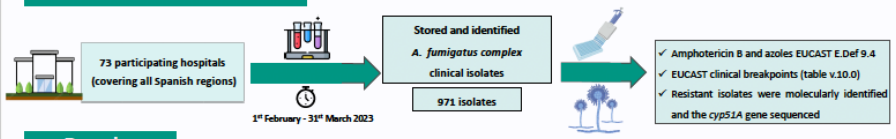
[1]Hospital General Universitario Gregorio Marañón - Madrid (Spain), [2]Instituto de Investigación Sanitaria Gregorio Marañón - Madrid (Spain), [3]School of Health Sciences - HM Hospitals, Camilo José Cela University - Madrid (Spain), [4]CIBER Enfermedades Respiratorias - CIBERES (CB06/06/0058) - Madrid (Spain), [5]Medicine Department, School of Medicine, Universidad Complutense de Madrid (Spain)

Background

We started out a surveillance program on azole resistance in *Aspergillus fumigatus* in Spain in 2019 and the rate of resistance found (7.4%) was mostly confirmed (6.4%) in a second survey conducted in 2022

We here report azole resistance in *A. fumigatus* data derived from the third national survey conducted in 2023

Material and Methods



Results

Isolates distributed as fully antifungal susceptible (n=901, 92.8%) or resistant to one or more antifungal agent (n=70, 7.2%) which involved *A. fumigatus sensu stricto*, n=40, *A. lentulus*, n=21, *A. fumigatiaffinis*, n=7, *A. fennelliae*, n=1, and *A. felis*, n=1

Table. Azoles and amphotericin B MIC distributions and percentage of resistance in *A. fumigatus complex* isolates

	MIC distributions (number of isolates at each MIC, in mg/L)										Resistance
	0.016	0.03	0.06	0.125	0.25	0.5	1	2	4	≥16	No. of isolates (%)
***A. fumigatus sensu lato* (n=971)**											
Amphotericin B		1	5	34	452	400	50	5	6	7	11	29 (3.0%)
Itraconazole	2	2	7	171	612	112	15	6	4	2	38	50 (5.1%)
Voriconazole				5	107	573	220	14	39	3	10	66 (6.8%)
Posaconazole	7	134	593	177	27	21	8	2			2	47 (4.9%)
Isavuconazole		1	4	4	17	390	468	48	7	20	12	62 (6.4%)
***A. fumigatus sensu stricto* (n=941)**											
Amphotericin B				5	34	452	400	50				0 (0%)
Itraconazole	2	2	7	170	609	107	11	3			30	33 (3.5%)
Voriconazole					5	107	573	218	3	22	3	10	38 (4.0%)
Posaconazole	7	133	592	166	10	21	8	2			2	35 (3.7%)
Isavuconazole		1	4	4	17	388	466	27	2	20	12	36 (3.8%)
Cryptic species (n=30)											
Amphotericin B		1						5	6	7	11	29 (96.6%)
Itraconazole				1	3	5	4	3	4	2	8	17 (56.6%)
Voriconazole							2	11	17			28 (93.3%)
Posaconazole		1	1	11	17							12 (40.0%)
Isavuconazole						2	2	21	5			26 (86.6%)

Values shaded in grey indicate MICs within the area of technical uncertainty (ATU) translated as resistant isolates as follows: posaconazole (*A. fumigatus sensu lato* [n=14/27]; *A. fumigatus sensu stricto* [n=2/10]; cryptic species [n=12/17]) and isavuconazole (*A. fumigatus sensu lato* [n=23/48]; *A. fumigatus sensu stricto* [n=2/27]; cryptic species [n=21/21]). Values in bold indicate resistant isolates according to EUCAST clinical breakpoints (table v 10.0)

Overall, the amphotericin B resistance rate was 3.0%, only found in cryptic species, whereas the azole resistance rate was 7%. Azole resistance was found in 4.2% and 93.3% of *A. fumigatus sensu stricto* and cryptic species isolates, respectively (Table)

