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IN THIS ISSUE

A Day in the Life of a Consultant Microbiologist

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Abstract

The practice of Clinical Microbiology has many different forms and takes place in many different environments. From reference laboratories to rural community hospitals to public health laboratories, there are a diverse set of needs for microbiology expertise that extend far beyond the traditional model. In a larger clinical laboratory setting, such as an academic medical center or a reference laboratory, there are often personnel dedicated exclusively to the oversight and practice of microbiology. However, in many other environments and situations, there is a void of microbiology expertise which must be filled. These unmet needs can be addressed by a non-traditional microbiologist, the consultant. Like the practice of microbiology itself, serving as a microbiology consultant can take many forms and can be an appealing alternative for some who are looking to create a more flexible life-style yet continue to utilize their microbiology expertise. The following discussion will outline some key considerations for those looking to start their own microbiology consulting business. In addition, the manuscript will describe the various consulting opportunities that exist and what the "day in a life" of a consultant microbiologist might look like.

Role of a Consultant Microbiologist

Prior to defining a road map that outlines the steps to becoming a successful consultant, it is important to define the role of a consultant. A consultant is hired to help a client solve a problem, reach a desired goal, or complete a project. The client (e.g., an individual, hospital, physician's office, or company) may want to improve the diagnostic services they provide but lack the microbiological expertise, time, or staffing to do so. They may also require consultant services to fast track a project. A successful consultant brings value by providing expertise and helping the client achieve their desired goals in a multitude of ways that are not so different from the roles of the traditional clinical microbiologist. For example, they may be hired to make a change, improve a process, sell a product, participate on committees, prepare protocols, recommend cost-saving measures, oversee operations, educate staff or clients, or be an expert witness.

Road Map to Consulting

There is a paucity of published information and only a few videos in the public domain (e.g., YouTube) and courses available to guide individuals through the journey to become a consultant. For the clinical microbiologist, one of the best resources is a colleague(s) who will share their experiences in how to start, market, and manage a consulting business. To that point, some of the information provided below is based on the experiences of several well-known and seasoned microbiologists with an average of 35 years of experience in the field who were surveyed and are currently working as part-time or full-time consultants. The authors, both former infectious disease laboratory directors at large multicenter hospitals with extensive experience (see "Authors' Education and Experience" below), wrestled with some basic questions and concerns prior to leaving their full-time positions. What was their motivation to make a career change? Was their

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current full-time position as a clinical microbiologist no longer challenging or rewarding? Were their financial expectations unfulfilled? Did they need a lifestyle change, or did they want to retire from their current job yet remain active in the health care field? Would they miss the benefits of working full time? Would they miss the structure of their working environment? Were their personalities compatible with that of a consultant?

Many successful consultants are ambitious individuals with type A personalities and generally possess some or all of the following characteristics: self-motivated, enjoy new challenges and opportunities, demonstrate confidence, listen closely and communicate clearly, have good problem-solving skills, and are team players.

In addition to being self-aware and assessing whether one's personality traits are conducive to consulting, the prospective microbiology consultant can also benefit from a collection of professional experiences that include, but are not limited to, working as a bench technologist, supervisor, manager, or laboratory director. Other resumé assets that establish a consultant's credibility and can improve the consultant's success are having university faculty appointments and serving as an educator for the laboratory, as well as other key groups, such as nursing, pharmacy, and medical staff. Finally, earning professional awards and establishing a track record of conducting clinically relevant research that leads to scientific publications help to establish a consultant's credibility and can be important assets for those who want to succeed as a consultant. As evidence of this, several surveyed consultants acquired clients through their past students and colleagues whom they met during previous work experiences.

Having a background in the discipline is an obvious prerequisite when pursuing a career in microbiology consulting. As such, many consultants are former medical technologists working in microbiology and other areas of the laboratory. Others have gone on to earn a Ph.D., which then qualifies them to serve as CLIA medical laboratory directors. The community of clinical microbiology laboratory directors is a small but tight network of individuals, and participation in the network can be helpful when establishing a client base for a consulting business. While serving as a CLIA medical director for many years, one of the authors developed a network of colleagues, some of whom would go on to be clients or would refer other clients.

