Un article d'experts américains décrit le biologiste médical de demain : il ressemble de façon étonnante au biologiste médical français d'aujourd'hui.

La publication de Diana Mass et John R. Snyder parue en 2004 puis en 2014 dans une version réactualisée dans le *Clinical Laboratory Management* (CLMA) converge totalement avec l'analyse des biologistes médicaux français. En effet, pour répondre aux défis de la médecine et des demandes de la société, des patients et des prescripteurs, les enjeux de la biologie médicale portent essentiellement : sur la pertinence de l'examen de biologie demandé par rapport à la situation pathologique du patient et sur la bonne interprétation des résultats.
Pour les auteurs, la vraie question aujourd'hui à se poser est « Quelle est la signification du résultat par rapport à l'état du patient ? » Et pour eux, le biologiste médical doit être préparé à collaborer de façon consultative pour une meilleure exploitation des données.
Ils décrivent pour les USA un modèle d'avenir… qui correspond au présent des biologistes médicaux français et de leurs laboratoires. Ces derniers apparaissent, de fait, particulièrement adaptés aux défis médicaux d'avenir.

Sources
- L'avenir du biologiste – in CLMA - D.MASS et J.R.Snyder - 2004
- L'avenir du biologiste (actualisé) – in CLMA - D.MASS et J.R.Snyder – 2014

Résumé

1. Pour les auteurs, les enjeux de la biologie médicale sont clairement concentrés sur les **phases pré et post analytiques et sur la révolution de l'information**.

2. Ils constatent que *« la complexité croissante des spécialités de biologie médicale incite de plus en plus les médecins à demander avis aux biologistes pour un choix judicieux des tests en termes de rapport coût/efficacité. En effet, les progrès rapides de la technologie du LABM et du diagnostic rendent la tâche pratiquement impossible aux*

médecins et autres professionnels de santé de se tenir au courant de toutes les nouveautés mises à leur disposition. »

3. Ils décrivent la nécessité de renforcer et promouvoir de **nouveaux professionnels de la biologie aux USA**… qui ressemblent en tout point à **ce qu'ils sont déjà en France**. Ces professionnels doivent en effet pouvoir, selon les auteurs :
    - Formuler des hypothèses à partir des données clinicobiologiques fournies,
    - Expertiser ces données afin d'y apporter une réponse claire,
    - Mesurer l'impact du résultat sur la santé du patient.

    « Le biologiste reste le lien naturel entre le laboratoire et les autres professionnels de santé pour le choix des examens, la collecte des échantillons, l'interprétation des résultats, les problèmes relatifs à la qualité et aux sources d'interférences des analyses. On demande aux biologistes de fournir des informations, de résoudre les problèmes, d'analyser des situations et de prendre toutes décisions relatives aux examens biologiques. »

4. Ils décrivent la nécessité d'une évolution du laboratoire de biologie médicale américain vers **un modèle intégré** : « Les trois phases pré-analytique, analytique et post-analytique développées dans les nouveaux laboratoires constituent selon le modèle de Barr un **ensemble indissociable : entrée, processus, sortie**. » **Les laboratoires français sont précisément conçus comme tels, répondant de fait à un modèle médical d'avenir.**

L'avenir du biologiste (actualisé) – in CLMA - D.Mass et J.R.Snyder – 2014 - Extrait - 2 pages version originale.

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The Future of the Clinical Scientist Workforce

Diana Mass and John R. Snyder

Introduction
Essential Role in Healthcare ⊠ Other Continuing Imperatives ⊠ A New Workforce ⊠ Laboratory Paradigms ⊠ The Old Laboratory ⊠ The New Laboratory ⊠ The Changing Workforce ⊠ Creating Conditions of Good Work
The Changing Nature of Work
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REFERENCES

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OBJECTIVES

To describe laboratory practices that provide value-added services

To discuss the information society as it relates to clinical laboratory services and patient safety needs

To define the "knowledge worker" and advocate the benefits of clinical scientists who perform this role

To compare and contrast the old laboratory and new laboratory paradigms and determine the value of the new laboratory as it improves patient safety

To describe conditions of good work, which can have a positive impact on current clinical laboratory vacancy rates

To explain the consultation process and determine the benefits in clinical laboratory practice as it relates to patient safety

To apply systematic reviews (ask, acquire, appraise, analyze, apply, and assess) in determining evidence-based decisions

To characterize four interactive skills that contribute to the effectiveness of consulting practice

To describe the various competencies of successful consultants

To assess the benefits to the healthcare delivery system when clinical scientists act as consultants

The task is not so much to see what no one yet has seen, but to think what nobody yet has thought about that which everybody sees.