Azole-resistant *A. fumigatus sensu stricto* isolates harboured *cyp51A* gene substitutions TR_{34}-L98H±S297T/F495I (n=22/40), TR_{46}-Y121F-T289A±S363P+I392V+G448S (n=8/40), other (F46Y/M172V/E427K, n=1; G54R±G448S, n=2), or showed wild type *cyp51A* gene sequences (n=7)

Isolates harbouring the TR_{34}-L98H or TR_{46}-Y121F-T289A substitutions were detected in patients admitted to 15 hospitals located in seven regions. The presence of such isolates had been already reported in six regions (Madrid, Catalonia, Castilla León, Castilla La Mancha, Valencia, and Andalusia) in previous surveys whereas a new region (Balearic Islands) is here added to the list (Figure)

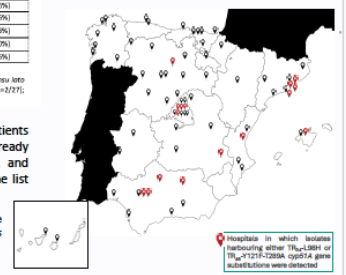


Figure. Map showing the cities where the 73 hospitals providing with *A. fumigatus* complex isolates were located

Conclusions

Up to 7% of *A. fumigatus* complex Spanish isolates collected in 2023 were azole-resistant, a steady resistance rate being reported in Spain since 2019

Environmentally generated azole-resistant isolates (TR_{34}-L98H or TR_{46}-Y121F-T289A *cyp51A* gene substitutions) involved 75% of all *A. fumigatus sensu stricto* resistant isolates and seem to be more prevalent in some areas

The study was supported by grant PI21/00450 from *Fondo de Investigación Sanitaria* (FIS. Instituto de Salud Carlos III) and an unrestricted grant from Gilead Ltd. The study was co-funded by the European Regional Development Fund (FEDER) 'A way of making Europe'

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Steps in guiding a PhD student

Mid training (7-36 months). Data delivery. Publications

- As a rule of thumb:
  - Posters/oral presentations should be turned into **Papers**
- Choose the most appropriate journal (aim 1st quartile journals)
- Objectives of the thesis (one objective – one paper)
- Our PhD students publish about 7-8 papers as part of their PhD projects
- Demand to mentor 95%

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Steps in guiding a PhD student

Mid training (7-36 months). Data delivery. Publications

- Drafting a paper is one of the most difficult tasks PhD students face!
- My experience is that PhD students get the doctorate but fail to get enough competences to draft scientific papers
- Procrastination is quite common and must be early detected
- Paper production pace should be kept from year 2 to 4
- Paper production is key to get a further post-doc position

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Steps in guiding a PhD student

Mid training (7-36 months). Data delivery. Publications

INTRODUCTION

MATERIAL & METHODS

RESULTS

DISCUSSION

CONCLUSIONS

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Steps in guiding a PhD student

Late training (37-48 months). PhD defence

- Year 4 should be allocated to publish the latest publications, drafting the PhD document, and thesis defence
- Papers should be backbone of the document
- Discussion of the document also takes some time
- Preparation of defence (and questions during defence)
- Demand to mentor 70%

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Individualized support to the doctoral student

IN THE CLINICAL SETTING

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Clinical Microbiology and Infectious diseases

Hospital General Universitario Gregorio Marañón

Research institute Gregorio Marañón

Centro de investigación biomédica en red en Enfermedades Respiratorias (CIBERES)

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Content

MY OWN JOURNEY

THE HOSPITAL

RELATIONSHIP DOCTORATE
STUDENT - SUPERVISOR

Content

HOSPITAL & STUDENT DIVERSITY

Understanding student diversity

- **Diverse backgrounds, diverse needs**
  - Clinical practitioners, international students, early-career researchers
  - Varying motivations, experiences, and academic goals

- **Learning & working styles**
  - Balancing workplace and academic responsibilities
  - Independent vs. collaborative learners

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"Career Anchors" by Edgar Schein