In order for a consultant to have Centers for Medicare and Medicaid Services approval to practice as a licensed medical laboratory director in a laboratory performing waived, moderate, or highly complex tests, an individual must maintain board certification through continuing education. These activities can come in many forms but most commonly include attendance at meetings that provide continuing education (CE) credits. There can be significant costs associated with obtaining CE credits and maintaining board certification, which should be accounted for when planning to start a consulting business. Many laboratory directors employed in traditional settings, such as hospitals or universities, will have funds provided by the employer to support CE activities. A consultant microbiologist will be responsible for generating those funds through the business. Of note, those qualified to direct a highly complex laboratory also qualify to serve as a CLIA director for all other CLIA-classified laboratories [3].

In our survey of practicing microbiology consultants, 1 to 2 years, on average, were spent planning before becoming a consultant. Part of that planning process was to decide which of the different consulting delivery models would be pursued. Below are a few of the key questions that need to be asked to answer this important question.

- Do you want to work full or part time?
- Do you want to work in a group or as an independent contractor?
- Do you have an entrepreneurial mindset and want to consult as part of a career path (i.e., working full time as an independent consultant) or as part of a consulting firm?

Although the independence afforded by working as a self-employed consultant is appealing to many, one must be prepared to make some sacrifices, such as working long hours, managing strong demands of clients, spending time away from home while traveling, and accepting the uncertainty and challenges that come with not working for an employer (e.g., losing health insurance, pension, and vacation benefits and a regular paycheck). However, if successful, the choice to pursue a career in consulting can be quite profitable, both monetarily and professionally. The question of whether the advantages of this career choice outweigh the challenges will ultimately depend on the individual and how they structure their consulting business. Financially, though, consulting can be very lucrative if you develop a large group of new and recurring clients. According to the Pew Research Center, 10% of the population, or 36% of the U.S. workforce, have made self-employment their career choice because of the flexibility and benefits [4]. ZipRecruiter conduct an ongoing survey of clinical laboratory consultant annual salaries in the United States and found that they can be as high as $133,000 to $200,000 and as low as $23,000, with an average range between $49,500 and $116,000 [5].

Choosing a career in consulting can have a number of lifestyle advantages over a traditional microbiology position. The consultant microbiologist lifestyle, whether working as an independent contractor or with a consulting group, can have lower pressure and allows the consultant to control the amount of time they spend, as well as the jobs they accept. One can set one's own schedule, choose projects of interest, enjoy life and family time, and work from a home office (a unique advantage during the COVID-19 pandemic). They can also create their own career trajectory, focus on personal goals they value, and do things they always wanted to but did not have time for. If the financial aspects of consulting are not of primary importance, a consultant can integrate working with clients and participating as a community servant, acting as a resource to the medical and lay community.

Based on our survey, most of the former Ph.D. microbiology directors elected to work part time as independent contractors, doing some consulting during their tenure as a microbiology director. As one consultant pointed out, it is always a good idea to notify

your employer each year if you plan to consult while working in your primary position. The same microbiologist transitioned to full-time consulting upon developing a private company with another colleague.

Develop a niche

One of the best and most common ways to transition into consulting is to use skills developed while working in the microbiology field and to identify a niche (e.g., point-of-care testing, laboratory stewardship, or scientific writing) that can be marketed to specific groups, individuals, or businesses who need someone with those skills and then market your services to that client(s) [1,2]. Most of the surveyed microbiologists during their initial planning phase realized the importance of developing a strong network of individuals who might need their services in the future. Once they were able to consult, they relied on those established relationships and word of mouth to secure work. Clients varied considerably among the surveyed microbiologists (e.g., laboratories, hospitals, manufacturers, pharmaceutical companies, regulatory agencies, and national and educational organizations). None of the consultants who responded to the survey had day-to-day involvement with their clients, except for the full-time consultants at the private consulting company, who are available 24/7 for questions and decisions. Table 1 lists a few of the more common tasks and opportunities that are available to the microbiology consultant.

Legal considerations

Most of the surveyed microbiologists formed a limited liability company (LLC). As an example, the authors applied for an LLC with legal assistance to practice in specific states. They found an LLC was relatively easy to set up and maintain annually [6]. To establish their LLCs they took the following steps.

1. Chose a name that reflected the nature of their consultation business.
2. Chose a registered agent (e.g., attorney).
3. Filed articles of organization paperwork with the Secretary of State that included the name and address of the LLC, length of its existence if not perpetual, name and address of the registered agent, and purpose of the LLC.

