The Impact of Managed Care and Health System Change on Clinical Microbiology

A Survey Analysis
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Prepared by

The Lewin Group, Inc.
9302 Lee Highway, Suite 500
Fairfax, VA 22031-1214

For the

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Executive Summary

This Executive Summary provides a brief review of each section of this report. Additional details may be found in the main text.

INTRODUCTION

The American Society for Microbiology (ASM) engaged The Lewin Group to conduct a survey analysis that investigated the impact of managed care and other health system change on the functions and practices of clinical microbiology laboratories. The study also explored the strategies implemented by laboratories in response to these changes. Main research questions included the following:

1. How has managed care / health system change affected the role of the clinical microbiologist?
2. How has managed care / health system change affected the clinical microbiology laboratory?
3. How has patient care vis-à-vis the laboratory been impacted by these changes?
4. What, if any, successful cost saving measures and revenue enhancement activities have laboratories implemented in response to managed care and/or other health system change?

The study analyzed a total of 351 responses.

DATA AND METHODS

The survey contained questions that pertained to each of the main research questions, described above. To develop the survey instrument, we relied on background information and the input of an ASM advisory panel. Survey topic areas included: sample group characteristics; roles of the clinical microbiology laboratory director and clinical laboratory director; managed care and health system change impact on clinical microbiology laboratories; patient care vis-à-vis the clinical laboratory; and cost saving/revenue enhancement measures. We held a focus group of ASM members to review the final survey instrument.

The survey sample was drawn by ASM personnel from the ASM membership. In addition to ensuring broad representation of different laboratory types, one of the goals of the study was to compare responses among different stakeholders. Accordingly, three groups were defined as main stakeholder groups: clinical microbiology laboratory directors, overall clinical laboratory directors, and administrators or executive management with responsibility for the laboratory. Of the 351 survey respondents, 143 were clinical microbiology laboratory directors, 125 were clinical microbiology laboratory directors, 125 were clinical laboratory directors, and 83 were administrators.

A range of statistical techniques were used to analyze the data. Descriptive statistics were calculated (means, standard deviations, tabulations, and proportions) for all questions on the survey. Cluster corrected bivariate and multivariate statistical analyses were used to explore relationships between questions, and to compare responses to key ques-
tions among the major subgroups of respondents. A number of questions asked survey respondents about their experience, and allowed us to create a number of key subgroups. Subgroups were based on position, setting, health system change experience, and payment source.

RESULTS AND DISCUSSION

The Effect of Managed Care and Health System Change on the Role of the Clinical Microbiologist

■ Laboratory staff have spent increasing amounts of time on managed care and related activities driven by health market change.

- Clinical microbiology laboratory directors and clinical laboratory directors reported that the time they spend on financial management (49% and 69% of respondents, respectively) and cost control activities (81% and 80% of respondents, respectively) has increased during the past five years.

- Additional activities where at least a quarter of survey respondents reported an increase include managed care contract marketing (23% to 42%), development and implementation of performance improvement strategies (74% to 84%), and outcomes research (33% to 46%).

- Importantly, nearly a third of microbiology laboratory directors and clinical laboratory directors reported decreases in time spent on the performance of laboratory tests and basic research, and about a fifth reported decreases in time spent on new product and test development.

■ Clinical microbiology laboratory directors, clinical laboratory directors, and administrators have similar perceptions about the impact of managed care and health system change on clinical microbiology laboratories.

- The agreement among survey participants is a positive result, as it indicates some degree of uniformity of opinion and focus across different levels within an organization.

Impact of Managed Care and Other Health System Change on the Clinical Microbiology Laboratory

■ A variety of strategies to reorganize and restructure have enabled laboratories to enhance their competitive positions in the evolving health care market.

- Nearly 90% of survey respondents reported that their laboratory had experienced at least one of the following during the past five years—had acquired another organization, had been acquired, had merged, had downsized, or had increased partnerships or affiliations with other laboratories.

- Results also illuminated the differences in the nature and effectiveness of strategies employed by the laboratories represented in this study:

Networked laboratories, for example, emphasized the importance of managed care in their activities and in their perception of the influence of market forces affecting their laboratories.
Laboratories that pursued a strategy of partnering or affiliating with other laboratories increased their efforts to control costs and improve quality, and became more efficient and productive during the past five years; results suggest that this was a powerful, and initially successful strategy.

Those laboratories that downsized focused mainly on cost control strategies.

- **Clinical microbiology laboratories have experienced changes in staffing patterns related to managed care and health system change.**
  - While there is some evidence of staff substitution (30% of respondents reported this has occurred in their laboratory), survey results indicate that overall downsizing of staff appears to be the more critical issue.
  - Between three and four times as many survey respondents reported a decrease than an increase in the number of mid-level positions (e.g., M.S or B.S level microbiologists or technical supervisors), and there was little indication that other types of lesser trained staff had been hired to replace them.
  - A total of 64% of respondents reported a decrease in overall staffing.

- **Despite fears that managed care would reduce testing volume, survey respondents reported increases in overall testing volume and in the volume of nearly all types of tests.**
  - Survey results suggest that testing volume increased during the past five years. Sixty-six percent of survey respondents reported an increase in overall testing volume.
  - Furthermore, except in the case of environmental testing, more people reported an increase than a decrease in volume for every type of laboratory test.
  - In many cases, however, a tenth or more of respondents reported decreases in the performance of certain types of laboratory tests, such as bacteriology, mycobacteriology, and anti-microbial susceptibility testing.
  - One notable survey result regarding testing volume is that more clinical microbiology laboratory directors and clinical laboratory directors reported decreasing rather than increasing the amount of time they spend performing laboratory tests.
  - Survey results indicate that laboratories have become more efficient during the past five years, having reduced time spent per test and having invested in technology to increase efficiency.

- **Managed care and health system change has affected laboratory purchasing decision-making and quality of supplies.**
  - About 70% of survey participants reported that purchasing decision-making has become more centralized; that is, fewer individuals or organizations are making decisions for larger numbers of laboratories. Nearly half of the survey sample feel that microbiologists’ decision-making authority for purchasing has changed, and of those, nearly three-quarters believe that their authority has declined.
  - Thirty percent of survey participants reported that they have witnessed a change in the quality of supplies during the past five years. Of the respondents who reported a change, most (71%) said there was a decline in the quality of supplies; however, 88% of all survey respondents reported no adverse effect on operations.
Various types of institutions have reacted differently to managed care and health system change.

- For instance, while individuals in reference laboratories have quickly adapted and reacted to the challenges of managed care, survey respondents from public health laboratories reported little engagement in managed care-related activities.

- Hospital-based laboratories, in both academic and non-academic hospitals, were distinguished in their strong emphasis on cost control and revenue enhancement.

Impact of Managed Care and Other Health System Change on Patient Care

- Laboratories have undertaken efforts to improve patient care.

  - One effect of managed care and health system change has been the increased use of quality assurance mechanisms, such as ongoing assessment of the competency of laboratory personnel, efforts to eliminate medically unnecessary testing, validation and verification of all test results, and monitoring of specimen integrity and contamination rates. Between 60% and 80% of survey respondents reported increases in the use of these measures.

  - Survey respondents also reported improvements in efficiency and productivity, which may also translate into improved service provision.

Cost Savings Measures Implemented In Response to Managed Care and Health System Change

- Laboratories have buoyed their financial position through cost control and revenue enhancement activities.

  - Survey results clearly demonstrate that laboratories have needed to initiate cost control and revenue enhancement activities in response to health care system cost pressures.

  - Nearly 90% of survey respondents reported that their laboratories acquired new technologies to increase efficiency or decrease cost. Respondents also reported implementation of utilization review (70%), outsourcing of costly, low volume tests (62%), and prior authorization requirements (47%).

  - Respondents also reported expansion into new areas such as overall outreach testing, molecular/PCR testing, diagnostic/pharmaceutical trials, and nursing home testing.

  - Institution type and health system change experience influenced survey results: academic and non-academic hospitals focused most aggressively on both cost control and revenue enhancement activities, relative to reference and public health laboratories. Laboratories that acquired another organization or developed partnerships or affiliations emphasized revenue enhancement, and laboratories that downsized focused on cost control activities.
Conclusion: Managed care and health system change has had a clear and potent impact on clinical microbiology

This study represents an important opportunity for the ASM to evaluate the impact of managed care and health system change on clinical microbiology. As the survey results show, clinical microbiology has undergone tremendous change and laboratories have begun to adapt to the new health care environment—changes can be seen in the activities performed by laboratory staff, in new efforts undertaken by laboratories to improve quality, in staffing changes, in efficiency and productivity levels, and in various cost savings and revenue enhancement activities adopted by laboratories. Microbiology laboratories are evolving in response to changing demands of the health care system, and managed care is likely to become an even more important force affecting microbiology in the years ahead. While this study documents profound change in the clinical laboratory, it measures the frequency of that change but not its magnitude. A crucial goal for the microbiology community during the coming years will be to continually evaluate the market forces affecting clinical microbiology laboratories to ensure continued quality service in the face of new challenges posed by a rapidly changing health care system.
i. Introduction

The Lewin Group was contracted by the American Society for Microbiology (ASM) to investigate the impact of managed care and other health system change on clinical microbiology laboratories. These laboratories play an important role in medical decision making. They provide physicians with test results needed to make accurate diagnoses, and help ensure that patients receive appropriate treatment. More recently, clinical laboratories have also become actively involved in research and extramural activities, such as infectious disease studies and epidemiologic surveillance. As a stakeholder in the U.S. health care system, clinical microbiology laboratories are experiencing the broad effects of managed care and health system change, and their roles and functions are being redefined.

Today, clinical microbiologists are confronted with the changes and challenges of a dynamic health care marketplace. Managed care has been adopted as a primary mechanism for cost control, has led to a radical restructuring of health service delivery. In an effort to increase efficiency, managed care has introduced capitated payment systems, shifted the site of care from inpatient to outpatient settings, and focused greater attention on disease management and preventive medicine. In turn, managed care practices have catalyzed additional health system change, including the development of integrated health networks. As a result of these developments, the roles of health service providers have been redefined, and the departments of health care institutions have undergone significant organizational changes. Clinical microbiologists are among the health service providers that must adapt and respond to health system change.

The purpose of this study was to examine the effects of an evolving health care marketplace on the functions and practices of clinical microbiology laboratories. Furthermore, the study was intended to explore the strategies implemented by laboratories in response to these changes. The study focused on the following main research questions:

- How has managed care / health system change affected the role of the clinical microbiologist?
- How has managed care / health system change affected the clinical microbiology laboratory?
- How has patient care vis-à-vis the laboratory been impacted by these changes?
- What, if any, successful cost saving measures and revenue enhancement activities have laboratories implemented in response to managed care and/or other health system change?

The study was based on a comprehensive telephone survey of clinical microbiology laboratory directors, clinical laboratory directors, and hospital administrators. The study analyzed a total of 351 responses. The survey was directed at three sampling groups in order to gain comprehensive insight into the multidimensional effects of managed care and health system change, and to examine institution-wide efforts to adapt and respond to these changes. The survey also sought to explore how experience within clinical microbiology varies by individual, laboratory, and market characteristics, and to investigate the interrelationships of market forces, health system change, and laboratory activities. In the sections that follow we present our methodology for the survey, detailed survey results, and a discussion of our findings.
ii. Data and Methods

A. SURVEY INSTRUMENT DEVELOPMENT

The ASM survey was designed to evaluate the impact of managed care and health system change on (1) the roles of clinical microbiology laboratory directors and clinical laboratory directors, (2) the operation of clinical microbiology laboratories, and (3) patient care vis-à-vis the laboratory. In addition, the survey sought to assess the response of microbiologists and their institutions to changes induced by health care market forces.

Prior to developing the survey instrument, The Lewin Group worked with the ASM to identify survey sampling groups. The ASM organized a Technical Advisory Panel of ASM members to assist us in this endeavor. Based on feedback from the panel we selected clinical microbiology laboratory directors, clinical laboratory directors, and hospital administrators as our sampling groups.

Following this process, The Lewin Group commenced survey development. We began by performing an informal literature review to identify and better define key issues. For this task, we relied heavily on literature published by the ASM, our conversations with ASM leadership, and clinical laboratory expertise within The Lewin Group project team. We then organized key issues into broad topic areas, and generated questions relevant to each. The final topic areas served as section headings for the survey and included the following:

• **Sample Group Characteristics** collected information on the respondents’ background and experience in the field of microbiology and/or laboratory management.

• **Roles of the Clinical Microbiology Laboratory Director and Clinical Laboratory Director** addressed the impact of managed care and health system change on the responsibilities of individuals who manage the day-to-day operations of clinical laboratories. Questions examined the extent to which the directors’ roles have increased or decreased in such areas as laboratory testing, staff supervision, financial and performance management, and clinical research.

• **Clinical Microbiology Laboratories** contained questions that evaluate the impact of managed care and health system change on the function and management of clinical microbiology laboratories. Specifically, this section examined changes in laboratory testing (e.g., volume and site of service), staffing, and financial practice patterns (e.g., budgeting, purchasing, and reimbursement). Hospital administrators were also asked about the role of the laboratory in their institution’s negotiations with managed care organizations.