ARTHUR SCHOPENHAUER, 1788–1860

Introduction

Today's laboratory manager faces a unique set of challenges in a healthcare environment shaped by financial constraints and increasing federal regulation. An imperative exists to ensure quality while exercising prudent fiscal responsibility, and this within the context of a dramatically changing workforce (12, 38) that must better serve patients in an era of expanding knowledge and rapid change. Further, "value-added" laboratory services continue to be today's watchword because customer (patients, physicians, administrators, etc.) satisfaction is necessary to achieve the goal of long-term sustainability and economic success for the laboratory (22, 38). The focus of this chapter is this value-added service, that is, service that addresses effectiveness (Does it work?) as well as cost and efficiency. This can only be accomplished if the right test is ordered and interpreted properly. Regardless of how accurate and

precise the result is, it is of no value unless it contributes to appropriate and timely diagnosis and treatment (4). Thus, the future workforce not only must provide accurate and reliable laboratory results but also must be prepared to interact with healthcare providers in a consultative manner regarding appropriate test utilization (20, 22, 31, 38).

Essential Role in Healthcare

Traditionally the information provided by the clinical scientist (clinical laboratory scientist/medical technologist) workforce has been essential in supporting the diagnosis and treatment of patients. There is no doubt that their expertise has provided information that physicians require to make critical decisions regarding their patient care responsibilities (4). In 1985, Strandjord estimated that 45% of medical decision making relied on information generated by laboratory tests (52). Today this number is estimated to be 70% (21). The Mayo Health System demonstrated that the laboratory contributes as much as 94% of the objective data in a clinical record. Furthermore, this information is accessed as often as 200,000 times per day as evidenced by retrievals from an electronic medical record (22). Thus, there can be no doubt that laboratory services are essential to the delivery of healthcare. Additionally, a knowledgeable and committed workforce that provides clinical laboratory consultative services by communicating directly to healthcare providers regarding appropriate testing options is now increasingly essential. A recurring theme is the need to improve laboratory services particularly in the preanalytical and postanalytical phases of the laboratory service continuum (3). Studies have shown that the greatest number of errors occurs in the preanalytical and postanalytical phases (6, 7), and thus the practices in these services provide the greatest opportunity for improvement.

The Laboratory Medicine Best Practices (LMBP) Initiative, sponsored by the Centers for Disease Control and Prevention since 2006 (8), seeks to change the status quo. The overall purpose of this effort is to improve the quality of laboratory medicine by promoting the use of effective, evidence-based practices. Using methods adapted from other tested systematic review methods, the LMBP method referred to as the A-6 cycle (10) has conducted systematic evidence reviews to evaluate and identify practices that improve healthcare quality outcomes consistent with the Institute of Medicine's quality aims (safe, timely, effective, efficient, equitable, and patient-centered) (27). An evidence-based approach is applied through the systematic synthesis and appraisal of existing evidence to answer questions and solve problems. The A-6 cycle has six steps: ask, acquire, appraise, analyze, apply, and assess. This evidence is used to evaluate practice effectiveness and thus help clinical scientists and other healthcare stakeholders determine what is effective, for whom, and in what settings. With this type of evidence, consultants can recommend medical laboratory strategies to change protocols, procedures, or practices (50).

Engagement in the preanalytical and postanalytical phases of laboratory service signals a fundamental shift in the nature of laboratory work. The shift is *away from* a sole focus on technology and the performance of procedures and *toward an enhanced focus on* the generation of laboratory information, an "information revolution" in laboratory medicine. Inherent in this information revolution are new tasks related to gathering, distributing, and adding value to the information provided by clinical laboratories (25, 46).

More than 20 years ago, Peter Drucker foresaw the transformation from an industrial society to an information society (15, 16). He noted a new era in information technology, one in which information concepts would take the place of a focus on data collection, storage, transmission, and presentation. Drucker proposed that the question, "What is the *meaning* of information and its *purpose*?" would help define a hierarchy of information. Indeed, data as simply raw descriptors may help diagnostic and patient management efficacy. Data in context becomes information improving the care of patients. Information in light of experiences and judgment becomes knowledge, improving therapeutic efficacy and effectiveness. Outcome-based testing protocols support enhanced service and aggregate cost savings but do require workers with expanded roles.