1. Technical/Functional Competence
2. General Managerial Competence
3. Autonomy/Independence
4. Security/Stability
5. Entrepreneurial Creativity
6. Service/Dedication to a Cause
7. Pure Challenge
8. Lifestyle

https://psycho-tests.com/test/sheins-career-anchors

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What truly drives your career decisions

Anchor	Core Motivation
Technical/Functional	Mastery in a specific skill or profession
General Managerial	Leadership, decision-making, and organizational control
Autonomy/Independence	Freedom to define how and when you work
Security/Stability	Job security and predictable future
Entrepreneurial Creativity	Innovating and building something new
Service/Dedication to a Cause	Making a meaningful difference for others
Pure Challenge	Solving tough problems, testing personal limits
Lifestyle	Harmonizing career with personal life priorities

Understand your strengths and choose the options that will bring inner satisfaction from work

https://psycho-tests.com/test/sheins-career-anchors

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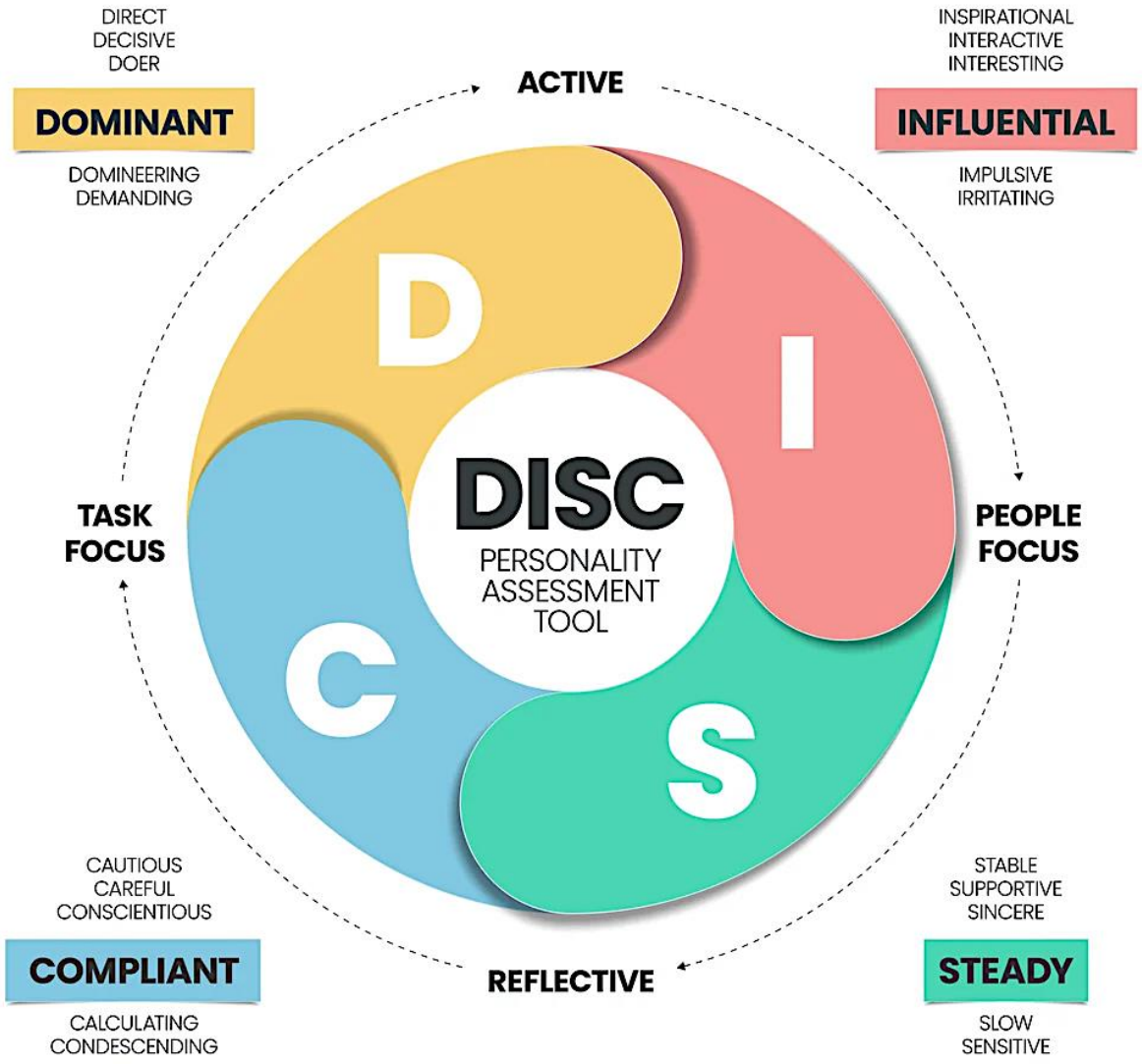
What type of leader is your supervisor?