• **Patient Care vis-à-vis the Clinical Laboratory** focused on the impact of managed care and health system change on the ability of clinical microbiology laboratories to provide optimal testing services for use in patient care. Questions explored changes in laboratory efficiency (e.g., testing volume, productivity, and cost per test) and the use of quality assurance mechanisms (e.g., validation and verification of results).

• **Cost Saving/Revenue Enhancement Measures** investigated how clinical microbiology laboratories and their respective institutions are responding to the effects of managed...
care and health system change. As the title of this section suggests, we focused here on financial strategies implemented by these laboratories. Included were questions about cost saving measures such as outsourcing and utilization reviews, and revenue enhancement activities such as strategies for expanding the range of testing services offered.

Because the sampling groups were expected to have a range of experience and backgrounds, we developed a core set of questions for all respondents as well as a few supplementary questions specific to each group. ASM members reviewed the draft survey instrument for its clarity and content; we met with an informal focus group at the ASM to discuss the survey in detail. The final survey consisted of 22 multiple choice questions (many with multiple parts), and a single open-ended question. The survey instrument can be found in Appendix A.

B. SAMPLE DESIGN

The survey sample was drawn by ASM personnel from the ASM membership database. Organizations included hospital laboratories, reference laboratories, public health laboratories, and other independent laboratories. Individuals were randomly sampled from the membership database by the ASM. The sample provided by the ASM was made up of individuals identified as clinical microbiology laboratory directors, identified based on their title and position on the membership lists.

In addition to ensuring broad representation of different laboratory types, one of the goals of the study was to compare responses among different stakeholders. Accordingly, three groups were defined as main stakeholder groups:

- Clinical microbiology laboratory directors,
- Overall clinical laboratory directors, and
- Administrators or executive management with responsibility for the laboratory

The sample design was then stratified to ensure adequate sample size in each of the three groups so that statistically meaningful comparisons among the groups would be possible. Using standard statistical power estimation techniques (Kraemer and Thiemann, 1987) a target sample size of 100–120 per group was defined, based on a desired statistical power level of 85%\(^1\). In order to survey clinical laboratory directors and administrators, each of the identified clinical microbiology laboratory directors was sent a letter asking them to identify and provide contact information for a clinical laboratory director and an administrator in their organization. This sampling method, where three individuals who hold different positions in one organization are all sampled, is known as a matched sampling design.

Upon fielding the survey, it was determined that a large number of microbiology laboratory directors on the list had shifted to one of the other positions, and that providing the additional names (of the other main study groups) was not always possible. Nevertheless, it was apparent that adequate numbers of each of the three groups could be identified through this process. Thus, in order to fully populate the three comparison groups (microbiology directors, laboratory directors, and administrators) we employed a quota sampling strategy for achieving the target cell sizes. In essence, this approach created three random samples, one for each of the main comparison groups. In some cases, the individuals were within the same organization, and in some cases not.

\(^1\) Assuming a two-tailed test, and a 5% level of statistical significance. These values and this level of statistical power are typical of survey studies of this type.
Having three sample groups allows for reasonably straightforward multi-sample comparisons of the three groups, using traditional statistical tests. The one complication is that individuals from the same organization cannot be treated as independent of one another. This situation is known as a cluster sample, and requires a correction of standard errors for the non-independence. Accordingly, all of the comparative analyses conducted for this study use cluster corrected statistical tests.

C. SURVEY ADMINISTRATION, FINAL SAMPLE SIZE, AND RESPONSE RATES

After the pre-survey mailing (described above) was sent out, the survey was administered by telephone over a three week period during January and February of 1998. The survey required approximately 20 minutes to complete. All responses were recorded using a computer-assisted telephone interview system (CATI).

The names of 512 clinical microbiology laboratory directors were provided to us by the ASM. Of these, 367 were successfully contacted by the survey agency. Two hundred thirty-four (or 64%) responded to the survey, and 133 (or 36%) refused to participate. The clinical microbiology laboratory directors referred a total of 251 clinical laboratory directors and administrators to the survey agency; and of these, 164 were successfully contacted. Of the clinical laboratory directors and administrators contacted, 135 (or 82%) responded to the survey, and 29 (or 18%) refused to participate. Overall, we achieved a 70% response rate.

The final sample consisted of 369 individuals (150 clinical microbiology laboratory directors, 129 laboratory directors, and 90 administrators) from 231 institutions. Thus, although there were clusters of individuals, there were also many independent observations in the sample.

D. STATISTICAL ANALYSIS

Upon examining responses, we discovered that very few respondents from non-hospital facilities (3 respondents), physician office laboratories (2 respondents), or non-affiliated laboratories (7 respondents) had been surveyed. Each of these groups was too small to constitute an analysis group, therefore, these 12 respondents were dropped from all of the analyses described below. Additionally, only 6 individuals reported receiving an educational degree that did not fall into one of the categories presented to respondents (BA or BS, science related MS or PhD, M D, M BA, or M HA). These 6 individuals were also dropped from the analyses. The analyses, therefore, were conducted on a total of 351 survey participants (143 clinical microbiology laboratory directors, 125 clinical laboratory directors, and 83 administrators).

A range of statistical techniques were used to analyze the data. Descriptive statistics were calculated (means, standard deviations, tabulations, and proportions) for all questions on the survey. Cluster corrected bivariate and multivariate statistical analyses were used to explore relationships between questions, and to compare responses to key questions among the major subgroups of respondents. A number of questions asked survey respondents about their experience, and allowed us to create a number of key subgroups. Subgroups were based on position, setting, health system change experience, and payment source.

In general, the main research questions (described above) constituted the basic framework that guided the comparative analyses that were conducted. For comparisons among
the questions requiring respondents to rate the importance (on a scale of 1-5) of market forces impacting clinical microbiology laboratories or services for obtaining managed care contracts, iterative t-tests were employed to assess which areas received the highest scores. The principle analytic technique to compare subgroup responses was multiple regression modeling. Regression analysis entails setting up a model of relationships among study variables (the survey questions). Each variable of interest is termed a “response” or “dependent” variable, and the host of variables that may be correlated with the response variables are called “explanatory” or “independent” variables.

The regression approach we used was to run a model for each question on the survey, in which each question was designated as the dependent variable. An identical set of explanatory variables were used for every model, including the following:

- Position;
- Institution type;
- Network status (i.e., whether the respondent’s organization is part of a network of affiliated laboratories);
- Health system change experience (i.e., whether the respondent’s organization had been acquired, acquired another organization, merged, downsized, expanded, or increased partnerships or affiliations during the past five years);
- Level of managed care volume;
- Perception of importance of managed care impact on clinical laboratories; and
- Level of Medicare volume.
- The respondent’s education level; and
- The respondent’s number of years of experience in the laboratory field or in hospital administration.

For continuous response variables (e.g., the importance scores), the primary analysis method was cluster corrected ordinary least squares (OLS) regression. For dichotomous dependent variables we used cluster corrected logistic regression, which models the sample-wide probability of the discrete yes/no choice (e.g., has your laboratory experienced a decrease in overall staffing?) as predicted by the explanatory variables. Polychotomous dependent variables were converted into dichotomous variables based on the main variable level of interest, and were modeled with logistic regression. For categorical response variables, p-values reported are based on the model likelihood ratio chi-square test for the logistic regression. For continuous response variables, p-values are based on the model F test for the OLS regression. These statistics test the dependence of the response variable on the explanatory variable(s), with a statistically significant result indicating that the values of the response variable do indeed depend on the values of the explanatory variable(s) (Weisberg, 1985; Hosmer and Lemeshow, 1989).²

It should be noted that multiple regression techniques are not necessary if the explanatory variables do not highly correlate with each other in such a manner as to obfuscate or confuse the relationship of any given explanatory variable to the dependent variable.

² In addition to examining overall levels of dependence, statistical tests were conducted to compare differences in responses between the multiple subgroups that composed the explanatory variables (e.g., each of the different types of labs.) Tests of multiple subgroup comparisons were evaluated with a Wald test (categorical dependent variables) and with a t-test (continuous dependent variables). These tests, although secondary to the main research questions, helped flesh out the underlying relationship between the response variable and the explanatory variable. These tests were not reported in the paper because exhaustive presentation of these less central results would obscure the main analysis results.
Indeed, compelling and more easily interpretable results are often obtained by simply ex-
amining bivariate relationships—the relationship between a dependent variable and a single 
explanatory variable (which might consist of several groups—i.e., the degree to which 
perceptions of the importance of managed care differed among the three stakeholder groups 
would be a bivariate relationship).

Determining whether bivariate or multivariate analyses are appropriate is an empiric 
question. The technique used to address this question was nested modeling, in which a 
regression model is gradually built up from a bivariate model to a multivariate model, and 
as each larger model is run, the results are checked for changes. If adding additional vari-
ables to the model does not change the result for a given explanatory variable, then the 
bivariate results can be used.

Nested modeling revealed that, in most cases, bivariate analyses were perfectly appro-
priate for this study. In a few cases a true multivariate relationship emerged, in which the 
effect of one explanatory variable on a dependent variable was largely influenced by a third 
(or several) additional variables. In reporting the comparative results, our approach is to 
present bivariate results, except in the case where a multivariate relationship was revealed. 
Unless otherwise noted all comparative results are based on bivariate regressions. As dis-
cussed above, under Sample Design, all of the p-values reported are corrected for clustering 
by institution.

Standard regression diagnostics were performed to ensure that we were using appropri-
ate model specifications for the data collected. The diagnostics included goodness of fit 
tests, residual and outlier analysis, and multi-collinearity assessment (variance inflation 
factors). These diagnostics indicated that the basic model specifications were sound and 
that the underlying methodological assumptions of regression modeling were met by the 
study data. All statistical analyses were performed using STATA®, Release 5.0 (StataCorp., 
1997).
iii. Descriptive Results

This section of the report presents descriptive results from the survey. Key results are described for each of the survey sections—characteristics of respondents; health system change experience of respondents; roles of the clinical microbiology laboratory director and clinical laboratory director; impact of managed care and health system change on the clinical microbiology laboratory; patient care vis-à-vis the laboratory; and cost savings measures implemented by laboratories.

Section IV of the report, Comparative Results, builds on the descriptive results presented here by illustrating how experience within clinical microbiology varies by individual, laboratory, and market characteristics. Thus the descriptive results provide a broad summary of responses to the survey questions, whereas the comparative results section (complete with p-values for all statistical comparisons) is aimed at providing insight on the interrelationships of market forces, health system change, and laboratory activities.

A. CHARACTERISTICS OF RESPONDENTS

As described previously in the methodology section, the sample of respondents to the survey included clinical microbiology laboratory directors (microbiology directors), clinical laboratory directors (clinical directors), and administrators. Respondents from a variety of settings participated in the survey, including those from academic and non-academic hospitals, public health laboratories, and independent reference laboratories. Exhibit III-1 presents demographic information derived from the survey respondents, including position, type of institution, network affiliation, years of experience, and level of education.

EXHIBIT III-1:

Demographic information of the sample

<table>
<thead>
<tr>
<th>Position</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical Microbiology Directors</td>
<td>143</td>
<td>40%</td>
</tr>
<tr>
<td>Clinical Laboratory Directors</td>
<td>125</td>
<td>36%</td>
</tr>
<tr>
<td>Administrators</td>
<td>83</td>
<td>24%</td>
</tr>
<tr>
<td>Total</td>
<td>351</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Institution</th>
<th>Number of Respondents (%)</th>
<th>Number of Institutions (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Hospital</td>
<td>214 (61%)</td>
<td>125 (56%)</td>
</tr>
<tr>
<td>Non-Academic Hospital</td>
<td>81 (23%)</td>
<td>59 (27%)</td>
</tr>
<tr>
<td>Independent Reference Laboratory</td>
<td>37 (11%)</td>
<td>25 (11%)</td>
</tr>
<tr>
<td>Public Health Laboratory</td>
<td>19 (5%)</td>
<td>13 (6%)</td>
</tr>
<tr>
<td>Total</td>
<td>351 (100%)</td>
<td>222 (100%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Educational Background</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA or BS</td>
<td>32</td>
<td>9%</td>
</tr>
<tr>
<td>MA</td>
<td>21</td>
<td>6%</td>
</tr>
<tr>
<td>PhD</td>
<td>202</td>
<td>58%</td>
</tr>
<tr>
<td>MD</td>
<td>58</td>
<td>17%</td>
</tr>
<tr>
<td>MBA</td>
<td>24</td>
<td>6%</td>
</tr>
<tr>
<td>MHA</td>
<td>14</td>
<td>4%</td>
</tr>
<tr>
<td>Total</td>
<td>351</td>
<td>100%</td>
</tr>
</tbody>
</table>
• **Position.** Of the survey respondents, 41% are clinical microbiology laboratory directors, 36% are clinical laboratory directors, and 24% are administrators.