Drucker coined the term "knowledge worker" for those fulfilling these expanded roles by gathering, distributing, and adding value to information. Throughout this chapter, the imperative for an information revolution in laboratory medicine practice will be described with corresponding implications for a future workforce composed of clinical scientists as knowledge workers.

Other Continuing Imperatives

The Pew Health Professions Commission Report (1995) described an emerging transformation of traditional healthcare practice into "systems of integrated care that combine primary, specialty, and hospital services" that require extraordinary collaboration skills across all levels and types of healthcare professions (31). Almost two decades later this concept has materialized in the accountable care organization (ACO), a major component of current healthcare reform proposals (http://www.healthcare.gov/news/factsheets/2011/03/accountablecare03312011ahtml, last accessed October 19, 2012). Nowhere is the change more urgent than in the clinical laboratory, where institutional goals can be achieved only by effectively collaborating with other healthcare practitioners to enhance the quality of diagnostic and therapeutic decisions.

Subsequent to the Pew Report, the 1999 Institute of Medicine report *To Err Is Human: Building a Safer Health System* (27) was published, stating that as many as 98,000 people die annually in U.S. hospitals as a result of medical

L'avenir du biologiste – in CLMA - D.Mass et J.R.Snyder – 2014 - Article traduit suivi par la version originale.

L'AVENIR DU BIOLOGISTE

DIANA MASS - JOHN R.SNYDER

Objectifs:

Décrire des méthodes de laboratoire qui apportent de la valeur ajoutée.
Exploiter toute information transmise
Etablir le niveau de connaissances du personnel technique en faisant appel de préférence à des biologistes pour accomplir cette tache.
Comparer et analyser les différences entre les pratiques du laboratoire traditionnel et celles du nouveau laboratoire et déterminer en quoi le nouveau laboratoire améliore la prise en charge du patient.
Décrire les conditions idéales de travail qui peuvent apporter un impact positif sur le taux actuel de vacuité du laboratoire.
Détailler le processus de consultation et déterminer les avantages des bonnes pratiques de laboratoire concernant la sécurité des patients.
Définir les caractéristiques des quatre qualités interactives contribuant à un travail de consultant efficace.
Décrire les nombreuses compétences de consultants performants.
Evaluer l'apport du biologiste consultant à l'amélioration de la qualité des soins.
Le but n'est pas vraiment de voir ce que personne n'a encore jamais vu, mais de penser à ce que personne n'a encore jamais pensé à propos de ce que chacun voit..
Arthur Schopenhauer, 1788-1860

De nos jours, le Directeur d'un laboratoire est soumis à diverses contraintes : financières, administratives, sociales, juridiques, etc.... Tout en assumant ses responsabilités, il doit offrir aux patients toujours plus de satisfactions dans un contexte d'évolution constante des connaissances et de turn-over du personnel beaucoup plus important que par le passé.
Cette « valeur ajoutée » offerte par le laboratoire est l'assurance de la pérennité de l'entreprise (15,29). Elle exige à la fois efficacité, moyens et rendement. Cet objectif ne peut être atteint que si le test prescrit est approprié et correctement interprété : un résultat précis et exact est sans valeur s'il n'est pas associé au diagnostic pré-test et/ou au traitement (3).
Convaincus que les données biologiques sont exactes et précises la vraie question que se posent les cliniciens est : « Quelle est la signification du résultat par rapport à l'état du patient ? ».
A cette interrogation le biologiste devra être préparé à collaborer de façon consultative pour une meilleure exploitation des données.