And you?



https://careerminds.com/blog/knowing-disc-profile

Other aspects to consider

- **Cultural & ethical sensitivities**
  - Avoid assumptions about student experience
  - Different ethical standards across cultures
  - Sensitivity to biases in clinical care and research
  - Multicultural teams and supervision

- **Mental health & burnout risks**
  - Long hours, emotional intensity, impostor syndrome
  - Supervisor's role in identifying stress and burnout signals
  - *Also supervisor is at risk!!!!*

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Clinicians undertaking a PhD

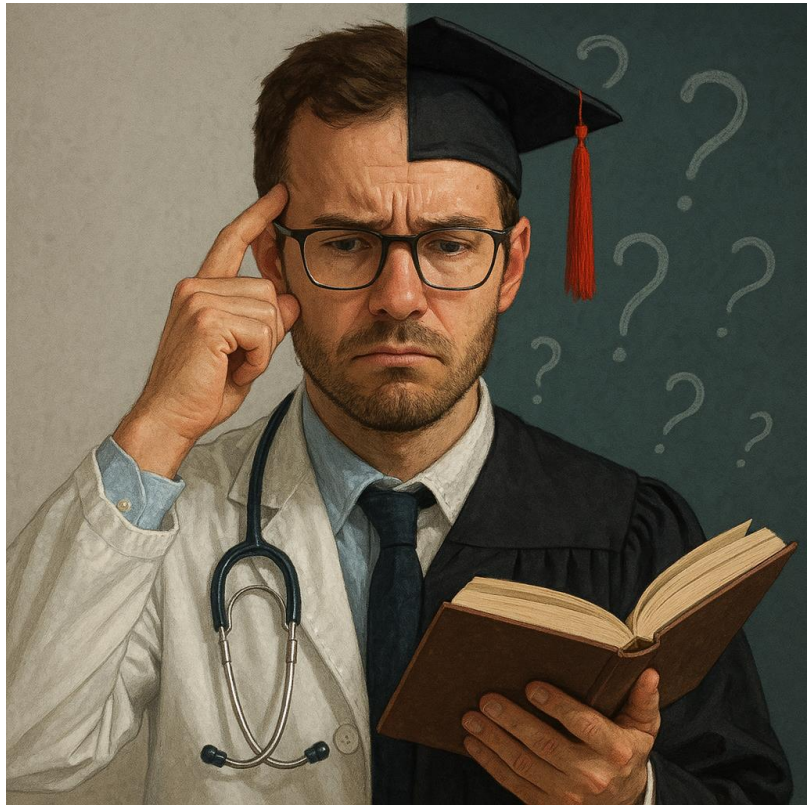
Challenges in Clinical Environments

- Often **part-time** basis off-campus, balancing research with patient care
- Time-managing, integrating into the research environment and developing an academic identity
- Navigating institutional and regulatory constraints
- Not so many people with PhD around

Very high rate of dropouts

Which is the main motivation?

