



## Review

## Mentor-mentee relationship in clinical microbiology

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## ABSTRACT

**Background:** Clinical microbiology is a field in constant evolution, with increasing technological opportunities and a growing emphasis on human and social issues. Maintaining knowledge and skills and anticipating future changes is challenging both for laboratory managers and for all the co-workers. Training and succession preparation represents a unique opportunity to adapt/prepare future generations according to the evolutions of the field.

**Aims:** The aim of this review is to provide to clinical microbiologists a reflection on ongoing technological and social changes in their field and a deepening of the central role of preparing future generations to these changes through a fruitful mentor-mentee relationship.

**Sources:** This narrative review relies on selected publications addressing mentor-mentee interactions in various academic fields, on interview with our colleagues and pairs, as well as on our personal experience.

**Content:** From the qualities and aspects that emerged as necessary for a productive mentor-mentee interaction, we selected and discuss five of them for the mentor: the role and responsibility, the positioning, the vision, the scientific credibility, and the moral credibility, as well as five for the mentee: creativity, flexibility, energy, responsibility, and self evaluation.

**Implications:** This review emphasizes the importance of both the scientific and the ethical credibility of the mentor and the mentee as well as the importance of human and social values such as solidarity, equality, equity, respectfulness, and empathy, and might support mentor and mentee in the field of clinical microbiology and also in the field of infectious disease in their intent for a fruitful interaction.

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## Introduction

Clinical microbiology is in the midst of a technological revolution, with the emergence of many new technological opportunities and with increased automation. This technological revolution is accompanied by a human and social revolution that notably interrogates the responsibility of each co-worker and the occupational well-being. This encompasses a large number of new notions that are now central and inevitable in the management of a team, including the company values, equality of opportunity, and equity between different employees. So far, human and social competencies have not been generalized as part of the academic training,

and these criteria are not sufficiently included in the selection process.

Such an evolving field also implies from its actors, vision and anticipation, creativity, and flexibility to face the new challenges but also communication to obtain the trust and the support of the teams, which are necessary to accompany the change and to avoid anxiety. In this narrative review we address the ongoing technological, human, and social change in clinical microbiology laboratories and focus on the importance of the mentor-mentee interaction. Indeed, training the future generation is an opportunity to face these evolutions and can be integrated into change management as it allows for adaptation of future generations according to the technological and social changes. In this context, the mentor-mentee relationship, a common model of formation of young individuals in the academic field plays a central role. In clinical microbiology mentorship applies to the academic staff in a broad range of situations: during specialization as a clinical

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microbiologist, during undergraduate training as a microbiologist or molecular biologist, during medical studies, during a PhD, or during postdoctoral studies. This relationship also applies to infectious disease specialists. Interestingly, one can be a mentee, as a young individual, and evolve to a mentor when more experienced. Thus, the challenge for mentors is to provide sufficient new skills and knowledge to their mentee including those that address human and social issues; it is therefore necessary that the mentors be interested and trained in such important issues. Such interactions and challenges not only apply to the academic staff but also applies to the technical staff, for whom a large part of the training is made by companionship.

This review relies on the available literature on the mentor-mentee relationship and on our personal experience to discuss the importance of this interaction in the field of clinical microbiology. Among the qualities and aspects that emerged as necessary for a productive mentor-mentee interaction, we selected and discuss five of them for the mentor: the role and responsibility, the positioning, the vision, the scientific credibility, and the moral credibility, as well as five for the mentee: creativity, flexibility, energy, responsibility, and self-evaluation. Many of the issues that we address also apply to other academic fields including the field of infectious disease.