• **Type of Institution.** Of the survey respondents, 61% work in academic hospitals, 23% work in non-academic hospitals, 11% work in independent reference laboratories, and 5% work in public health laboratories.

• **Educational Background.** Of the survey respondents, 9% have completed Bachelor degrees, 6% have completed Master degrees, 75% have completed Doctoral degrees, 7% have completed Business degrees, and 4% have completed Master degrees in Health Administration.

• **Professional Experience.** The survey respondents have an average of 20 years professional experience in their fields.

**B. HEALTH SYSTEM CHANGE EXPERIENCE OF RESPONDENTS**

The main purpose of this study was to evaluate the impact of managed care and health system change on the clinical microbiology laboratory. An important subset of survey questions focused on the types of health system changes that respondents have experienced. Specifically, respondents were asked if their institutions have undergone structural changes during the past five years. Respondents were also asked if their laboratory is part of a network of laboratories. Finally, they responded to questions regarding the source of payment for laboratory services (e.g., managed care, Medicare, private fee-for-service). Responses to these questions not only provided interesting information about the sample and participants’ general experiences, but also allowed us to explore how respondents’ experiences informed their responses to other survey questions (see Section IV: Comparative Results).

• Survey respondents experienced a variety of structural changes during the past five years. Exhibit III-2 presents the percentages of respondents who experienced being acquired by another institution; acquiring another institution; merging with another laboratory; downsizing; and increasing partnerships or affiliations with other laboratories. One note concerning these results is that it may appear inconsistent that 33% of individuals reported that their laboratories acquired another organization, but only 8% reported that their laboratory had been acquired. One possible explanation for this seeming inconsistency is that laboratories that acquired another organization are statistically significantly more likely to be part of a network of laboratories (p<.001). Therefore, multiple respondents from the same network could have reported acquiring the same organization.

• Thirty-six percent of respondents’ laboratories are part of a network of affiliated laboratories.

• Forty percent of respondents reported that payments for laboratory services from managed care organizations fall into the top three largest sources of testing volume for their laboratories. Fifty-seven percent of respondents reported that payments for laboratory services from Medicare fall into the top three largest sources of testing volume for their laboratories.

• Seventy percent of respondents reported that, on a scale from 1-5, where one is the least important and five is the most important, managed care as a market force has had a very important (rating of 4 or 5) impact on their laboratory.
C. IMPACT OF MANAGED CARE AND HEALTH SYSTEM CHANGE ON THE ROLES OF THE CLINICAL MICROBIOLOGY LABORATORY DIRECTOR AND THE CLINICAL LABORATORY DIRECTOR

The evolution of the health care system has brought about major shifts in the roles and responsibilities of all types of health care personnel. Today's health care system continues to be characterized by rapid change. Clinical microbiology has been impacted by shifts in the health care system, and it is important to evaluate the effects of these changes. The first set of survey questions examined the impact of managed care and health system change on the roles of individual providers.

To help microbiologists systematically evaluate how their own roles and responsibilities have changed over the past five years, each clinical microbiology laboratory director (microbiology directors) and clinical laboratory directors (clinical directors) who participated in the survey were asked whether the time that they spend on each of fourteen different responsibilities had increased, decreased, or remained the same during the past five years. Exhibit III-3 presents the results for each responsibility. Results broadly indicate that:

- Many microbiology directors and clinical directors have increased the amount of time they spend on a variety of less traditional responsibilities, but relatively few have actually decreased the amount of time they spend on other responsibilities.

Note: percentages may not add to 100% as some respondents replied "unsure."
• A notable exception to this trend are the areas of performing laboratory tests and basic research, where many reported that they have decreased the amount of time they spend performing these responsibilities.

• The areas that saw the greatest numbers of microbiology directors and clinical directors increasing their time are in less traditional areas of practice, including development and implementation of performance improvement strategies, implementation of cost control strategies, and financial management.

These results mirror the emphasis on performance improvement and cost control that have been seen across many sectors of the health care system. Furthermore, these results also imply that less experienced personnel may now be taking over the more traditional responsibilities of performing laboratory tests and basic research, or alternatively, that less time is simply being spent on these activities.

EXHIBIT III-3:

Changes in microbiology director and clinical director responsibilities over the past five years

<table>
<thead>
<tr>
<th>Microbiology Directors</th>
<th>Clinical Directors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Microbiology Directors</strong></td>
<td><strong>Clinical Directors</strong></td>
</tr>
<tr>
<td>Increased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Perform laboratory tests</td>
<td>30%</td>
</tr>
<tr>
<td>Epidemiologic surveillance and disease reporting</td>
<td>57%</td>
</tr>
<tr>
<td>Financial management</td>
<td>49%</td>
</tr>
<tr>
<td>Managed care contract marketing</td>
<td>23%</td>
</tr>
<tr>
<td>General customer marketing</td>
<td>41%</td>
</tr>
<tr>
<td>Staff supervision</td>
<td>43%</td>
</tr>
<tr>
<td>Development and implementation of performance improvement strategies</td>
<td>74%</td>
</tr>
<tr>
<td>Implementation of cost control strategies</td>
<td>81%</td>
</tr>
<tr>
<td>Basic research</td>
<td>18%</td>
</tr>
<tr>
<td>New product and test development</td>
<td>30%</td>
</tr>
<tr>
<td>Outcomes research</td>
<td>33%</td>
</tr>
<tr>
<td>Clinical consultation</td>
<td>44%</td>
</tr>
<tr>
<td>Continuing education</td>
<td>31%</td>
</tr>
<tr>
<td>Academic activities</td>
<td>29%</td>
</tr>
</tbody>
</table>

* Less than 10% of respondents

Note: percentages may not add to 100%, as some respondents reported “not applicable” if they do not perform the responsibility.

D. IMPACT OF MANAGED CARE AND OTHER HEALTH SYSTEM CHANGE ON THE CLINICAL MICROBIOLOGY LABORATORY

The second set of survey questions focused on how operations of laboratories have changed during the past five years as a result of managed care and major health system change. Just as these changes affect the roles and responsibilities of individuals, market forces also can have a profound impact on the overall functionality of an organization. Survey questions on this general topic focused on survey participants’ perceptions of the importance to their
laboratory of various market forces, laboratory testing, staffing, budget/reimbursement, and managed care marketing.

1. General

(a) Importance of Market Forces

A range of key market forces have emerged over the past decade, all of which have affected the operations of health care organizations, including clinical microbiology laboratories. These market forces include:

• Growth of managed care;
• Hospital consolidation such as mergers and buyouts;
• Emergence of independent reference laboratories;
• Changes in Medicare and other third party reimbursement; and
• Changes in the Clinical Laboratory Improvement Act (CLIA) and other regulatory requirements.

In order for us to assess the relative impact of these forces on clinical microbiology laboratories, survey respondents were asked to rate, on a scale from one to five, the importance of these market forces. As depicted in Exhibit III-4, managed care was perceived to be the most important market force impacting clinical laboratories, followed by changes in Medicare.

Exhibit III-4:

Importance of market forces impacting clinical microbiology laboratories
(b) Importance of Services for Managed Care Contracts

As shown above, managed care is perceived by survey respondents to be a powerful market force impacting microbiology laboratories. In many parts of the country, health care providers, including clinical microbiology laboratories, compete for managed care contracts in order to increase their volume of patients or services provided. Typically, organizations compete based on quality, cost, and the comprehensiveness of services. In an effort to evaluate which services provided by clinical microbiology laboratories are important to managed care contract negotiations, survey respondents rated, on a scale from one to five, the importance of various services for obtaining managed care contracts. Results are presented in Exhibit III-5. The three most important services or qualities for obtaining managed care contracts, according to survey participants, are courier services and the quality of the facility, followed closely by a networked reporting system. These results exemplify managed care’s focus on communication across an integrated delivery system and improving quality of care.

EXHIBIT III-5:

Importance of services for obtaining managed care contracts

<table>
<thead>
<tr>
<th>Service</th>
<th>Importance Rating (1–5 scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Courier services</td>
<td>4.3</td>
</tr>
<tr>
<td>Quality of facility</td>
<td>4.1</td>
</tr>
<tr>
<td>Networked reporting system</td>
<td>4.1</td>
</tr>
<tr>
<td>Specimen collection sites</td>
<td>3.9</td>
</tr>
<tr>
<td>Utilization reporting</td>
<td>3.4</td>
</tr>
<tr>
<td>Support of outcomes analyses</td>
<td>3.3</td>
</tr>
</tbody>
</table>

(C) Changes in Purchasing and Quality

The functions of managed care are essentially two-fold: to reduce health care costs, and at the same time, improve quality of care by providing more integrated, coordinated services. A concern held by many health care experts is that managed care may actually impair quality due to incentives for providers to reduce care (i.e., expend fewer resources) provided to patients. In the clinical microbiology laboratory, the quality of supplies and equipment can influence the quality of the services provided to patients. Survey respondents were asked about changes in decision-making regarding the purchasing of supplies, and whether or not the quality of supplies has changed over the past five years. About 70% of
survey participants reported that purchasing decision-making has become more centralized; that is, fewer individuals or organizations are making decisions for larger numbers of laboratories. Increasing centralization of decision-making has become an approach commonly used by organizations to control costs. Exhibit III-6 shows that nearly half of the survey sample feel that microbiologists’ decision-making authority for purchasing has changed, and of those, nearly three-quarters believe that their authority has declined.

Finally, survey respondents were asked about changes in the quality of supplies or suppliers. Only 30% of survey participants reported that they have witnessed a change in the quality of supplies during the past five years. Of the respondents who reported a change (n=104), most (71%) said there was a decline in the quality of supplies. Of those who reported a decline in quality (n=74), more than 50% reported an adverse impact on laboratory operations. It should be noted, however, that those respondents who feel that operations have been adversely affected by a decrease in quality of supplies represent only about 12% of the entire sample.

<table>
<thead>
<tr>
<th>EXHIBIT III-6:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in microbiologists’ decision-making authority for purchasing during the past five years</td>
</tr>
</tbody>
</table>

Have microbiologists’ decision-making authority for purchasing changed? (n=351)

- 55% No
- 43% Yes
- 2% Unsure

If so, has their decision-making authority increased or decreased? (n=149)

- 72% Decrease
- 24% Increase
- 4% Unsure

(d) Role of the Laboratory in Managed Care Contract Negotiations

Often, institutions obtain managed care contracts for the organization as a whole. For instance, a hospital might win a managed care contract that includes services performed by the hospital’s clinical microbiology laboratory. Administrators, as the group most likely to negotiate with managed care organizations for institution-wide contracts, were asked whether their institution’s laboratory played a role in negotiations with managed care organizations. Fifty-five percent of administrators reported that their laboratory does play a role in their institutions’ negotiations with managed care organizations. Of these,
• Approximately 70% of administrators reported that their laboratory is an asset in these negotiations;
• About 2% reported their laboratory is a liability; and
• The remaining administrators reported that their laboratory is neither an asset nor a liability (23%), or that they were unsure (4%).

These results are important because they indicate an opportunity for many laboratory directors to demonstrate to both administrators of their own institutions and to managed care organizations the value that their laboratory could potentially bring to the negotiating table.

2. Laboratory Testing

In order to learn whether the volume of specific categories of tests have changed due to managed care and health system change, survey respondents were asked whether their laboratories’ volume of eleven types of tests had increased, decreased, or remained the same during the past five years. Survey participants were also asked whether each of ten types of tests are performed in-house, are outsourced, or both. As shown in Exhibit III-7, in nearly every case, more survey respondents reported an increase in performing the tests than a decrease. Furthermore, tests are generally performed on an in-house basis.