- Contact a group to get sp… …arning?
- Get a job in the h…
- Or really want to … now to conduct research and prepare a PhD? Get your career in a new direction



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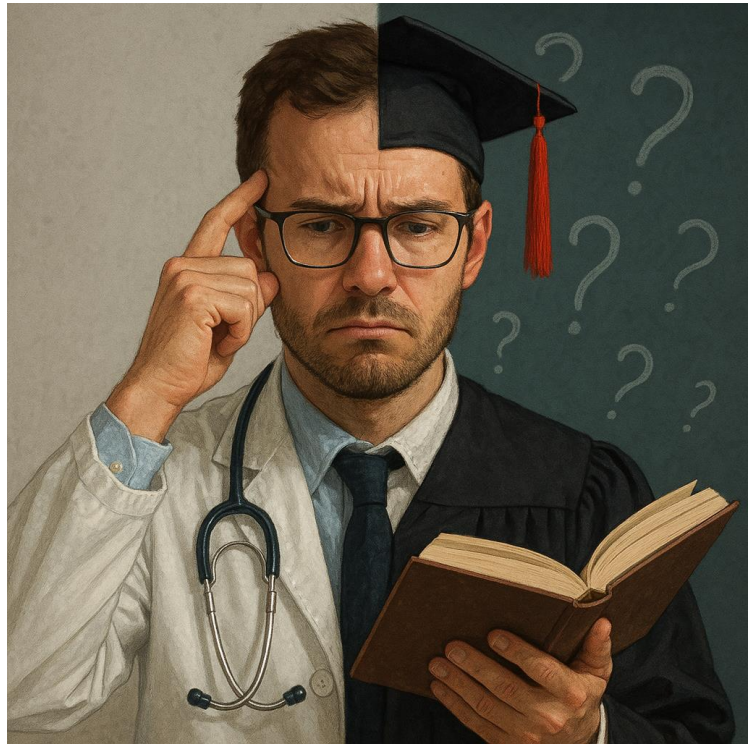
Practical tips

1. Help your student **feel part** of the team and **university**
2. **Identity shift** (from skilled clinician to student) and tethered **autonomy**
3. Know each other's **boundaries**
4. Help your student **use their time** well
5. Exploit the student **clinical skills** (interviews, assessments, professionalism..)
6. Get to know your hashtags *(#phdchat; #AcademicChatter; #phdlife; #AcademicTwitter; #phdchatter; #phdweekend; #parttimephd)*
7. **Be clear on expectations** (productivity, rules, conflict management)
8. Funding
9. Monitor **progress**
10. Prepare for setbacks and **delays**
11. Don't underestimate the power of informal supports
12. Career and future planning



Hynes SM. MedEdpublish 2020; 9:199

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Different backgrounds are also found in the clinical setting

Backgrounds different from physicians

Biologist, Pharmacist, Food Technician, ….

Engineer

HumanIC project has received funding from the European Union's Horizon Europe research and innovation program under the Marie Sklodowska-Curie (HORIZON-MSCA-2022-DN-01, project no 101119726

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Practical tips for non physicians

1. You need to understand the language
2. You need to really understand the problem
3. You need to understand physician’s minds and priorities

Personal opinion

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Bridge the Cultural Gap

- **Learn the language**:
  - Clinicians often speak in shorthand—medical acronyms, clinical urgency
  - Patient-first logic
  - Keep a glossary and ask questions often. Understand and communicate.
- **Respect rhythms**: Hospitals run at a different pace.
  - Be patient with scheduling and be mindful of clinical priorities.
  - Get to understand the hospital and all its problems.
- **Attend clinical meetings**: Observing how doctors make decisions helps you align your research goals with real medical needs.
  - You need the necessary background. Patients and families are behind.