Rôle essentiel en matière de Santé

Traditionnellement, le rôle essentiel du biologiste porte sur l'aide au diagnostic et au traitement des maladies humaines. Il ne fait aucun doute que les informations transmises aux cliniciens leur permettent de prendre les bonnes décisions diagnostiques (=diagnostic post tests) et thérapeutiques (3). En 1985, Standjord estimait que 45% des décisions médicales relevaient des informations générées par les tests de Laboratoires. Actuellement, ce pourcentage est estimé à 70% (14). Selon le « Mayo Health System », aux Etats-Unis les examens biologiques constituent 94% des données informatiques médicales, ces informations sont consultées 200 000 fois/jour (15). Il est donc évident que le rôle du laboratoire est essentiel pour la prise en charge des patients. Le consultant aura également pour mission de fournir aux professionnels de santé des protocoles d'examens biologiques (18).
En effet l'implication du laboratoire lors des phases préanalytique et post-analytique est essentielle (ce fut le thème du congrès d' Atlanta, en avril 2003).
Cet engagement dans les phases pré-analytiques et post-analytiques du laboratoire de biologie clinique nécessite un changement fondamental de son organisation. Ce changement, au-delà de la technologie et de l'application des procédures porte sur la qualité de l'information transmise. C'est la « révolution de l'information » au sein du laboratoire. Inhérentes à cette révolution de l'information, de nouvelles fonctions apparaissent concernant la centralisation, la diffusion, et la valeur ajoutée des informations fournies par le LABM.

Il y a plus de 20 ans, Peter Drucker prévoyait la mutation d'une société industrielle vers une société de l'information (9.10). Il avait compris la naissance d'une ère nouvelle dans la technologie de l'information centrée sur la récupération des données, leur stockage, leur transmission et leur présentation. Certes, certaines données biologiques brutes peuvent par elles mêmes être utiles, cependant lorsqu'elles sont appropriées et associées au contexte clinique (diagnostic pré test) elles sont source d'information. De cette information correctement exploitée (expérience et aptitude) résultent l'amélioration du diagnostic (diagnostic post-test) et l'efficacité thérapeutique. « La gestion » des résultats (protocoles, arbres décisionnels,...) renforce cette prestation, évite la redondance, est source d'économies mais justifie un personnel hautement qualifié.
Drucker définit « le savoir du praticien » comme une valeur ajoutée de l'information. Cette nécessité d'une révolution de l'information dans le cadre des pratiques de laboratoire fera jouer un rôle majeur au biologiste grâce à l'utilisation de ses connaissances.

Autres nécessités émergeantes

En 1995, le rapport Pew de la Commission des professions de la Santé décrivait une évolution des pratiques traditionnelles en matière de soin en « un système de soin intégré associant généralistes et spécialistes » ce qui demande des capacités de collaboration extraordinaires entre les différents professionnels de santé (22).
Il devient donc urgent, pour que les objectifs d'amélioration de la qualité du diagnostic et des décisions thérapeutiques soient menés à bien, qu'une collaboration étroite entre le LABM et les autres professionnels de santé soit mise en place.
En 1999, dans un rapport de l'académie de Médecine intitulé « l'erreur étant humaine, il faut bâtir un système de soin plus sûr », il est mentionné que 98 000 personnes meurent chaque année aux Etats-Unis suite à des erreurs médicales. Cette statistique déconcertante ne tient pas compte des décès supplémentaires dus à l'omission d'un examen ou d'une mauvaise interprétation des résultats (20) .Jamais il n'a été aussi urgent qu'aujourd'hui d'éduquer les cliniciens à la juste prescription des examens biologiques ainsi qu'à l'interprétation des résultats. Ceci n'est pas nouveau, le devoir du biologiste d'informer personnellement le clinicien pour l'utilisation correcte d'un examen a déjà été abordé il y a plus de 20 ans mais malheureusement les dirigeants de laboratoires ont manqué de volonté et de courage.
L'usage de ne fournir que des résultats de tests voire d'algorithmes n'est pas l'assurance d'une bonne prise en charge du malade. (7).
Les biologistes ont reçu durant leur cursus une formation clinique dont ils ne se sont jamais servis par crainte d'empiéter sur les prérogatives des cliniciens. Ce n'est que très récemment qu'il leur a été demandé, aux Etats-Unis, d'exploiter ces connaissances. L'implication dans la phases pré-analytique et post –analytique nécessite un changement radical des comportements.
En effet, les organes représentatifs de la profession (syndicats, commission NABM,...) ne sont guère engagés dans cette voie bien qu'il ait été noté une évolution sensible des demandes d'examens.
Parallèlement, les biologistes sont rarement consultés (entretien avec les cliniciens, interprétation des résultats et actions appropriées) et ce malgré leurs connaissances concernant les valeurs prédictives (spécificité, sensibilité) et les limites du potentiel des résultats bruts de laboratoire.
Afin de se prévaloir de la qualification de « consultant », les biologistes doivent adopter une démarche scientifique lors de l'exploration biologique :

- Formuler des hypothèses à partir des données clinicobiologiques fournies
- Expertiser ces données afin d'y apporter une réponse claire.
- Mesurer l'impact du résultat sur la santé du patient.