### EXHIBIT III-7:

Percent of respondents reporting change in volume of laboratory tests during past five years, and site of laboratory test performance

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Increased</th>
<th>Decreased</th>
<th>Remained the Same</th>
<th>In-house</th>
<th>Outsourced</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteriology</td>
<td>41%</td>
<td>18%</td>
<td>13%</td>
<td>75%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Mycobacteriology</td>
<td>36%</td>
<td>15%</td>
<td>20%</td>
<td>50%</td>
<td>10%</td>
<td>17%</td>
</tr>
<tr>
<td>Anti-microbial susceptibility</td>
<td>39%</td>
<td>11%</td>
<td>23%</td>
<td>73%</td>
<td>1%</td>
<td>4%</td>
</tr>
<tr>
<td>Infectious disease serologies</td>
<td>31%</td>
<td>12%</td>
<td>22%</td>
<td>38%</td>
<td>9%</td>
<td>27%</td>
</tr>
<tr>
<td>Mycology</td>
<td>29%</td>
<td>11%</td>
<td>30%</td>
<td>64%</td>
<td>4%</td>
<td>8%</td>
</tr>
<tr>
<td>Parasitology</td>
<td>28%</td>
<td>18%</td>
<td>22%</td>
<td>69%</td>
<td>4%</td>
<td>1%</td>
</tr>
<tr>
<td>Virology</td>
<td>38%</td>
<td>9%</td>
<td>21%</td>
<td>44%</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Molecular tests</td>
<td>57%</td>
<td>1%</td>
<td>11%</td>
<td>34%</td>
<td>20%</td>
<td>23%</td>
</tr>
<tr>
<td>Blood cultures</td>
<td>38%</td>
<td>6%</td>
<td>33%</td>
<td>73%</td>
<td>1%</td>
<td>21%</td>
</tr>
<tr>
<td>Environmental tests</td>
<td>15%</td>
<td>15%</td>
<td>33%</td>
<td>56%</td>
<td>6%</td>
<td>4%</td>
</tr>
<tr>
<td>Point of care tests</td>
<td>23%</td>
<td>3%</td>
<td>22%</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Note: percentages may not add to 100%, as some respondents reported “not applicable” if their laboratory does not perform a given type of test.
3. Staffing

One effect of managed care and health system change, and the drive to control health care costs, in particular, has been staff substitution and overall shifts in staffing trends. Staff substitution essentially entails substituting lesser trained, less costly staff for more highly trained, more expensive staff. Another trend contributing to changes in staffing is the emerging pattern of institutional downsizing and consolidation. These trends and market forces are having an impact on hiring trends across the health care industry. In order to assess hiring trends in clinical microbiology laboratories, survey participants were asked whether staffing of each of seven different types of laboratory personnel has increased, decreased, or remained the same during the past five years. Results, shown in Exhibit III-8, indicate that:

- Staffing of pathologists and PhD level microbiologists essentially remained the same during the past five years, with equal numbers of survey participants indicating an increase as reporting a decrease.
- Staffing of MS or BS microbiologists, technical supervisors, and medical technologists appears to have decreased, with much larger percentages of survey participants indicating a decrease than an increase for each category of staff.
- Staffing of medical laboratory technicians and laboratory assistants remained about the same, with equal numbers of survey participants indicating an increase as reporting a decrease.

EXHIBIT III-8:

Staffing trends during the past five years

<table>
<thead>
<tr>
<th>Position</th>
<th>Increased</th>
<th>Decreased</th>
<th>Remained the Same</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pathologists</td>
<td>19%</td>
<td>19%</td>
<td>48%</td>
</tr>
<tr>
<td>PhD Microbiologists</td>
<td>10%</td>
<td>9%</td>
<td>75%</td>
</tr>
<tr>
<td>MS or BS Microbiologists</td>
<td>9%</td>
<td>32%</td>
<td>53%</td>
</tr>
<tr>
<td>Technical Supervisors</td>
<td>9%</td>
<td>37%</td>
<td>52%</td>
</tr>
<tr>
<td>Medical Technologists</td>
<td>17%</td>
<td>46%</td>
<td>37%</td>
</tr>
<tr>
<td>Medical Laboratory Technicians</td>
<td>24%</td>
<td>24%</td>
<td>42%</td>
</tr>
<tr>
<td>Laboratory Assistants</td>
<td>19%</td>
<td>19%</td>
<td>41%</td>
</tr>
</tbody>
</table>

Note: percentages may not add to 100%, as some respondents reported “not applicable” if their laboratory does not hire people for the positions.

These results suggest that there has been a general reduction in staffing of mid-level positions. There is little evidence, based on these results, that staff substitution has been a major trend in laboratories. Rather, the lack of an increase at the lower levels suggests that there may be fewer staff working in laboratories overall. These results are further confirmed by questions later in the survey that asked if survey participants’ laboratories had implemented either a decrease in overall staffing, or substitution of less expensive staff in lieu of more highly trained staff to achieve cost savings. While 64% of respondents reported a decrease in overall staffing, only 30% reported the use of staff substitution. Downsizing of laboratories appears to be the larger and more critical issue. Results are similar when the responses to this question are tabulated separately for each laboratory type.
4. Budget/Reimbursement

Survey participants responded to a series of questions about their laboratories’ revenues and budgets. The purpose of these questions was to understand how the financial operations of laboratories have changed during the past five years as a result of managed care and major health system change. Key findings from these questions are depicted in Exhibit III-9. Results indicate that over the past five years:

- Total revenue increased;
- Fee-for-service (FFS) revenue declined;
- Revenue from capitated contracts increased; and
- Clinical microbiology laboratory budgets increased.

Additional results suggest that revenue per test and personnel budgets may have declined slightly, and administrative budgets essentially remained the same.

EXHIBIT III-9:

Changes in budget and revenue streams for clinical microbiology laboratories during the past five years

- Total Revenue: 46% Increase, 25% Increase, 11% Increase, 17% Increase
- FFS Revenue: 40% Decrease, 19% Decrease, 10% Decrease, 31% Decrease
- Capitated Contract Revenue: 46% Increase, 36% Increase, 14% Increase, 5% Increase
- Microbiology Lab Budgets: 46% Increase, 13% Increase, 12% Increase, 28% Increase

Note: results may not add to 100% due to rounding.
Overall, as shown in Exhibit III-10, the top source of testing volume for the majority of clinical microbiology laboratories continues to be either Medicare or fee-for-service contracts. Interestingly, managed care is a lesser source of revenue, despite the decline in overall fee-for-service revenue and increase in capitated revenue for many laboratories.

EXHIBIT III-10:
Top sources of testing volume across the sample

E. IMPACT OF MANAGED CARE AND OTHER HEALTH SYSTEM CHANGE ON PATIENT CARE VIS-À-VIS THE LABORATORY

Just as it is important to understand the impact of managed care and health system change on laboratory personnel and the overall operations and functionality of the clinical microbiology laboratory, it is also critical to evaluate the effects that these changes may have on laboratories’ abilities to provide high quality patient care and services. Survey participants were asked a number of questions relating to testing volume, efficiency, and productivity, as well as laboratories’ use of quality assurance mechanisms. Results of these questions are presented below.

1. Testing Volume, Efficiency, and Productivity

The first set of questions asked of survey participants in this section dealt with issues of testing volume, efficiency, and productivity. While the responses to these questions were not intended to directly evaluate managed care’s and other health system change’s impacts on patient care, the responses are helpful in understanding the various health system pressures on laboratories and their abilities to focus their resources on providing patient care. Results are depicted in Exhibit III-11. Generally, survey responses suggest that laboratories have responded to health system pressures to increase efficiency, reduce costs, and improve quality:
Managed care and health system change have produced increases in both efficiency (less time spent per test) and productivity, and a decrease in costs.

Similar to many other health care sectors there has been increased emphasis on outpatient services.

Laboratories have increasingly adopted the managed care practice of using guidelines when performing laboratory tests.

EXHIBIT III-11:

Percent of respondents reporting an increase or decrease in testing volume, efficiency, and productivity

<table>
<thead>
<tr>
<th></th>
<th>Overall testing volume</th>
<th>Inpatient testing volume</th>
<th>Outpatient testing volume</th>
<th>Time spent per test</th>
<th>Cost per test</th>
<th>Use of guidelines</th>
<th>Overall productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present reporting . . .</td>
<td>66%</td>
<td>50%</td>
<td>78%</td>
<td>57%</td>
<td>44%*</td>
<td>55%</td>
<td>85%</td>
</tr>
</tbody>
</table>

*Note: In this case, 44% represents a majority of respondents as there were more than two possible responses.

2. Use of Quality Assurance Mechanisms

In addition to the increased use of guidelines, as discussed above, many other mechanisms have been employed in an attempt to improve health care quality. In order to understand the prevalence and types of quality assurance mechanisms being used in clinical microbiology laboratories, survey respondents were asked whether their use of four types of quality assurance mechanisms have increased, decreased, or remained the same during the past five years. Exhibit III-12 presents the results from these questions.

These results indicate that there has been an upsurge in the use of all four types of quality assurance mechanisms. The greatest percent of survey respondents reported an increase in the use of assessment of the competency of laboratory personnel, followed by efforts to eliminate medically unnecessary testing. A smaller but substantial percent of respondents reported increased use of methods to validate and verify test results, and to monitor specimen integrity and contamination rates.
F. COST SAVINGS MEASURES IMPLEMENTED IN RESPONSE TO MANAGED CARE AND OTHER HEALTH SYSTEM CHANGE

Few health care organizations today are immune to the cost pressures affecting the U.S. health care system. The final section of the survey was intended to capture the ways in which laboratories are responding to pressures to reduce health care costs. Questions in this section focused on laboratories’ implementation of cost saving measures and revenue enhancement activities. Survey respondents also had an opportunity to speak about innovative strategies that their organizations’ had implemented to reduce costs, increase efficiency, or improve their laboratories’ market share.

1. Cost Saving Measures and Revenue Enhancement Activities

Many survey respondents reported having implemented cost saving measures during the past five years. As discussed previously, one major way in which laboratories have attempted to create cost savings has been through decreasing the number of staff; nearly two-thirds of survey respondents reported that their laboratories’ had done so. Surprisingly, however, survey results indicate that staff substitution is not especially prevalent as a means for achieving cost savings; only 30% of survey participants reported that their laboratories had used staff substitution. Other survey results included:

- Eighty-nine percent of survey participants indicated the acquisition of new technologies to increase efficiency and/or decrease cost.
• Seventy percent of survey participants reported implementing utilization review during the past five years.

• Sixty-two percent of survey participants reported that their laboratory implemented outsourcing of costly, low volume tests.

• Forty-seven percent of survey participants reported implementing procedures for obtaining prior authorization or instituting pre-approval requirements.

These results clearly indicate that clinical microbiology laboratories are placing a strong emphasis on reducing costs in order to remain competitive in the increasingly demanding health care marketplace. Furthermore, as Exhibit III-13 shows, laboratories are also branching out into new areas of business in order to supplement their revenue streams. In addition to expanding overall outreach testing, many survey participants reported greater involvement in molecular/PCR testing, and involvement in pharmaceutical and diagnostic trials.

**EXHIBIT III-13:**

Percent of respondents reporting implementation of various revenue enhancement strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall outreach testing</td>
<td>69%</td>
</tr>
<tr>
<td>Molecular/PCR testing</td>
<td>65%</td>
</tr>
<tr>
<td>Diagnostic/Pharma. testing</td>
<td>59%</td>
</tr>
<tr>
<td>Nursing home testing</td>
<td>45%</td>
</tr>
<tr>
<td>Employee/industrial health testing</td>
<td>36%</td>
</tr>
<tr>
<td>Environmental testing</td>
<td>23%</td>
</tr>
<tr>
<td>Veterinary testing</td>
<td>15%</td>
</tr>
</tbody>
</table>

2. Innovative Strategies

Survey respondents were asked to describe innovative strategies that their laboratories have implemented in response to managed care and other health system change. The goal of this question was to learn of additional cost control and revenue enhancement activities used by laboratories to strengthen their position in the health care marketplace. To be as exhaustive as possible, this topic was covered in both the multiple choice questions, described previously, as well as in an open-ended question. Previously, we inquired about such activities as eliminating medically unnecessary testing, monitoring utilization, assess-
ing the competency of laboratory personnel, acquiring new technologies, and expanding the scope of testing services. In response to the open-ended question asking for additional strategies that had not been mentioned previously, about half of all survey participants commented that either no additional strategies were being used by their laboratory, or that they were unaware of any additional strategies. The remainder of respondents discussed novel approaches for laboratory improvement, and/or provided details about strategies mentioned in previous questions. As shown in Exhibit III-14, laboratory efforts focused primarily on improving laboratory efficiency by:

- Reducing the amount of time spent per test by cutting down on both the number of time-intensive tests performed (e.g., complete blood work-ups) and the number of specimens examined per test (9.4% of survey respondents).
- Hiring experts to assess laboratory operations and develop mechanisms for improving work flow such as redistributing laboratory functions across staff, and enhancing marketing efforts (8.6% of survey respondents).

EXHIBIT III-14:

Innovative strategies to reduce costs, increase efficiency, or improve market share

<table>
<thead>
<tr>
<th>Innovative strategies</th>
<th>Percent of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk purchasing and vendor discount</td>
<td>2.3%</td>
</tr>
<tr>
<td>Expanded scope of laboratory testing services</td>
<td>3.4%</td>
</tr>
<tr>
<td>Improved IT capabilities and communication channels</td>
<td>4.3%</td>
</tr>
<tr>
<td>Acquired new technologies to automate testing and improve efficiency</td>
<td>6.6%</td>
</tr>
<tr>
<td>Integrated/integrating laboratory department functions, internally and/or with affiliated laboratories</td>
<td>6.8%</td>
</tr>
<tr>
<td>Introduced activities to improve staff selection, education, and utilization</td>
<td>8.3%</td>
</tr>
<tr>
<td>Hired experts to improve laboratory efficiency and marketing efforts</td>
<td>8.6%</td>
</tr>
<tr>
<td>Reduced time intensive testing procedures</td>
<td>9.4%</td>
</tr>
</tbody>
</table>

49% of respondents replied no additional strategies or unsure, or were not asked.
• Developing a more productive staff by using more stringent criteria when hiring (to ensure that applicants’ credentials meet the requirements of the position), providing continuing education activities, and performing utilization reviews (8.3% of survey respondents).