The paperwork was signed by the person forming the LLC and, in some states, the registered agent. Note that all states have a filing fee, albeit nominal, that varies from state to state, and if there is more than one person forming the LLC, an operating agreement that defines the members' rights and responsibilities is required. After the documents are filed and approved, the state issues a certificate that formally confirms the existence of the LLC. Once an LLC certificate is received, the owner is able to obtain a tax ID number and a business license, if necessary, and to set up a business bank account. (Disclaimer: the information provided is based on the authors' experience in their respective states and may not apply to consultants in all states or countries.) A few of the surveyed microbiologists work in multiple states. Prior to setting up an LLC, registration may be required with a registered agent in states beyond an individual's primary state of business. Although some clients provide liability insurance, most of the surveyed consultants are self-insured. Client coverage may be negotiated as part of the contractual arrangements.

Financial plan

An important question when starting a consulting business is how to determine how much to charge for your services. Do you charge an hourly rate or per project or presentation, or for travel expenses? As one surveyed consultant commented, "If you charge too little because you think you will get more business, clients may not take you seriously, and if you charge too much, you just might price yourself out of the market." It is best to establish a firm pricing structure following analysis and some trial and error as to how much time a given project will take. When calculating your time, you may want to consider whether several clients are facing similar problems that will allow you to implement the same solution and decrease the time and charge for each of those clients.

Table 1. Consulting opportunities in clinical microbiology

- Accept direct calls from physicians to discuss case diagnosis, treatment, and stewardship.
- Call clients weekly to answer questions and provide input.
- Participate as an expert witness in legal cases.
- Participate on hospital antibiotic stewardship committee and laboratory decision-making committee for new technology and instrumentation.
- Prepare for laboratory inspections.
- Sign off on CAP proficiency testing.
- Prepare procedures and verification studies.
- Respond to staff and physician questions.
- Provide consultations for laboratories that do not have a Ph.D. director.
- Serve as a CLIA medical director. Of interest, only those respondents who were CLIA medical directors had experience working as a laboratory technologist early in their careers.

Determining the client's cost savings may also help to establish your fee. When establishing a pricing structure, consultants should also factor in the expenses to support their business, including outside resources to solve a client's problem, supplies, legal fees, liability insurance, and benefits otherwise covered by an employer. For private consulting companies, in addition to obtaining an LLC and city license, they also must pay self-employment taxes. Some consultants find accounting software to be a valuable tool for customized online invoicing, bookkeeping for IRS documentation, and to store information in the cloud in the event of computer crashes. Others use a certified public accountant familiar with LLC requirements in the state(s) where the consultant is practicing.

Marketing your service

Prepare a resumé outlining your education and years of experience, and design business cards that include contact information and credentials for potential clients. Being able to succinctly define in writing and verbally what you can do and what value you can bring to the client, will help market your services. Develop a branded look for all your documents and forms, such as a proposal template and billing forms. Some consultants, like those at the private consulting company, prepare brochures and send letters listing their services to laboratory managers, supervisors, and pathology directors.

Networking

Social media and professional websites, like ClinMicroNet, DivC, LinkedIn, Facebook, and other laboratory "chat groups," are excellent ways of staying in touch with key people and making yourself known to potential clients. All the surveyed consultants obtained consulting jobs either by word of -mouth, through their website, by marketing to industries they already knew, or through networks they had established. Put yourself out there at meetings, get involved in organizational committees, and seek introductions at meetings with professionals where you can exchange contact information to follow up. Consider building a website that provides the strategies to market your company online or create a website using tools like WordPress or Squarespace, which require you to learn basic Web design skills. For those without website-building skills there are a number of templated services that can help design and establish a professional-appearing website. Another option is to work with a headhunter to acquire consulting jobs.

Client interview

All the surveyed consultants transitioned from their primary full-time job in microbiology to consulting in the same field. For potential new clients, it is incredibly important to communicate your skills; experience, such as an example of a problem solved; and solutions used. Also, if they ask what you do and what do you offer, you need to be able to provide a short, concise response. You may find it helpful to enlist a respected colleague to listen and offer constructive criticism to refine your response. During your initial meeting, the client will most likely discuss their goals and objectives and outline their expectations of your role in solving their problem. It is important to ask questions to ensure you understand a client's obstacles and objectives so you can evaluate what will be needed to meet the client's goal and to develop recommendations based on your evaluation. As a consultant, you may want to provide a detailed written report or oral presentation summarizing your discussion and what you recommend without overpromising or overextending beyond the established goal. The next step is signing a contract developed by either the client or the consultant. Consultants at a private company prepare their own contracts; alternatively, clients themselves may prepare the contracts, and after review by an attorney and when negotiations are complete, the client will modify the contract, followed by signing by both client and consultant.