Si l'équipe du laboratoire est déployée de façon plus appropriée dans un rôle interactif et consultatif pour une meilleure exploitation des examens biologiques, on peut penser que les examens inutiles diminueront, ce qui sera bénéfique en terme de cout de santé.
Un laboratoire n'est performant que si le personnel est à son plus haut niveau de compétences.

De nouveaux professionnels.

La complexité croissante des spécialités de biologie médicale incite de plus en plus les médecins à demander avis aux biologistes pour un choix judicieux des tests en terme de rapport coût/efficacité. En effet, les progrès rapides de la technologie du LABM et du diagnostique rendent la tâche pratiquement impossible aux médecins et autres professionnels de santé de se tenir au courant de toutes les nouveautés mises à leur disposition. (41).

Le biologiste reste le lien naturel entre le laboratoire et les autres professionnels de santé pour le choix des examens, la collecte des échantillons, l'interprétation des résultats, les problèmes relatifs à la qualité et aux sources d'interférences des analyses. On demande aux biologistes de fournir des informations, de résoudre les problèmes, d'analyser des situations et de prendre toutes décisions relatives aux examens biologiques.
Par ailleurs le développement de la biologie délocalisée, est dû à un nouvel engouement pour les tests diagnostics rapides hors des hôpitaux et des laboratoires privés. Ces tests délocalisés sont de plus en plus nombreux en raison d'une technologie développée, plus compacte, d'équipements peu coûteux ainsi que d'une grande variété de tests diagnostics fiables. Pour ces instruments, les médecins et autres professionnels de santé ont besoin de plus de conseils et de formation pour une meilleure pratique (26).
Cet autre rôle de conseil va enrichir l'activité des biologistes désireux de nouvelles responsabilités.

Les biologistes consultants sont des personnes de savoir qui allient la capacité d'analyse des données, l'expérience professionnelle, la consultation de diverses sources d'informations et la pratique quotidienne.

Ces nouveaux « professionnels du savoir » possèdent des qualités uniques que nos tutelles devront reconnaître et encourager.

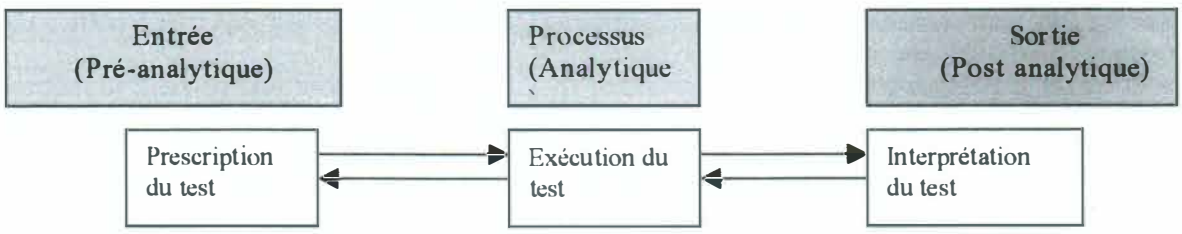
- Ces professionnels du savoir sont des spécialistes
- Ils sont en mesure de recevoir et de transmettre une connaissance théorique
- Leur formation est universitaire
- Ils étudient constamment
- Ils travaillent en équipe
- Ils donnent un sens à leur travail
- Ils ont besoin d'un environnement flexible en réseau et en connexion
- Leurs décisions sont prises après concertation si nécessaire

Ainsi l'évolution vers une biologie informative reposant sur le savoir est le challenge proposé aux biologistes.

Paradigme de laboratoire.

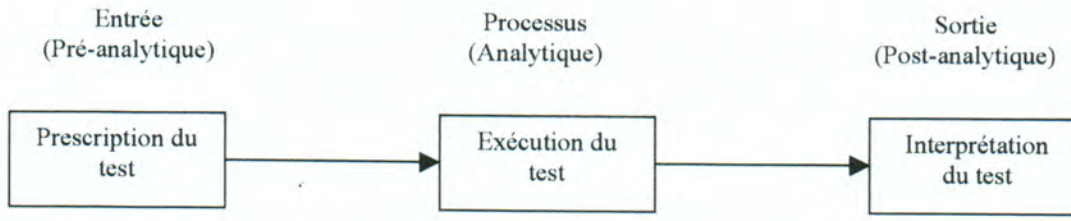
Comparé au laboratoire traditionnel, le futur laboratoire est interactif. Les trois phases pré-analytique, analytique et post-analytique développées dans les nouveaux laboratoires constituent selon le modèle de Barr un ensemble indissociable : entrée, processus, sortie.