• Integrating laboratory departments internally and/or with affiliated laboratories to merge functions and avoid duplicating efforts (6.8% of survey respondents).

Other innovative strategies were directed at reducing costs and capturing greater market share in addition to increasing efficiency. These activities included expanding the scope of laboratory services to include community-based patient testing and non-hospital/industrial microbiology testing; pursuing vendor discounts through bulk purchasing and special contracts; introducing computer technologies to provide decision support, automate testing, and improve communication across laboratories and between laboratory personnel and physicians.
iv. Comparative Results

The results presented in the previous section powerfully demonstrate the impact that managed care and health system change have had on clinical microbiology. Results showed that the responsibilities of clinical microbiology laboratory directors (microbiology directors) and clinical laboratory directors (clinical directors) have changed, the operations of laboratories have evolved to adapt to changes in the health care system, and laboratories are responding to the pressures bearing down on health care costs. These results are important in providing clinical microbiology laboratories with key information on how the environment for microbiology is changing, and the strategies that microbiology, as a whole, has undertaken to keep pace with the environment.

This section of the report goes beyond the results presented above to describe how particular segments of clinical microbiology have fared under today's conditions. The main purpose of the comparative analysis is to understand how experience within clinical microbiology varies by individual, laboratory, and market characteristics, and to understand the interrelationships of market forces, health system change, and laboratory activities. It is also possible to develop a deeper understanding of the strategies undertaken by institutions to adapt to health system change. Finally, it is possible, to some extent, to evaluate the preliminary successes of the strategies adopted by clinical microbiology laboratories.

Analyses were conducted to determine differences in how survey participants responded to questions depending on:

- Their position (i.e., clinical microbiology laboratory director, clinical laboratory director, or administrator);
- The type of institution in which they work;
- Consolidation activities by their laboratory:
  - Whether their institution is part of a network,
  - Whether their institution has been acquired or has acquired another organization,
  - Whether their institution has merged with another laboratory,
  - Whether their institution has developed new affiliations or partnerships with other laboratories;
- Downsizing by their laboratory; and
- Differences in market forces/payment sources:
  - Whether one of their top three sources of testing volume is managed care,
  - Whether they believe managed care is a very important market force impacting clinical laboratories,
  - Whether one of their top three sources of testing volume is Medicare.

Bivariate comparative results (correlations/relationships between two variables) are presented below for the most revealing and significant results in each of these subgroups. As described previously in the Methods section of the report, bivariate, rather than multivariate results, are discussed here due to the compelling nature of the results and the fact that they are readily interpretable. Multivariate analyses were conducted to ensure that the
bivariate relationships are not biased by confounding effects of other variables. Unless otherwise noted, the multivariate results were not materially different than the bivariate results reported here. Interesting null results (where statistically significant results might have been expected but were not found) are also noted throughout this section.

It is important to note that, for the most part, the comparisons among different subgroups of respondents (e.g., academic hospitals, non-academic hospitals, reference laboratories, and public health laboratories) measure differences in the number of respondents in each group who reported a change that occurred during the past five years. For example, respondents were asked whether their involvement in certain activities had increased, decreased, or remained the same during this time period. The responses allow us to compare changes in the level of involvement in laboratory activities by various subgroups during the past five years, but it is not possible, based on these results, to compare absolute levels of involvement in the activities. Therefore, simply because greater numbers of individuals from one subgroup might report increases in an activity compared to another subgroup does not necessarily mean that the former has a higher level of participation in the activity overall than the latter.

A. POSITION

Analyses were conducted to determine whether responses to survey questions varied by position. Subgroup analyses reveal that microbiology directors and clinical directors spend their time differently, and all three groups had somewhat different perceptions about the importance of managed care as a market force, and the importance of having specimen collection sites for obtaining managed care contracts.

As shown in Exhibits V-1 and V-2, during the past five years, greater percentages of clinical directors compared to microbiology directors reported an increase in the amount of time they spend on various administrative functions, including financial management, managed care contract marketing, and developing performance improvement strategies. More microbiology directors reported increasing the amount of time spent on performing laboratory tests compared to clinical directors. Clinical directors were more likely to conduct outcomes research compared to microbiology directors.

While microbiology directors, clinical directors, and administrators disagreed about the importance of managed care as a market force (clinical directors thought it to be more important) and the importance of specimen collection sites for obtaining managed care contracts (microbiology directors thought it to be more important), there was general agreement across these three groups throughout the survey.

B. INSTITUTION TYPE

Various types of institutions have reacted differently to managed care and health system change. Depending on the traditional patient base and structure of organizations, institutions have adopted customized strategies for meeting the challenges of the evolving environment. This survey revealed interesting subgroup differences among the four types of institutions that responded to the survey:

- Academic hospitals;
- Non-academic hospitals;
- Independent reference laboratories; and
- Public health laboratories.
EXHIBIT IV-1:
Changes in time spent on administrative functions by staff position

<table>
<thead>
<tr>
<th>Activity</th>
<th>Microbiology Directors</th>
<th>Laboratory Directors</th>
<th>Administrators</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in time spent on performing lab tests</td>
<td>30%</td>
<td>18%</td>
<td>—</td>
<td>p=.012</td>
</tr>
<tr>
<td>Increase in time spent on financial management</td>
<td>49%</td>
<td>69%</td>
<td>—</td>
<td>p=.001</td>
</tr>
<tr>
<td>Increase in time spent on managed care contract marketing</td>
<td>23%</td>
<td>42%</td>
<td>—</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td>Increase in time spent on performance improvement strategies</td>
<td>74%</td>
<td>84%</td>
<td>—</td>
<td>p=.051</td>
</tr>
<tr>
<td>Increase in time spent on outcomes research</td>
<td>33%</td>
<td>46%</td>
<td>—</td>
<td>p=.036</td>
</tr>
<tr>
<td>Importance of managed care (1-5 scale)</td>
<td>3.94</td>
<td>4.11</td>
<td>3.81</td>
<td>p=.078</td>
</tr>
<tr>
<td>Importance of specimen collection sites (1-5 scale)</td>
<td>3.97</td>
<td>3.90</td>
<td>3.59</td>
<td>p=.067</td>
</tr>
</tbody>
</table>
The survey revealed, for example, that relative to other types of institutions, reference laboratories are more highly focused on managed care and have taken steps to adapt to changes in the health care environment. For instance, individuals who work in reference laboratories were much more likely to have increased the amount of time spent on managed care contract marketing, and considered managed care as a market force to be more important than individuals from other organizations. Reference laboratories’ clear emphasis on managed care was reflected in other questions as well—51% of survey respondents from reference laboratories reported that the percent of their organizations’ revenues from capitated contracts increased during the past five years, compared with between 16% and 33% of respondents from other types of institutions.

Interestingly, as shown in Exhibit IV-3, the heightened focus of reference laboratories on managed care did not translate into increased efforts during the past five years (relative to the other institutions) to control costs (i.e., through utilization review) or bolster revenue (i.e., through outreach testing). It is unknown, however, to what extent reference laboratories had already been performing these activities at the beginning of the five year period. For instance, it is possible that reference laboratories use utilization review more frequently than other types of laboratories and that their use of this tool had remained constant (and high) during the past five years.

Non-academic hospitals appeared to place strong emphasis on cost control and revenue enhancement issues during the past five years. Sixty-nine percent of individuals from non-academic hospitals reported spending increased time on cost control strategies during the past five years. Relative to individuals from other types of institutions, large percentages of individuals from these hospitals also reported increases in strategies to increase revenue, including outpatient testing, overall outreach testing, nursing home testing, and employee/
industrial health testing. Finally, large percentages of individuals from these hospitals also reported implementing methods to control cost/improve performance—84% reported implementing efforts to eliminate medically unnecessary testing, and 73% reported implementing efforts to validate/verify test results (compared, for instance, to only 57% of respondents from academic hospitals). Seventy-seven percent of respondents from non-academic hospitals reported an increase in outsourcing high cost, low volume tests and in conducting utilization reviews.

Likewise, academic hospitals engaged in many of the same activities as non-academic hospitals to decrease costs and enhance revenue. Eighty-two percent of individuals from academic hospitals reported an increase in outpatient testing and 72% reported an increase in overall outreach testing activities. Notably, individuals from academic hospitals were most likely to report a decrease in overall staffing to control costs—fully 70% of individuals from academic hospitals reported decreasing staff. Eighty-three percent of respondents from academic hospitals also reported efforts to eliminate medically unnecessary testing and 72% reported implementation of utilization review during the past five years.

Public health laboratories were distinguished in their detachment from managed care and health system change—whereas 11% of respondents from public health laboratories reported increasing the amount of time they spend on managed care contract marketing, for other institutions this value ranged from 20% and 46%. Furthermore, respondents from public health laboratories felt that managed care was not a very important market force impacting their laboratories; these respondents gave managed care an importance score of only 3.3, while individuals from other institutions rated the importance of managed care as 3.9 or higher. Only 16% of these respondents reported an increase in their percent of revenue from managed care contracts and they were most likely to report an increase in their costs per test. Survey results for the four institution types are presented in Exhibit IV-4.

C. CONSOLIDATION

One strategy that many health care organizations have undertaken to remain competitive in today’s health care environment is consolidating with other organizations. Such consolidation has transformed the health care industry. To understand how laboratories that chose to consolidate during the past five years have fared, analyses were conducted for four key subgroups—laboratories that are part of a network, laboratories that acquired other organizations, laboratories that merged with other laboratories, and laboratories that developed affiliations or partnerships with other organizations.

1. Institutions that are Part of a Network

Increasing numbers of organizations have joined a network of providers. Networks serve to facilitate referrals and shared contracts, and allow organizations to share resources. Subgroup analyses were conducted for networked and non-networked laboratories to evaluate whether being part of a network influenced responses to survey questions. Another important goal of these analyses was to understand the types of strategies networked providers have undertaken that differ from non-networked laboratories.

Subgroup analyses clearly revealed that networked laboratories are more involved in implementing managed care strategies compared to non-networked laboratories. For example, 48% of individuals in networked laboratories reported an increase in their insti-
EXHIBIT IV-4:

Institution subgroup results

<table>
<thead>
<tr>
<th>Increase in time spent on managed care contract marketing</th>
<th>Academic Hospitals</th>
<th>Non-academic Hospitals</th>
<th>Independent Reference Labs</th>
<th>Public Health Labs</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in time spent on cost control strategies</td>
<td>20%</td>
<td>30%</td>
<td>46%</td>
<td>11%</td>
<td>p=.009</td>
</tr>
<tr>
<td>Importance of managed care (1-5 scale)</td>
<td>3.94</td>
<td>4.02</td>
<td>4.36</td>
<td>3.33</td>
<td>p=.011</td>
</tr>
<tr>
<td>Increase in percent of revenue from capitated contracts</td>
<td>36%</td>
<td>33%</td>
<td>51%</td>
<td>16%</td>
<td>p=.046</td>
</tr>
<tr>
<td>Increase in outpatient testing</td>
<td>82%</td>
<td>85%</td>
<td>68%</td>
<td>21%</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td>Implementation of eliminating medically unnecessary testing</td>
<td>83%</td>
<td>84%</td>
<td>65%</td>
<td>42%</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td>Implementation of validation/verification of all test results</td>
<td>57%</td>
<td>73%</td>
<td>68%</td>
<td>84%</td>
<td>p=.036</td>
</tr>
<tr>
<td>Decrease in overall staffing</td>
<td>70%</td>
<td>63%</td>
<td>38%</td>
<td>42%</td>
<td>p=.002</td>
</tr>
<tr>
<td>Implementation of outsourcing</td>
<td>61%</td>
<td>77%</td>
<td>62%</td>
<td>11%</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td>Implementation of utilization review</td>
<td>72%</td>
<td>77%</td>
<td>57%</td>
<td>37%</td>
<td>p=.004</td>
</tr>
<tr>
<td>Implementation of overall outreach testing</td>
<td>72%</td>
<td>82%</td>
<td>49%</td>
<td>26%</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td>Implementation of nursing home testing</td>
<td>43%</td>
<td>58%</td>
<td>43%</td>
<td>21%</td>
<td>p=.018</td>
</tr>
<tr>
<td>Implementation of employee/industrial health testing</td>
<td>29%</td>
<td>54%</td>
<td>43%</td>
<td>21%</td>
<td>p&lt;.001</td>
</tr>
</tbody>
</table>

Institutions’ percent of revenue from capitated contracts compared to only 29% of individuals who work in laboratories that are not part of a network. Furthermore, 67% of individuals whose institution is part of a network reported spending more time developing cost control strategies compared to 58% of individuals not in networked laboratories. These individuals also rated managed care as a market force more highly compared to their non-networked counterparts (4.20 compared to 3.83). Those in laboratories that are part of a network were also more likely to report the use of prior authorization.

Not surprisingly given their general interest in managed care, individuals working in networked laboratories gave higher importance scores to several areas considered important for obtaining managed care contracts—having a networked system for reporting results (4.25 compared to 3.96), providing courier services (4.46 compared to 4.20), and having specimen collection sites (4.07 compared to 3.70). Specific results are summarized in Exhibit IV-5.