Personal opinion

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Clarify/Align Your Research Scope

- **Translate tech into clinical value:**
  - Always ask yourself, “How would this help a doctor, nurse, or patient?”
  - CONTRIBUTE TO THE ORGANIZATION
- **Get feedback early**:
  - Share initial prototypes or conceptual frameworks with clinicians—they'll help catch unrealistic assumptions fast
- **Simplify without dumbing down**:
  - Explain your work in a way that engages non-engineers without losing its scientific integrity

Personal opinion

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Manage Stress Proactively

- **Define what success looks like**—for both yourself and your clinical collaborators
  - Not just publication count
- **Set communication boundaries**:
  - It's okay to not respond instantly to every request
  - Define availability clearly
- **Find allies**:
  - Connect with other researchers embedded in clinical environments—they've probably felt the same kind of overwhelm

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🛠 Use Tools That Help You Adapt

- **Visualization software** to make abstract ideas more accessible.
- **Shared digital workspaces** like hospital-approved cloud drives to foster collaboration.
  - Confidenciality is KEY. Informed consents. Hospital protocols
- **Versioned documentation** so you can show how your thinking evolved based on clinical feedback

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RELATIONSHIP

DOCTORATE STUDENT - SUPERVISOR

Individualized support, OF COURSE

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But … a coin has two sides

- The role of a doctoral supervisor is NOT to treat students like children or constantly monitor their emotional states

- Our responsibility lies in **fostering academic growth, critical thinking, and independent research**

- At this stage, we already are two professionals

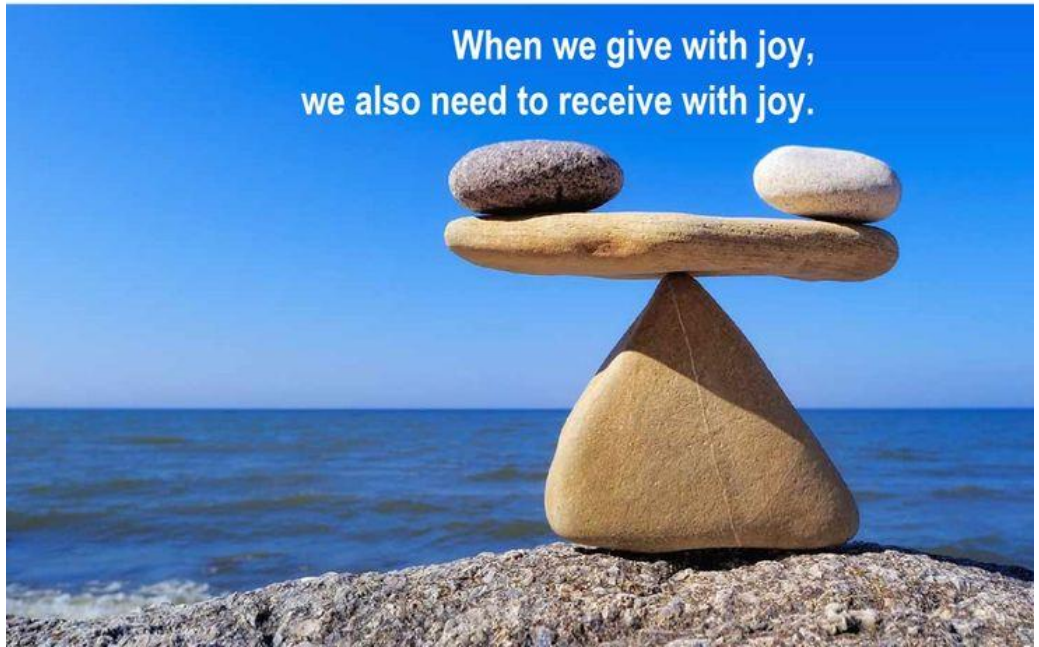
The PhD student's world revolves around one thesis, while the **CLINICAL supervisor's daily reality is a whirlwind of mentoring, healing, teaching, researching, reporting and managing**

Your supervisor is not only yours, and probably you are not the priority

Bidirectional relationship

Student

- Joyful enthusiasm
- Mutual trust
- Committed work
- Open communication
- Intellectual stimulation



Supervisor

- Shared experience
- Supportive guidance
- Role modeling
- Support learning
- **Psychological safety**

Leadership

What People Get Wrong About Psychological Safety

Six misconceptions that have led organizations astray. by Amy C. Edmondson and Michaela J. Kerrissey