Fig .1 le nouveau model de laboratoire interactif



Le laboratoire ancien

De nos jours, de nombreux LABM fonctionnent selon le mode de laboratoire traditionnel (Fig .2) qui consiste en un processus linéaire, à flux unidirectionnel d'un acte suivi de l'acte suivant.
Ici le souci majeur est la qualité de l'examen ainsi que les fonctions de production et d'organisation interne du laboratoire (phase analytique). Dans le modèle traditionnel, on se focalise sur la technologie et les performances analytiques, la communication est pratiquement inexistante entre la demande de l'examen et le rendu des résultats. Dans ce contexte, le LABM n'est pas concerné par le fait que ces résultats soient appropriés ou non.
Fig. 2.



Le Nouveau laboratoire

Le nouveau laboratoire type (fig.3) est interactif, et ses services évolués. On s'intéresse non seulement à la qualité des données, exactitude et précision (processus/analytique), mais également à la pertinence médicale des demandes d'examens (entrée/pré-analytique), à l'interprétation correcte des résultats et aux réponses aux questions posées au laboratoire (sortie/post-analytique). L'implication du laboratoire durant tout le processus d'examens aura un impact positif sur les résultats des patients, améliorera la qualité des demandes d'examens, le niveau de services du laboratoire, et sera une source importante d'économies de santé (3).
Le modèle de Barr démontre (fig. 3) comment une utilisation appropriée des examens engendre une meilleure intégration du LABM dans la prise en charge du patient.
Lors de la phase pré-analytique, il faut se poser la question de la pertinence du choix du test (sensibilité pour exclure une maladie, spécificité pour l'affirmer) et de la qualité de l'échantillon prélevé (condition de recueil, jeun, heure,...).
La phase analytique porte sur la qualité des instruments et réactifs (exactitude et précision des données).
La phase post-analytique concerne l'interprétation correcte des résultats confrontés au contexte clinique.
Elle détermine si finalement trop de données ne risqueraient pas d'alourdir et finalement nuire à la qualité de l'information et d'induire le prescripteur en erreur.

Le modèle de Barr identifie les facteurs qui affectent les décisions du médecin et les actions à mener à chaque étape du processus. Il identifie également la prestation du personnel concerné à chaque étape de ce processus.
Les trois phases sont critiques :
Si un examen n'est pas convenablement prescrit, ou si les précisions du laboratoire vont au-delà des besoins d'un jugement médical, ou si le résultat est mal interprété, alors le résultat biologique est sans valeur et peut même conduire à un diagnostic erroné préjudiciable pour le patient.
Les biologistes n'ont jamais eu l'occasion d'appliquer leur savoir médical en raison d'un manque de vision de leur rôle lors du déroulement du processus d'examens.