2. Institutions that have acquired another organization

Results indicate that laboratories that have acquired other organizations were much more likely than other laboratories to witness growth in revenues and budgets and expansion into new areas of business. Not surprisingly, given the expensive and time-consuming strategy adopted by these organizations, individuals who work for laboratories that acquired another organization during the past five years gave much higher importance scores to the market forces affecting laboratories, including managed care (4.21 compared to 3.85), hospital consolidation (3.91 compared to 2.80), and changes in Medicare (4.10 compared to 3.76).
Fifty-three percent of respondents from this subset of laboratories reported an increase in total laboratory revenue and budgets during the past five years, compared with only 42% and 43% of respondents from other laboratories, respectively. These respondents were also more likely to report an increase in the percent of revenue from both fee-for-service contracts as well as capitated contracts. These results are not particularly surprising given that their strategy of acquiring another institution literally bought them additional revenue and a need for larger budgets.

| EXHIBIT IV-5: |  |
|---|---|---|
| Network subgroup results | Acquired another organization | Did not acquire another organization | p-value |
| Importance of managed care (1-5 scale) | 4.21 | 3.85 | p=.003 |
| Importance of hospital consolidation (1-5 scale) | 3.91 | 2.80 | p<.001 |
| Importance of changes in Medicare reimbursement (1-5 scale) | 4.10 | 3.76 | p=.009 |
| Increase in total laboratory revenue | 53% | 42% | p=.083 |
| Increase in percent of revenue from fee-for-service contracts | 28% | 15% | p=.001 |
| Increase in percent of revenue from capitated contracts | 45% | 31% | p=.010 |
| Increase in total microbiology laboratory budget | 53% | 43% | p=.095 |
| Increase in overall testing volume | 78% | 60% | p=.004 |
| Increase in outpatient testing | 86% | 74% | p=.010 |
| Implementation of overall outreach testing | 76% | 65% | p=.070 |
| Implementation of employee/industrial health testing | 43% | 33% | p=.074 |
| Implementation of molecular/PCR testing services | 74% | 61% | p=.038 |
| Participation in diagnostic and pharmaceutical trials | 71% | 53% | p=.001 |

Finally, laboratories that acquired other organizations expanded aggressively into new and growing areas of business—78% of respondents from these organizations reported an increase in overall testing volume (compared to 60% of respondents from other laboratories) and 86% reported an increase in outpatient testing (compared to 74% of respondents from other laboratories). Larger percentages of these respondents also reported moving into outreach testing, employee/industrial health testing, molecular/PCR testing services, and diagnostic and pharmaceutical trials. Results are summarized in Exhibit IV-6.

3. Institutions That Have Merged With Another Laboratory

Unlike laboratories that acquired another organization, laboratories that merged with other laboratories were not especially dissimilar to organizations that did not merge. Analyses indicated only a few noteworthy subgroup differences. Surprisingly, laboratories that merged with other laboratories were not as focused on performance improvement and quality is-

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3 Result from multivariate model with controls for laboratory type and other health system change variables (see methods).
sues compared to other organizations. For example, while 63% of individuals from laboratories that did not merge reported spending additional time over the past five years on developing performance improvement strategies, only 52% of individuals from laboratories that did merge reported increasing the time spent in this area. Individuals in laboratories that merged also rated the importance of the quality of a testing facility less highly compared to others (3.82 compared to 4.25), and fewer individuals from these laboratories reported validating/verifying all test results or implementing utilization review. Finally, more survey respondents from merged laboratories reported a decrease in overall staffing compared to other laboratories. Results are summarized in Exhibit IV-7.

EXHIBIT IV-6:

Subgroup results for laboratories that acquired another organization

<table>
<thead>
<tr>
<th></th>
<th>Acquired another organization</th>
<th>Did not acquire another organization</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance of managed care (1-5 scale)</td>
<td>4.21</td>
<td>3.85</td>
<td>p=.003</td>
</tr>
<tr>
<td>Importance of hospital consolidation (1-5 scale)</td>
<td>3.91</td>
<td>2.80</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td>Importance of changes in Medicare reimbursement (1-5 scale)</td>
<td>4.10</td>
<td>3.76</td>
<td>p=.009</td>
</tr>
<tr>
<td>Increase in total laboratory revenue</td>
<td>53%</td>
<td>42%</td>
<td>p=.083</td>
</tr>
<tr>
<td>Increase in percent of revenue from fee-for-service contracts</td>
<td>28%</td>
<td>15%</td>
<td>p=.001</td>
</tr>
<tr>
<td>Increase in percent of revenue from capitated contracts</td>
<td>45%</td>
<td>31%</td>
<td>p=.010</td>
</tr>
<tr>
<td>Increase in total microbiology laboratory budget</td>
<td>53%</td>
<td>43%</td>
<td>p=.095</td>
</tr>
<tr>
<td>Increase in overall testing volume</td>
<td>78%</td>
<td>60%</td>
<td>p=.004</td>
</tr>
<tr>
<td>Increase in outpatient testing</td>
<td>86%</td>
<td>74%</td>
<td>p=.010</td>
</tr>
<tr>
<td>Implementation of overall outreach testing</td>
<td>76%</td>
<td>65%</td>
<td>p=.070</td>
</tr>
<tr>
<td>Implementation of employee/industrial health testing</td>
<td>43%</td>
<td>33%</td>
<td>p=.074</td>
</tr>
<tr>
<td>Implementation of molecular/PCR testing services</td>
<td>74%</td>
<td>61%</td>
<td>p=.038</td>
</tr>
<tr>
<td>Participation in diagnostic and pharmaceutical trials</td>
<td>71%</td>
<td>53%</td>
<td>p=.001</td>
</tr>
</tbody>
</table>

EXHIBIT IV-7:

Subgroup results for laboratories that merged

<table>
<thead>
<tr>
<th></th>
<th>Merged</th>
<th>Did Not Merge</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in time spent on performance improvement strategies</td>
<td>52%</td>
<td>63%</td>
<td>p=.024</td>
</tr>
<tr>
<td>Importance of the quality of a testing facility (1-5 scale)</td>
<td>3.82</td>
<td>4.25</td>
<td>p=.009</td>
</tr>
<tr>
<td>Implementation of validation/verification of all test results</td>
<td>20%</td>
<td>30%</td>
<td>p=.098</td>
</tr>
<tr>
<td>Decrease in overall staffing</td>
<td>73%</td>
<td>60%</td>
<td>p=.036</td>
</tr>
<tr>
<td>Implementation of utilization review</td>
<td>62%</td>
<td>72%</td>
<td>p=.081</td>
</tr>
</tbody>
</table>
4. Institutions That Have Increased Their Partnerships Or Affiliations With Other Laboratories

Institutions that pursued a strategy of partnering or affiliating with other laboratories increased their efforts to control costs and improve quality, and became more efficient and productive during the past five years. These results suggest that partnering or affiliating with other laboratories was a powerful, and initially successful strategy.

Respondents from these laboratories, compared to laboratories that did not partner or affiliate, gave higher importance ratings to market forces impacting clinical microbiology laboratories, including managed care (4.21 compared to 3.73), hospital consolidation (3.67 compared to 2.66), the emergence of independent reference laboratories (3.15 compared to 2.70), and changes in Medicare (3.99 compared to 3.75). Individuals from these organizations were also more likely to report spending an increasing amount of time on financial issues, such as financial management, managed care contract marketing, and cost control strategies. Larger percentages of individuals from these organizations also reported implementing such measures as outsourcing, utilization review, acquisition of new technology, and prior authorization. Results are summarized in Exhibit IV-8.

| Subgroup results for laboratories that developed partnerships or affiliations
<table>
<thead>
<tr>
<th>Developed partnerships or affiliations</th>
<th>Did not develop partnerships or affiliations</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in time spent on financial management</td>
<td>50%</td>
<td>39%</td>
</tr>
<tr>
<td>Increase in time spent on managed care marketing</td>
<td>32%</td>
<td>17%</td>
</tr>
<tr>
<td>Increase in time spent on cost control strategies</td>
<td>65%</td>
<td>58%</td>
</tr>
<tr>
<td>Importance of managed care (1-5 scale)</td>
<td>4.21</td>
<td>3.73</td>
</tr>
<tr>
<td>Importance of hospital consolidation (1-5 scale)</td>
<td>3.67</td>
<td>2.66</td>
</tr>
<tr>
<td>Importance of emergence of reference laboratories (1-5 scale)</td>
<td>3.15</td>
<td>2.70</td>
</tr>
<tr>
<td>Importance of changes in Medicare reimbursement (1-5 scale)</td>
<td>3.99</td>
<td>3.75</td>
</tr>
<tr>
<td>Increase in total laboratory revenues</td>
<td>52%</td>
<td>40%</td>
</tr>
<tr>
<td>Increase in percent of revenues from capitated contracts</td>
<td>46%</td>
<td>25%</td>
</tr>
<tr>
<td>Increase in percent of budget for administration</td>
<td>28%</td>
<td>17%</td>
</tr>
<tr>
<td>Increase in cost per test</td>
<td>19%</td>
<td>35%</td>
</tr>
<tr>
<td>Increase in overall productivity</td>
<td>89%</td>
<td>80%</td>
</tr>
<tr>
<td>Implementation of outsourcing</td>
<td>68%</td>
<td>56%</td>
</tr>
<tr>
<td>Implementation of utilization review</td>
<td>78%</td>
<td>62%</td>
</tr>
<tr>
<td>Acquisition of new technology</td>
<td>95%</td>
<td>82%</td>
</tr>
<tr>
<td>Implementation of prior authorization</td>
<td>57%</td>
<td>38%</td>
</tr>
</tbody>
</table>
As shown in Exhibit IV-9, these financial activities may have contributed to improvements in laboratory profitability. More survey respondents from laboratories with partnerships or affiliations compared to respondents from other laboratories reported an increase in laboratory revenues, capitated contracts, and administrative budgets during the past five years. These respondents were also more likely to report increases in efficiency and productivity—they were much less likely to report an increase in cost per test (19% compared to 35%) and more likely to report productivity gains (nearly 90% compared to 80%). These results, taken together, strongly suggest that affiliating or partnering with other laboratories was a successful strategy for keeping pace with the changing health care environment.

**EXHIBIT IV-9:**
Activities contributing to enhanced profitability in partnered and non-partnered laboratories
D. INSTITUTIONS THAT HAVE DOWNSIZED

Institutional downsizing has become a popular competitive strategy for organizations trying to economize, reduce costs, and remain competitive. Downsizing may also be a response to advances in technology that allow for increased automation. Responses from individuals who work in institutions that downsized during the past five years provide an insightful contrast to the responses discussed above from individuals whose institutions consolidated.

Not surprisingly given their strategy of downsizing, survey respondents from these organizations were more focused on managed care than their counterparts. Forty-one percent of these respondents reported an increase in percent of revenue from capitated contracts compared to only 30% of individuals from organizations that did not downsize.

Individuals who work in downsized laboratories have changed how they spend their time, and new patterns of activity are revealing—these respondents are significantly less likely to have increased their time performing laboratory tests, but are more likely to have increased the amount of time devoted to developing cost control strategies. As shown in Exhibit IV-10, large percentages of survey respondents from downsized organizations also reported implementation of strategies to restructure laboratory operations, including a decrease in

EXHIBIT IV-10:
Factors driving downsizing and changes in laboratory operations
Overall staffing, outsourcing, utilization review, substitution of staff, and acquisition of new technology. Analyses conducted on this subgroup across the survey indicated fewer resources being spent on laboratory operations, which is not surprising given that they downsized. Fewer of these individuals, compared to respondents who work in laboratories that did not downsize, reported increases in total laboratory revenue (37% compared to 55%), revenue per test (15% compared to 27%), the total microbiology laboratory budget (32% compared to 61%), or the percent of budget that is spent on personnel (16% compared to 36%).

While survey results suggest increases in efficiency (e.g., respondents in downsized laboratories were less likely to report an increase in cost per test), results do not indicate relative increases in productivity—compared to respondents from organizations that did not downsize, fewer respondents from downsized laboratories reported increases in overall testing volume or increases in inpatient testing. Results are summarized in Exhibit IV-11.