From the Magazine (May–June 2025)

6 Key Misconceptions about psychological safety

1. **Means Being Nice**– True psychological safety allows for respectful disagreement, not just comfort

2. **Means Getting Your Way**– Safety supports candor, not consensus

3. **Means Job Security**– It's about openness, not immunity from consequences

4. **Requires a Trade-Off with Performance**– In fact, it enables higher performance through learning and innovation

5. **Is a Policy or checklist** – It's a dynamic team culture, not a static rule

6. **It's top-down only** – Everyone contributes to building it, not just leaders

✅ **What It Really Means:** A shared belief that it's safe to speak up, ask questions, and admit mistakes—without fear of humiliation or punishment

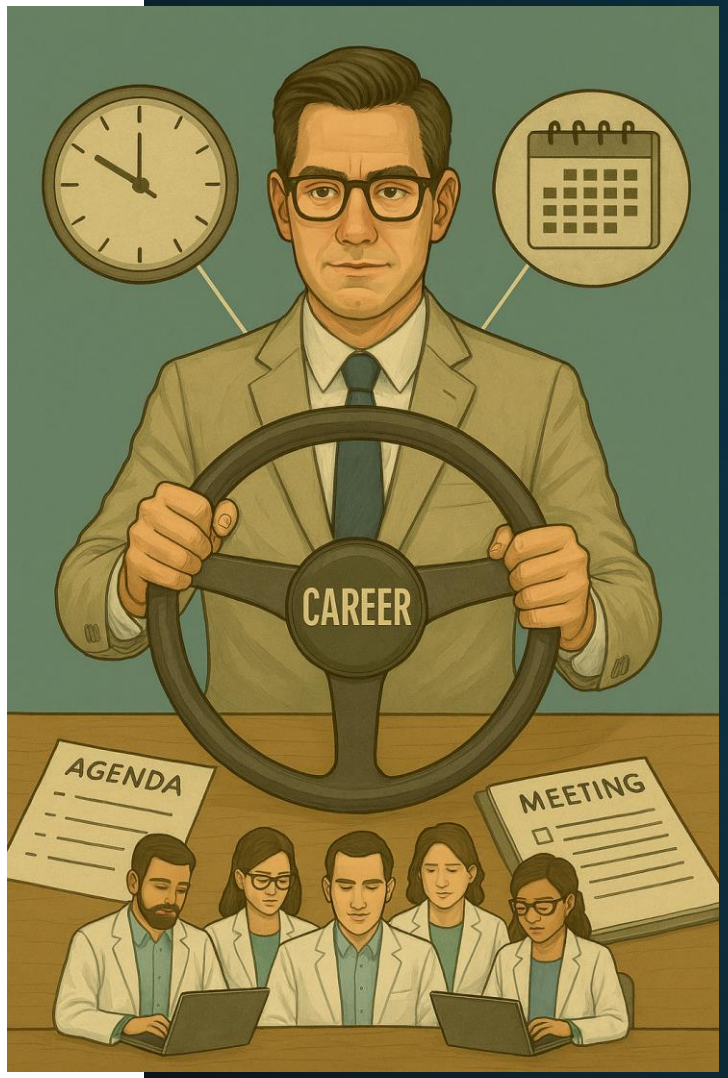
AC Edmondson & MJ Kerrissey *Harvard Business Review*, May–June 2025