## The laboratory's human and social environment

### *Human and social expectations*

Based on a questionnaire survey about the personal life and working conditions of trainees and young specialists in clinical microbiology and infectious diseases, Maraolo and colleagues reported that working conditions vary between different regions of Europe [1]. This survey also reported that alongside the scientific or technical expectations of co-workers in the field of clinical microbiology and infectious disease, there is a growing expectation on social and human qualities. Traditionally, the academic educational process is largely based on evaluation of theoretical and technical skills. For this reason, in addition to the scientific and technical competence assessments, efforts must be made for a very thorough evaluation on human, social, and managerial skills in academia. Team spirit must be part of the important skills for a future collaborator. Another essential feature is the interest and motivation for the discipline in which one engages, rather than the interest and the ambition to succeed. However, the interest and the motivation for a given activity is very much associated with success [2]. When engaging a new co-worker, this aspect must be evaluated very precisely, otherwise there is the risk of being very quickly faced with young individuals or new-co-workers who are demotivated or with failures. More generally, it is the responsibility of actual generations to present exciting and stimulating aspects of clinical microbiology to create a large number of vocations and guarantee effective succession both at the level of technical staff and university biomedical staff.

### *Values*

The different co-workers of a laboratory or a company may come from unrelated social and cultural environments, and as a consequence may have different personal and professional principles and values. In this case, common values must be those of the institution or of the laboratory. They may be proposed by the laboratory manager and it is important that they receive the support of all the co-workers [3]. The mentor and the mentee can thus use the values of the laboratory as common values.

### *Equality*

The growing concept of equality means to ensure that everyone has the same chances of success within the laboratory or company. It is not only the responsibility of the laboratory or the managers, but of all the co-workers and of the whole institution. An interview-based study performed with European clinical microbiologists and infectious disease specialists reported that inequality and discrimination occurs in hospitals and university and describes some existing inequities and discrimination patterns [4]. Such a study giving examples of inappropriate behaviours, including gender aspects and social or ethnic discrimination, may help with efforts to reduce such behaviours by identifying possible demotivating effects of inequality or discrimination [5]. It is therefore important that the company or institution provides new tools and solutions to promote equality and constructive behaviours.

### *Becoming a manager*

Management, defined as the implementation of the human resources and the material required for a company to achieve its objectives, can be broken down into an increasing number of different aspects including the management of human resources, quality management, project management [6], change management, risk management, and team management. As a result, a large number of employees within a company find themselves involved in managerial activities. In addition, the organization of a company is more like a fractal structure, including a group within a team, a team within a unit, a unit within a department, a department within an institution, and an institution within a network of institutions. This structure involves intermediate managers at each level of the fractal rather than a single 'head' leader in a strictly pyramidal structure. This implies horizontal interactions, and not vertical interactions with the hierarchy; regarding young individuals, this implies many interactions other than those with a hierarchic superior [7]. Thus, the widespread pyramidal representation of a company or a laboratory does not directly reflect the organization. It reflects a certain vertical hierarchy rather than the true responsibility level, which is central in terms of management. Finally, a pyramid cannot exist or stand without its base, and numerous decisions and responsibilities are also part of the duties of the co-workers constituting the different pillars of a laboratory. A horizontal representation might better reflect the process, which successively involves different people who are all essential. Whatever the organization of the laboratory or company, the positioning of an assistant manager is always complicated because he/she does not yet have experience or legitimacy, despite rapid responsibilities. It is interesting to note that so far, most management courses are proposed at postgraduate level. In the future, more management courses should be integrated into undergraduate training because, as discussed earlier, almost everyone will be led to manage at some point in his/her professional career. For too long, managerial skills have been associated with intuitions or feeling but such self-development in management is not efficient, being akin to learning to write alone. An introduction to the basic concepts of management early in the university curriculum would thus help to prevent development of erroneous management habits. This would also help to balance the impact of bad examples and to reduce the risk of reproducing negative behaviours. Early learning of management skills can yield positive results, as demonstrated by Cummings and colleagues with only a 2-day coaching workshop experience with residents in long-term care facilities [8]. Nevertheless, things are evolving very quickly, with, on one hand, for example at our institution, introduction of micro MBA courses for university executives; and, on the other hand,

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