Implementation

Effective implementation of plans for improvement requires consensus, commitment, problem-solving techniques, and management methods. For a successful outcome, the client and consultant should discuss what steps the company is ready to pursue. Designing the steps for process improvement should preferably be done with the client and stakeholders, including administration, depending on the magnitude of the change. As a consultant, you may provide the right recommendation, but the stakeholders are not onboard with making a change. Therefore, it is important to first build stakeholder consensus and commitment in instituting corrective action; otherwise, recommendations may not be implemented due to constraints outside your purview. To institute your recommendation(s), you may need to request a second meeting once the constraints have been resolved. As a consultant, you may question whether you should recommend only steps you believe will be accepted or implemented successfully, or what you know is the right thing to do. This is a question only you can answer. You may find it helpful to implement gradual changes and discuss progress on a regular basis. If a change proves successful, further changes may be more readily accepted and instituted. As part of the consultation, you may also want to educate the client on how to resolve similar problems in the future.

What Is a Day Like in the Life of a Consultant Microbiologist?

There were varied responses from the surveyed consultants about their activities as consultants that included preparation of presentations and manuscripts, reviewing data files, writing protocols, onsite inspections, site visits, responding to phone calls, interaction with physicians, and participating in committee meetings. These microbiologists have all had rewarding experiences in their consulting careers. For example, one consultant acted as the major lead by providing a core laboratory consolidation, cost analysis for major recommended changes, and information to achieve optimal antimicrobial treatment. Other consultants have enjoyed being expert witnesses and the financial gains associated with these cases. Many have been a resource for health care providers and the public through formal and informal presentations and publications on current events related to public health, laboratory medicine, antimicrobial stewardship, etc. Tables 2 and 3 provide more insights into the life of a consultant.

Table 2. Pros and cons of being a consultant

Pros	*Cons*
• Enjoying freedom and flexibility of work schedule	• Sending reminders for late payments
• Controlling what you do	• Lacking time to complete consulting jobs
• Making more money per hour	• Missing hands-on bench work
• Keeping active and up to date in the field	• Paying expenses to attend meetings and maintain licensure and board certifications
• Meeting new clients	• Taking on too many clients for a part-time consultant
• Appreciating respect and implementation of recommendations without argument	• Missing benefits, health insurance, pension
• Working with health care administrators	• Disagreements with other health care specialists
• Encouraging communication	• Determining what to charge and paying taxes
• Leveraging years of experience to work on projects and help people who need help	• Overall, the most consistent cons were "securing clients" and "no benefits."
• Learning from clients	

Table 3. Lessons learned from our surveyed consultants

- Plan; make sure you have liability insurance (self-insured or from clients), license, or LLC; use website or social media to market yourself.
- Know your limits and stay within them.
- Create a business plan.
- Keep in contact with your colleagues and peers. Your colleagues can be a great resource for the dos and don'ts of consulting.
- Make sure you will be OK financially without your primary job.
- Do not overprice or underprice your service.
- Explain clearly and concisely what you do if asked.
- Listen and ask questions so you have a clear understanding of a client's obstacles and objectives.
- Get a contract and negotiate before you say "Yes."
- Watch out for non-competes.
- Inform your primary employer annually if you are consulting, and separate your full-time job responsibilities from your consulting obligations.
- Choose jobs of interest to you.
- Clarify what your timelines are.
- Provide evidence based guidance
- Provide advice and let the client decide.
- Maintain credentials.
- Keep informed, attend live or virtual educational meetings, and participate in American Society for Microbiology (ASM) and other professional society activities.
- Continue to publish and participate as a speaker, moderator, or meeting organizer.
- Realize consulting is a fragile relationship and the first to be eliminated if cutbacks are required.
- Understand that some pathologists think if the laboratory passes CAP inspections, they do not need a consultant.
- Local experience with a national "consulting organization" because of aggressive cost-cutting recommendations may leave a negative initial impression of consultants with laboratory personnel that could negatively influence an individual seeking to be a valuable personal consultant for the laboratory.
- Should have realized benefits of consulting a long time ago, e.g., no staffing or employee evaluations, no budgets to prepare, and no lab managers to deal with.