Message for pHD students: **You are at the steering wheel**

You are a true profesional in the field, no longer in a junior role

You are in control. You deserve to be here, in high-education world

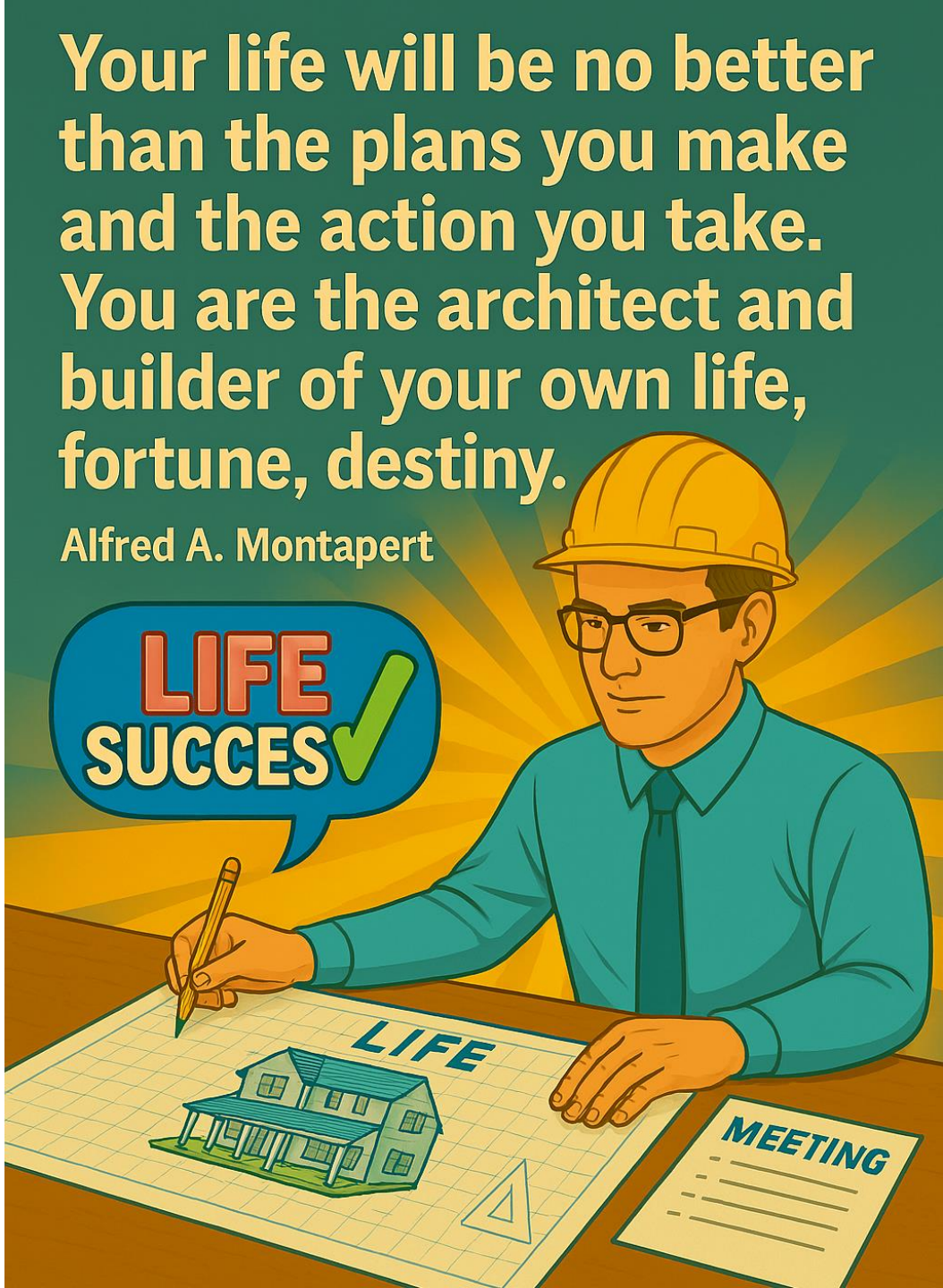
- Set agendas, meetings, timelines
- Prepare the meetings (questions, ideas), keep timing
- Speak up. What feedback you need
- It is normal to have phases of push and pull



Planification is key

"Your life will be no better than the plans you make and the action you take. You are the architect and builder of your own life, fortune, destiny."

Alfred A. Montapert



Everybody is an individual

- Supervisors also need mentorship and training
- We want, and need, the student to succeed
- We want to develop the researcher, not just the research
- Help us to help you