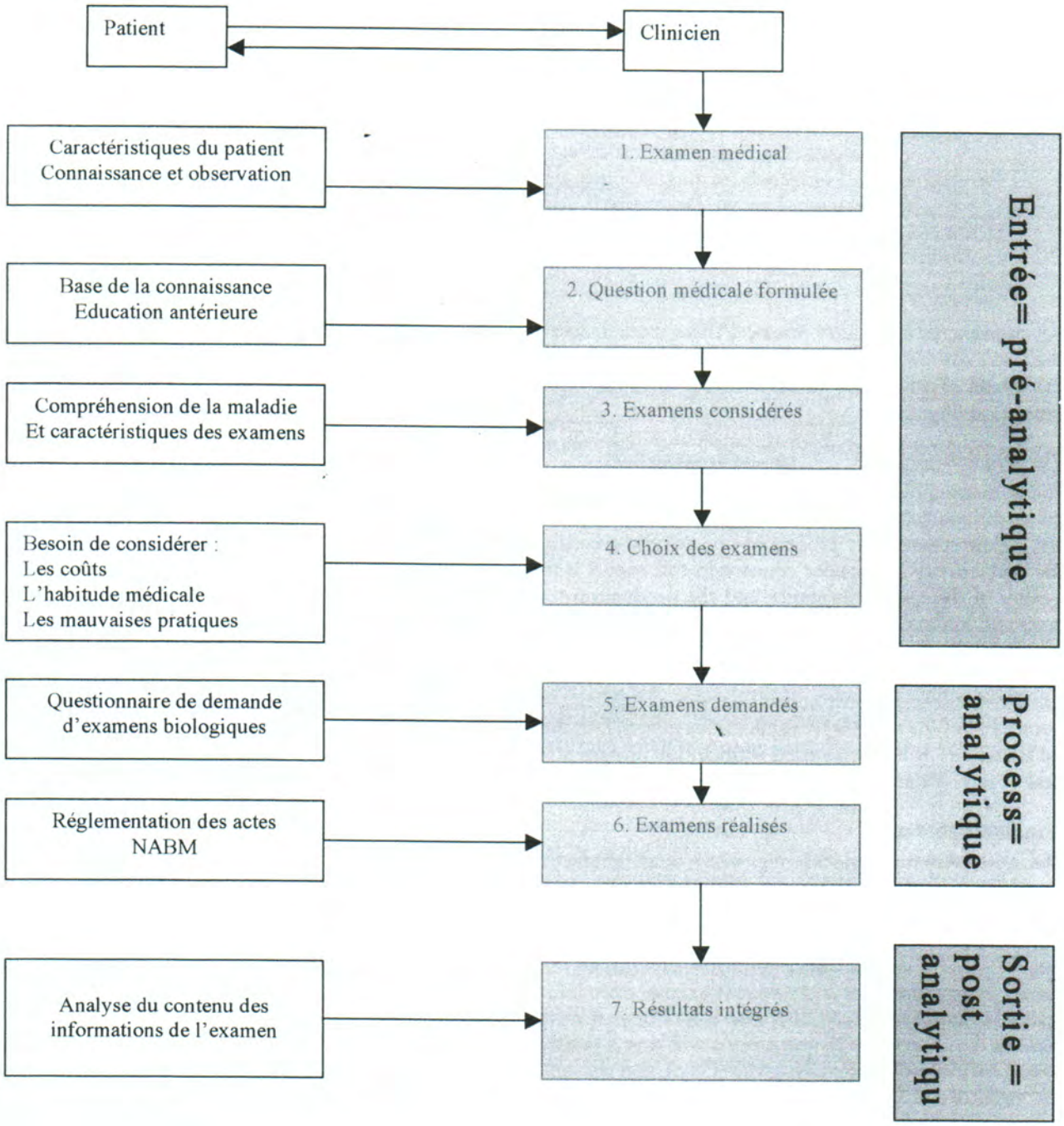


Fig .3

Cadre rouge et caractères rouges : collaboration prescripteur/ biologiste consultant

Une main d'œuvre changeante

Aux Etats-Unis le laboratoire de biologie clinique est en train de vivre un taux de vacuité sans précédent qui ne sera pas résolu dans un futur proche (43). Des projections statistiques prévoient un accroissement général de la population composée en grande partie de personnes

âgées avec des affections chroniques ce qui nécessitera un plus grand nombre de professionnels de santé actuellement insuffisants. (6).
Les besoins en personnel qualifié sont devenus pour les directeurs de laboratoires une préoccupation majeure au quotidien.
Ainsi la pénurie de biologistes incite les responsables à réévaluer les compétences nécessaires pour accomplir certaines tâches de routine afin de les remplacer par un personnel moins qualifié (4).
Les directeurs de laboratoire vont devoir, pour maintenir la qualité des résultats, gérer au mieux ces compétences.
Cette double difficulté : accroissement des besoins et réduction des compétences, devra être affrontée avec imagination, innovation et courage afin d'offrir des prestations non seulement fiables mais aussi à valeur ajoutée.
Beaucoup de dirigeants pensent que la technologie, l'automation et la robotique supprimeront une grande partie du personnel (30-36). Ce fut en tout cas la démarche industrielle de ces 30 dernières années (25). Beaucoup de laboratoires se sont tournés vers des solutions de plus en plus automatisées. Cette vision fut une erreur, car la baisse des effectifs a privé le système de possibilités cognitives nécessaires pour apporter les informations biologiques utiles pour la prise en charge du patient. Il est désormais évident que la technologie et l'automation ne peuvent se substituer à un personnel qualifié (28).
Les responsables financiers de laboratoires affirment qu'il est possible de faire tourner un laboratoire de routine avec une main d'œuvre peu qualifiée. Bien sûr les niveaux de qualification du personnel peuvent varier selon les tâches et les fonctions. Par exemple, un Département de Chimie hautement spécialisé utilisant un équipement hautement sophistiqué et complexe nécessitera un personnel plus qualifié pour le faire fonctionner ainsi qu'une supervision.
Chaque secteur du laboratoire devra déterminer la répartition des effectifs la plus appropriée pour son processus analytique spécifique (4).