In Summary, What Is the Best Advice for Someone Considering a Career Change?

You first need to determine your motivation to change careers and talk to colleagues who are consulting to determine the pros and cons of consulting so you make an informed career choice. Realistically evaluate your skills and personality, for example, are you a 'people person', self-motivated, a problem solver, or detailed oriented? What time commitment are you willing to devote to developing a consulting business? Do you want to work full or part time or only as your personal time permits? Can you financially make a change? Where do you want to focus your efforts, (e.g., laboratory management, technical issues, or education)? Determine when you will make the change and plan ahead, ideally 9 months to 1 year in advance.

You may want to take a course in setting up a consulting business. Have a plan for what comes next, both short and long term, (e.g., 1, 5, 10-year plan). Continue to stay informed and updated by subscribing to relevant journals, attending conferences, webinars, and professional organizations. If you intend to stay in the field of microbiology, you will have the luxury of being able to apply past experiences, knowledge, and rely on relationships developed over the years to your advantage. Be flexible and be prepared for an evolutionary journey!

Editor's Post-Script

The authors of this manuscript have started their own microbiology consulting businesses following successful careers as Directors of Microbiology Laboratories. A brief summary of their careers is provided for perspective on one type of career path that can lead to consulting. Both majored in biology as undergraduates and worked as medical technologists before returning to school to receive their Master of Science and Doctor of Philosophy degrees with a major in Microbiology. Upon graduation, they each accepted positions as Directors of Microbiology. Although they consulted while holding full-time Director positions, in 2016, each made a career change, leaving their primary positions to pursue careers as independent part-time consultants.

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A Gram-negative Curve Ball

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Question

A man in his 70s presented to a gastroenterology clinic for evaluation of chronic diarrhea and presumed microscopic colitis. He had reported GI-related symptoms for 18 months with occasional profound watery diarrhea up to eight times per day. Previous visits included a CT, which showed distention due to gas and moderate stool burden, and a colonoscopy, which found diverticulosis and hemorrhoids. Symptoms persisted despite at-home remedies and two courses of cholestyramine. For the current visit, the following microbiological tests were ordered: *Clostridioides difficile* stool antigen, routine stool culture, and complete ova and parasite stool exam (O&P), including *Cryptosporidium* and *Giardia* antigen testing.

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The *C. difficile* stool antigen and complete O&P were negative. For the routine stool culture, overnight growth revealed a predominant microbe: non-hemolytic grey on sheep's blood agar (35°C in 5% CO_2), green colonies on Hektoen enteric agar (35°C in air), non-lactose fermenter on MacConkey agar (35°C in air), and no growth on *Campylobacter* blood agar (42°C under microaerophilic conditions). Additional testing of the microbe revealed a curved Gram-negative bacillus that was oxidase positive and hippurate hydrolysis negative. Which of the following matches this description?

(a) *Campylobacter jejuni*

(b) *Shigella sonnei*

(c) *Pseudomonas aeruginosa*

(d) *Arcobacter butzleri*

(e) *Cyclospora cayetanensis*

(See back for answer)

Clinical Microbiology Q&A

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Answer

The answer to this question is (d) *Arcobacter butzleri*. *A. butzleri* is a curved, Gram-negative, non-spore-forming rod that is oxidase positive and hippurate hydrolysis negative. The genus *Arcobacter* is most closely related to the genus *Campylobacter*. *A. butzleri* has been reported as the fourth most common *Campylobacter*-like microbe isolated from patients with diarrhea [1]. *A. butzleri* was also found to be the causative agent of an outbreak linked to a wedding reception in Wisconsin in 2013 [2]. The pathogen is considered to be underrecognized because of its variable growth at 35°C, limiting culture by clinical microbiology laboratories.

Incorrect Answers

C. cayetanensis is a parasite that would be detected by the complete ova and parasite examination. Green colonies on Hektoen enteric agar is suggestive of *S. sonnei*, but *S. sonnei* is not curved and is oxidase negative. *P. aeruginosa* is known for being oxidase positive, but the Gram stain description is not consistent, and the microorganism is not associated with causing diarrhea. The curved morphology and positive oxidase reaction are most associated with *Campylobacter* and *Arcobacter* species. *C. jejuni* can be ruled out by the lack of growth on Campy agar and the negative hippurate hydrolysis reaction.

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