<table>
<thead>
<tr>
<th>Subgroup results for laboratories that downsized</th>
<th>Downsized</th>
<th>Did Not Downsize</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in time spent performing laboratory tests</td>
<td>13%</td>
<td>24%</td>
<td>p=.008</td>
</tr>
<tr>
<td>Increase in time spent developing cost control strategies</td>
<td>66%</td>
<td>57%</td>
<td>p=.011</td>
</tr>
<tr>
<td>Importance of managed care (1-5 scale)</td>
<td>4.20</td>
<td>3.72</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td>Increase in total laboratory revenue</td>
<td>37%</td>
<td>55%</td>
<td>p=.001</td>
</tr>
<tr>
<td>Increase in percent of revenue from capitated contracts</td>
<td>41%</td>
<td>30%</td>
<td>p=.029</td>
</tr>
<tr>
<td>Increase in revenue per test</td>
<td>15%</td>
<td>27%</td>
<td>p=.003</td>
</tr>
<tr>
<td>Increase in total microbiology laboratory budget</td>
<td>32%</td>
<td>61%</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td>Increase in percent of budget for personnel</td>
<td>16%</td>
<td>36%</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td>Increase in overall testing volume</td>
<td>58%</td>
<td>75%</td>
<td>p=.002</td>
</tr>
<tr>
<td>Increase in inpatient testing</td>
<td>16%</td>
<td>28%</td>
<td>p=.014</td>
</tr>
<tr>
<td>Increase in cost per test</td>
<td>20%</td>
<td>34%</td>
<td>p=.007</td>
</tr>
<tr>
<td>Decrease in overall staffing</td>
<td>92%</td>
<td>34%</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td>Implementation of outsourcing</td>
<td>76%</td>
<td>47%</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td>Implementation of utilization review</td>
<td>77%</td>
<td>62%</td>
<td>p=.005</td>
</tr>
<tr>
<td>Implementation of staff substitution</td>
<td>38%</td>
<td>22%</td>
<td>p=.001</td>
</tr>
<tr>
<td>Acquisition of new technology</td>
<td>93%</td>
<td>84%</td>
<td>p=.011</td>
</tr>
</tbody>
</table>
E. MARKET FORCES/PAYMENT SOURCES

1. Managed Care as a Top Source of Testing Volume and an Important Market Force

Managed care is the driving force behind many of the changes occurring in the health care system. As such, managed care subgroup analyses were conducted for two groups of respondents—laboratories for which managed care constitutes one of the top three sources of testing volume, and survey respondents who believe managed care is a very important (importance score of 4 or 5) market force impacting microbiology laboratories. The results for these two subgroups were very similar; therefore, we only present results for the subgroup for which managed care constituted a top source of testing volume. Of the two groups, this subgroup’s results can be considered more compelling as these respondents have had more real world experience with managed care compared to the other subgroup.

As expected, survey results for individuals whose institutions rely more heavily on managed care testing volume indicated a strong emphasis on managed care. For instance, as shown in Exhibit IV-12, individuals in institutions that have high managed care testing volume are more likely than their counterparts to have increased the time they spend on financial management (50% compared to 41%), managed care contract marketing (34% compared to 18%), and outcomes research (33% compared to 27%). Survey respondents in this group were also more likely to have seen an increase in the percent of revenues from capitated contracts during the past five years. Another impact of high managed care volume appears to be increased centralization of purchasing decision-making; 76% of

EXHIBIT IV-12:

Percent of respondents reporting an increase in managed care-driven activities by level of managed care testing volume

<table>
<thead>
<tr>
<th>Activity</th>
<th>High Managed Care Volume</th>
<th>Low Managed Care Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Management</td>
<td>50%</td>
<td>41%</td>
</tr>
<tr>
<td>Managed Care Contract Marketing</td>
<td>34%</td>
<td>18%</td>
</tr>
<tr>
<td>Outcomes Research</td>
<td>33%</td>
<td>27%</td>
</tr>
</tbody>
</table>

Laboratory Activities Driven by Managed Care

The Impact of Managed Care and Health System Change on Clinical Microbiology
individuals in laboratories with a high volume of managed care reported increased centralization during the past five years compared to 62% of individuals from other laboratories.\textsuperscript{4}

Survey respondents in laboratories that have high managed care volume also reported changes in efficiency and productivity—more respondents from this group reported increased use of guidelines, fewer reported increased cost per test, fewer reported increases in time per test, and more reported increases in overall productivity and outpatient testing. Another impact of high managed care volume on laboratories was an increase in the percent of tests not billed (23\% of those in laboratories with high managed care volume reporting an increase compared to 9\% of those in laboratories with lower managed care volume).

Organizations with high levels of managed care volume were further distinguished by their use of cost saving measures. For example, 42\% of individuals who work in organizations with a high level of managed care volume reported the use of staff substitution compared to only 22\% of individuals who work in laboratories with lower levels of managed care volume. Another cost saving measure used by laboratories with higher levels of managed care volume is the acquisition of new technology; 94\% of these individuals reported the use of new technology compared to 85\% of other individuals. Results are summarized in Exhibit IV-13.

\begin{center}
\textbf{EXHIBIT IV-13:}
\end{center}

<table>
<thead>
<tr>
<th>Subgroup results for laboratories with higher managed care volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher managed care volume</td>
</tr>
<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>Increase in time spent on financial management</td>
</tr>
<tr>
<td>Increase in time spent on managed care contract marketing</td>
</tr>
<tr>
<td>Increase in time spent on outcomes research</td>
</tr>
<tr>
<td>Increase in percent of revenue from capitated contracts</td>
</tr>
<tr>
<td>Increase in outpatient testing</td>
</tr>
<tr>
<td>Increase in time per test</td>
</tr>
<tr>
<td>Increase in cost per test</td>
</tr>
<tr>
<td>Increase in tests not billed</td>
</tr>
<tr>
<td>Increase in use of guidelines</td>
</tr>
<tr>
<td>Increase in overall productivity</td>
</tr>
<tr>
<td>Implementation of staff substitution</td>
</tr>
<tr>
<td>Acquisition of new technology</td>
</tr>
<tr>
<td>Centralization of purchasing decision-making</td>
</tr>
</tbody>
</table>

\textsuperscript{4} Result from multivariate model with controls for laboratory type and other health system change variables (see methods).
While, as mentioned previously, most of the findings for the two managed care subgroups were very similar, one dissimilar finding is worth noting—individuals who believe managed care to be an important market force reported the use of decrease in overall staffing, while individuals in the subgroup with high managed care volume reported the use of staff substitution. Perhaps this finding implies that as laboratories increase their percent of revenue from managed care contracts they are more likely to substitute staff rather than downsize staff.

2. Institutions for Which Medicare is One of Their Top Three Sources of Testing Volume

As the largest payer for health care in the United States, Medicare is a powerful and important market force. As the population continues to age, Medicare will provide insurance coverage to an increasingly large percent of the population. For these reasons, it is useful to understand how institutions that rely heavily on Medicare-generated business have fared under the evolving health care system.

Subgroup results appear to suggest that laboratories with a high level of Medicare volume fared very well during the past five years, managing to increase their revenues and budgets more so than organizations with lower levels of Medicare volume. Fifty-four percent of individuals who work in laboratories with high levels of Medicare volume reported an increase in total laboratory revenues compared to only 36% of respondents who work in other laboratories. Fifty percent of these individuals indicated an increase in total microbiology laboratory budgets compared to only 41% of others. These results are not especially surprising given the continuous growth of the Medicare program.

Individuals in laboratories with a high level of Medicare volume also reported increases in productivity during the past five years. These respondents were more likely than their counterparts in organizations with lower levels of Medicare volume to report an increase in overall testing volume, increase in overall productivity, implementation of outreach testing, and expansion into employee/industrial health testing.

Individuals in these laboratories also placed a stronger emphasis on the importance of managed care strategies compared to individuals in institutions with lower levels of Medicare volume. For example, large percentages of individuals in laboratories with high levels of Medicare volume reported increasing the amount of time spent on managed care contract marketing (28% compared to 20%), gave managed care a higher importance score (4.08 compared to 3.83), reported an increase in the percent of revenue from capitated contracts (47% compared to 21%), and indicated implementing the use of guidelines and utilization review (62% and 74% compared to 46% and 64%, respectively). More individuals in these laboratories also reported the use of staff substitution (37% compared to 22%). Results are summarized in Exhibit IV-14.
EXHIBIT IV-14:

Subgroup results for laboratories with higher Medicare testing volume

<table>
<thead>
<tr>
<th></th>
<th>Higher Medicare Volume</th>
<th>Lower Medicare Volume</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in time spent on managed care contract marketing</td>
<td>28%</td>
<td>20%</td>
<td>p = .012</td>
</tr>
<tr>
<td>Importance of managed care (1-5 scale)</td>
<td>4.08</td>
<td>3.83</td>
<td>p = .044</td>
</tr>
<tr>
<td>Increase in total laboratory revenue</td>
<td>54%</td>
<td>36%</td>
<td>p = .001</td>
</tr>
<tr>
<td>Increase in percent of revenue from capitated contracts</td>
<td>47%</td>
<td>21%</td>
<td>p &lt; .001</td>
</tr>
<tr>
<td>Increase in total microbiology laboratory budget</td>
<td>50%</td>
<td>41%</td>
<td>p = .093</td>
</tr>
<tr>
<td>Increase in overall testing volume</td>
<td>70%</td>
<td>61%</td>
<td>p = .071</td>
</tr>
<tr>
<td>Increase in use of guidelines</td>
<td>62%</td>
<td>46%</td>
<td>p = .002</td>
</tr>
<tr>
<td>Increase in overall productivity</td>
<td>88%</td>
<td>80%</td>
<td>p = .054</td>
</tr>
<tr>
<td>Implementation of utilization review</td>
<td>74%</td>
<td>64%</td>
<td>p = .060</td>
</tr>
<tr>
<td>Implementation of staff substitution</td>
<td>37%</td>
<td>22%</td>
<td>p = .001</td>
</tr>
<tr>
<td>Implementation of overall outreach testing</td>
<td>74%</td>
<td>62%</td>
<td>p = .014</td>
</tr>
<tr>
<td>Implementation of employee/industrial health testing</td>
<td>41%</td>
<td>29%</td>
<td>p = .027</td>
</tr>
</tbody>
</table>
v. Limitations of the Study

There are a few important limitations to this analysis:

• The analysis was limited to individuals identified through membership lists. Although a broad sampling of lists was used in an effort to include a diversity of laboratories and stakeholders, the sample cannot, in the purest sense, be considered a truly representative sample of the universe of laboratories in the country. Therefore, caution must be exercised when generalizing results from the survey to all laboratories in the United States. Nevertheless, the total possible respondents represent a substantial number of clinical microbiology laboratories in the country and, as shown in the descriptive results section, a diversity of institutions and stakeholders are represented.

• Surveys such as this one are based largely on impressions and opinions of the respondents. There is no way to verify the accuracy of the information reported, and perceptions are often somewhat different from reality. Again, this limitation is standard for this type of survey research—clearly the information gained from the survey is very valuable and represents an important contribution to our understanding of the changes affecting clinical microbiology.

• Importantly, this survey analysis focused on changes that occurred during the past five years, such as changes in revenue and implementation of a number of laboratory activities. It was beyond the scope of the survey to capture baseline information (e.g., revenues or the level of involvement in various activities at the beginning of the five year period). Thus, while the survey captures relative differences in changes affecting clinical microbiology laboratories, as it was intended to do, it does not reveal absolute differences among the comparative groups.

• The survey examined the impact of both general health system change and managed care, in particular, on clinical microbiology laboratories. Although the survey contained specific questions on managed care activities, in some cases it was not possible to discern which of these two influences was actually responsible for some of the changes experienced by clinical microbiology laboratories, or whether it was a combination of the two.

• Finally, establishing direct causal relationships between managed care expansion and other health system change on laboratory activities is not possible with this type of research—indeed, only a controlled prospective study, focused on a few very specific indicators could (potentially) address this issue. Nevertheless, by examining stakeholders perceptions of the interrelationship of these market forces and changing laboratory activities, the study provides fundamental insights on the direction and future of clinical microbiology laboratories.

The study’s overarching findings are reviewed and discussed in the next section.
vi. Discussion and Conclusions

This study represented an important opportunity to assess the impact of managed care and health system change on clinical microbiology laboratories from a cross-section of the clinical microbiology community. The survey results provide useful descriptive statistics on a variety of important topics, and highlight differences in reaction to market change across various institutions. While the results presented in the previous sections cover a broad range of topics, several key issues and cross-cutting themes emerged from this analysis. These findings are organized according to our main research questions.

The Effect of Managed Care and Health System Change on the Role of the Clinical Microbiologist

• Laboratory staff have spent increasing amounts of time on managed care and related activities driven by health market change.

A number of survey questions demonstrate that adapting to managed care and health system change has become an increasingly consuming focus of clinical microbiology laboratories. One particularly strong indication of the emphasis on managed care and health system change is that large numbers of microbiology directors and clinical directors reported that the time they spend on managed care and health system change-driven activities has increased during the past five years. Such areas include financial management, managed care contract marketing, development and implementation of performance improvement strategies, and outcomes research. While both clinical microbiology laboratory directors and clinical laboratory directors reported increasing the amount of time spent in these areas, the comparative analyses showed that more clinical directors compared to microbiology directors reported these increases.

• Clinical microbiology laboratory directors, clinical laboratory directors, and administrators have generally similar perceptions about the impact of managed care and health system change on clinical microbiology laboratories.

With the exception of how clinical microbiology laboratory directors and clinical laboratory directors spend their time, study results found few differences in survey responses of clinical microbiology laboratory directors, clinical laboratory directors, and administrators. This is a very positive result as it indicates some degree of uniformity of opinion and focus across different levels within an organization.

Impact of Managed Care and Other Health System Change on the Clinical Microbiology Laboratory

• Various types of institutions have reacted differently to managed care and health system change.

While managed care and health system change generally have been a powerful influences on the operations of clinical microbiology laboratories, a key finding was that various types of institutions have reacted differently to changes in the health care envi-
The Impact of Managed Care and Health System Change on Clinical Microbiology

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ronment. For instance, while individuals in reference laboratories have quickly adapted and reacted to the challenges of managed care, survey respondents from public health laboratories were relatively detached from managed care. This finding is consistent with recent research showing that public health laboratory directors feel isolated from managed care systems (The Lewin Group, 1997). Academic and non-academic hospitals were distinguished in their strong emphasis on cost control and revenue enhancement. Clearly, the unique characteristics of each type of laboratory have influenced respondents’ reactions to changes in the health care market. This is an important finding for the ASM as it demonstrates the diversity of needs and issues affecting the various types of clinical microbiology laboratories.

Despite fears that managed care would reduce testing volume, survey respondents reported increases in overall testing volume and in the volume of nearly all types of tests.

The emergence of managed care has generated concerns that in the quest to reduce health care costs, managed care would lead to a reduction in services provided to patients. Survey results suggest that, in fact, testing volume actually increased during the past five years. Sixty-six percent of survey respondents reported an increase in overall testing volume. Furthermore, except in the case of environmental testing where equal numbers of survey respondents reported an increase as a decrease, more people reported an increase than a decrease in volume for every type of laboratory test.

These results are striking as they contradict generally held fears about the future of microbiology. It is possible that managed care’s emphasis on cost-effective care may actually produce a greater level of testing volume than a fee-for-service system. However, it should be noted that test volume is only one dimension of laboratory activity—the survey provides clear evidence that costs per test are decreasing, and that time spent per test is decreasing. Although these results may be taken in part as positive productivity gains, it is also clear that managed care and health system change are driving a shift away from costlier—and potentially more rigorous—laboratory services.

One interesting survey result regarding testing volume is that more microbiology directors and clinical directors reported decreasing rather than increasing the amount of time they spend performing laboratory tests. Many survey respondents, however, reported that the amount of time they spend performing laboratory tests had simply remained the same during the past five years. Given the increases in testing volume, it is possible that other types of laboratory staff, such as staff microbiologists, are spending more of their time performing tests. Also, survey results indicate that laboratories have become more efficient during the past five years, having reduced time spent per test, and having invested in technology to increase efficiency. Overall, the survey results indicate that while operations have changed in response to the environment, managed care and health system change has not had a keenly felt detrimental impact on laboratory testing volume.

Clinical microbiology laboratories have experienced changes in staffing patterns related to managed care and health system change

Undoubtedly, laboratory staffing patterns have changed due to the emergence of managed care and other health system change. While there is some evidence of staff substitution—an issue that has generated much concern recently—survey results indicate that overall downsizing of staff appears to be the more critical issue. Many more survey respondents reported a decrease than an increase in the number of mid-level positions (e.g., MS or BS level microbiologists or technical supervisors), and there was little indi-
cation that other types of lesser trained staff had been hired to replace them. Furthermore, while 64% of respondents reported a decrease in overall staffing, only 30% reported the use of staff substitution.

A review of the comparative results for staffing questions raises some important questions. A number of different subgroups were found to be especially likely to have decreased overall staffing. For example, individuals in academic and non-academic hospitals were much more likely than those in reference or public health laboratories to report a decrease in overall staffing. Also, individuals in laboratories that had merged or downsized were more likely than respondents who had not experienced such changes to report a decrease in overall staffing.

In contrast, the high managed care volume and high Medicare volume subgroups were much more likely compared to lower managed care and Medicare volume laboratories to report the use of staff substitution. This finding raises the question of how a shift in payment source might affect staffing patterns. For example, it is possible that as additional laboratories tap into the managed care market, these laboratories may also turn to staff substitution as a way to reduce costs. While downsizing of staff is currently the more prevalent option adopted by laboratories, the ASM should continue to evaluate the use of staff substitution as managed care becomes an even more potent market force for microbiology.

- A variety of strategies to reorganize and restructure have enabled laboratories to enhance their competitive positions in the evolving health care market.

The vast majority of survey respondents’ laboratories had undergone some type of structural or organizational change during the past five years. Nearly 90% of survey respondents reported that their laboratory had experienced at least one of the following during the past five years—had acquired another organization, had been acquired, had merged, had downsized, or had increased partnerships or affiliations with other laboratories. As other types of health care organizations have experienced strikingly similar changes, this result strongly demonstrates that microbiology laboratories have been shaped by the same forces at work in the rest of the health care system.

The comparative results illuminated the differences in strategy, and in initial success, taken by the laboratories represented in this study. Networked laboratories, for example, emphasized the importance of managed care in their activities and in their perception of the influence of market forces affecting their laboratories. Laboratories that pursued a strategy of partnering or affiliating with other laboratories increased their efforts to control costs and improve quality, and became more efficient and productive during the past five years; results suggest that this was a powerful, and initially successful strategy. Those laboratories that downsized focused mainly on cost control strategies.

The strategies adopted by clinical microbiology laboratories will continue to adapt to major shifts in the health care landscape. The ASM can help laboratories evaluate the success of these strategies, and help guide microbiology through further change.
Impact of Managed Care and Other Health System Change on Patient Care

- **Laboratories have undertaken efforts to improve patient care.**

  One effect of managed care and health system change has been the increased use of quality assurance mechanisms, such as ongoing assessment of the competency of laboratory personnel, efforts to eliminate medically unnecessary testing, validation and verification of all test results, and monitoring of specimen integrity and contamination rates. While survey respondents were not specifically asked whether quality of laboratory services had improved or had a positive impact on patient care, these quality assurance mechanisms are generally associated with improvements in service provision. Survey respondents reported improvements in efficiency and productivity, which may also translate into improved service provision. A final strong result was that only twelve percent of survey respondents replied in the affirmative to a question that asked if operations had been adversely affected by a decrease in quality of supplies.

Cost Saving Measures Implemented In Response to Managed Care and Health System Change

- **Laboratories have buoyed their financial position through cost control and revenue enhancement activities.**

  Survey results clearly demonstrate that laboratories have needed to initiate cost control and revenue enhancement activities in response to health care system cost pressures. Many survey respondents reported that their laboratories acquired new technologies to increase efficiency or decrease cost, and implemented utilization review, outsourcing of costly, low volume tests, and prior authorization requirements. Laboratories also expanded into new areas such as overall outreach testing, molecular/PCR testing, diagnostic/pharmaceutical trials, and nursing home testing. Institution type and health system change experience influenced survey results: academic and non-academic hospitals focused most aggressively on increasing both cost control and revenue enhancement activities during the past five years, relative to reference and public health laboratories. Laboratories that acquired another organization or developed partnerships or affiliations emphasized revenue enhancement, and laboratories that downsized focused on cost control activities.

  As described above, the majority of survey respondents reported that overall testing volume increased during the past five years; a majority of respondents also indicated that revenues increased during this time period. It was beyond the scope of this study to fully evaluate the relationships among these results. One possibility, for example, is that overall testing volume and revenues increased due to these cost control and revenue enhancement activities. It is difficult to know to what extent these activities compensated for reduced testing volume and revenue, or to what extent these activities may have enhanced continued volume and revenue growth. These results indicate the need for future evaluation of these issues by the ASM.
Conclusion: Managed care and health system change has had a clear and potent impact on clinical microbiology

This study represents an important opportunity for the ASM to evaluate the impact of managed care and health system change on clinical microbiology. As the survey results show, clinical microbiology has undergone tremendous change and laboratories have begun to adapt to the new health care environment—changes can be seen in the activities performed by laboratory staff, in new efforts undertaken by laboratories to improve quality, in staffing changes, in efficiency and productivity levels, and in various cost savings and revenue enhancement activities adopted by laboratories. Microbiology laboratories are evolving in response to changing demands of the health care system, and managed care is likely to become an even more important force affecting microbiology in the years ahead. While this study documents profound change in the clinical laboratory, it measures the frequency of that change but not its magnitude. A crucial goal for the microbiology community during the coming years will be to continually evaluate the market forces affecting clinical microbiology laboratories to ensure continued quality service in the face of new challenges posed by a rapidly changing health care system.

REFERENCES

StataCorp. 1997. STATA release 5 users guide and reference manual. College Station, TX: StataCorp.
Appendix A: Advisory Panel for the Survey

Vicki Baselski, Ph.D.
Professor
Department of Pathology
University of Tennessee at Memphis

Roberta Carey, Ph.D.
Director, Clinical Microbiology
Loyola University Medical School

Joseph Campos, Ph.D.
Director, Microbiology Laboratory
Department of Laboratory Medicine
Children's National Medical Center

Gary Doern, Ph.D.
Co-Director Clinical Microbiology
Department of Pathology
University of Iowa Hospital and Clinics

Susan Dougherty, MBA
Regional Director
Department of Pathology and Laboratory Medicine
Allegheny University Hospitals

Lynne Garcia, M.S.
Laboratory Supervisor
UCLA Medical Center

Peter Gilligan, Ph.D.
Director
Clinical and Immunology Laboratories
University of North Carolina Hospitals

Yvonne Lue, Ph.D.
Director of Microbiology and Virology
Quest Diagnostics Inc.

John McGowan, M.D.
Professor
Epidemiology Department
Emory University

Michael Pfaller, M.D.
Director, Clinical Microbiology
Medical Microbiology Division
Iowa College of Medicine

Alice Weissfeld, Ph.D.
CEO
Microbiology Specialists, Inc.
Foreword

For some time, professionals working in the microbiology laboratory environment have had the strong sense that dramatic changes have been taking place under cost containment pressures from managed care organizations. Many laboratories have directly experienced major changes, such as staff reduction, increasing workload and greater cost accounting demands, that have the potential to compromise the traditionally high level of performance of laboratory testing. To obtain an assessment of the extent of such changes that goes beyond anecdotal impressions, the American Society for Microbiology commissioned the Lewin Group, an internationally recognized health care policy research and management consulting firm, to survey a large number of clinical microbiology laboratory supervisors, directors and administrators.

With the results of this survey, we now have the first semi-quantitative, objective evaluation of the impact of managed care on the status of clinical microbiology laboratories in a variety of settings, from academic medical centers to community hospitals. In large part, survey results confirm what was already suspected. In a high percentage of the laboratories surveyed, one or more of the following has occurred:

- less qualified staff, in some cases, are doing work formerly done by more highly trained technicians
- staff have been reduced in number
- test volume has increased
- laboratory directors are required to do more administrative and cost accounting tasks
- laboratory directors have less time for research and test validation
- laboratories are functioning in a broader organizational structure, achieved through merger, acquisition, formation of networks or other similar activity

It is important to note that this review, although it represents the experience of a broad spectrum of clinical microbiology laboratories, is not totally comprehensive. One notable group not included are people who were previously employed in the field but have lost or changed jobs due to the very changes we are focusing on. Nonetheless, it is clear even from this initial set of data that serious changes are occurring, and occurring widely. Most likely such changes will inevitably continue into the near future, although perhaps not at the rapid pace of the last five years. These changes represent a challenge to clinical microbiology. It will be necessary to find new ways to train and motivate workers, to respond to cost initiatives while retaining quality, and to maintain the broad spectrum of services that the medical care system has come to expect from clinical microbiologists.

It is the goal and commitment of ASM to be a major force toward innovative responses to these challenges. Among the messages that we communicate to policy makers, it is paramount to stress that clinical microbiology testing adds value to health care and that any compromise in the quality of such testing can reduce the extent to which medicine in the United States is able to improve life expectancy and quality of life.
We must keep always before the mind of the public the fact that we live in a time when the efficacy of antimicrobials cannot be taken for granted. In some cases, resistance to multiple antimicrobials can present a life-threatening problem. By guiding optimal and appropriate use of antibiotics, clinical microbiologists contribute to preventing the rise of resistance to antibiotics and to detecting resistance when it occurs.

We need to emphasize the negative impact of laboratory directors having less time for clinical microbiology research and test validation. One result will surely be diminished innovation in diagnostic methods, which will in turn impair our ability to identify new and reemerging infections and to recognize antimicrobial resistance at a time when such resistance is rising in many dangerous pathogens.

With this report, we call to the attention of legislators, third-party payers and the public that the fruits of the molecular technology revolution will be much harder to realize with an undertrained and overburdened laboratory workforce.

Gail H. Cassell, Ph.D.
Chair, Public and Scientific Affairs Board, American Society for Microbiology

Stanley Falkow, Ph.D.
Past President, American Society for Microbiology

Kenneth I. Berns, M.D., Ph.D.
Past President, American Society for Microbiology

Alice Weissfeld, Ph.D.
Chair, Committee on Professional Affairs, Public and Scientific Affairs Board

Mary Gilchrist, Ph.D.
Chair, Committee on Laboratory Practices, Public and Scientific Affairs Board

Stuart Levy, M.D.
President, American Society for Microbiology