Création de « bonnes conditions de travail»

L'aspect purement industriel de la biologie clinique risque de sous-utiliser une certaine catégorie de personnel ce qui explique que le taux de vacuité sans précédent observé dans les LABM américains n'est pas seulement dû au manque de diplômés ni aux retraites prévisibles mais également à la défection délibérée d'une profession pour d'autres opportunités qui apportent considération, valorisent l'intellect, et sont rémunératrices.
Dans l'économie mondiale et maintenant dans un cadre plus élargi de pratiques de laboratoires telles que décrites ci-dessus, les professionnels du savoir sont reconnus comme étant des personnes de grande valeur (38), seules capables de résoudre les dossiers biologiques difficiles.
Ce rôle de consultants mènera à des carrières biomédicales utiles, stimulantes et, à raison, rémunératrices (15) et il est certain que de bonnes conditions de travail conduisent et contribuent à la stabilité de l'emploi (29).
De nombreux biologistes talentueux préfèrent les tâches habituelles du laboratoire traditionnel (opérations internes et techniques sophistiquées) alors que d'autres préfèrent être impliqués dans l'analyse des cas patients à titre consultatif. Toutes ces fonctions sont nécessaires, toutefois, cette dernière voie doit être cultivée et encouragée (15).
Limiter le travail de laboratoire à l'application d'une technologie dans le but de rendre des résultats, refuser de comprendre les raisons de demandes d'économies ou comment les données

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The Future of the Clinical Scientist Workforce

Diana Mass and John R. Snyder

OBJECTIVES

To describe laboratory practices that provide value-added services

To discuss the information society as it relates to clinical laboratory services and patient safety needs

To define the "knowledge worker" and advocate the benefits of clinical scientists who perform this role

To compare and contrast the old laboratory and new laboratory paradigms and determine the value of the new laboratory as it improves patient safety

To describe conditions of good work, which can have a positive impact on current clinical laboratory vacancy rates

To explain the consultation process and determine the benefits in clinical laboratory practice as it relates to patient safety

To characterize four interactive skills that contribute to the effectiveness of consulting practice

To describe the various competencies of successful consultants

To assess the benefits to the healthcare delivery system when clinical scientists act as consultants

The task is not so much to see what no one yet has seen, but to think what nobody yet has thought about that which everybody sees.

ARTHUR SCHOPENHAUER, 1788–1860

TODAY'S LABORATORY MANAGER faces a unique set of challenges in a healthcare environment shaped by financial constraints and increasing federal regulation. An imperative exists to ensure quality while exercising prudent fiscal responsibility, and this within the context of a dramatically changing workforce (7, 29) that must better serve patients in an era of expanding knowledge and rapid change. Further, "value-added" laboratory services has become today's watchword because customer satisfaction is necessary to achieve the goal of long-term sustainability and economic success for the laboratory (15, 29). The focus of this chapter is the discussion of this value-added service, that is, service which addresses effectiveness as well as cost and efficiency. This can only be accomplished if the right test is ordered and interpreted properly: regardless of how accurate and precise the result is, it is of no value unless it contributes to appropriate and timely diagnosis and treatment (3). Thus, the future workforce not only must provide accurate and reliable laboratory results but also must be prepared to interact with healthcare

providers in a consultative manner regarding appropriate test utilization (13, 15, 22, 29).

Essential Role in Healthcare

Traditionally the service provided by the clinical scientist (clinical laboratory scientist/medical technologist) workforce has been essential in the diagnosis and treatment of patients. There is no doubt that their expertise has provided information that physicians require to make critical decisions regarding their patient care responsibilities (3). In 1985, Strandjord estimated that 45% of medical decision making relied on information generated by laboratory tests (39). Today this number is estimated to be 70% (14). The Mayo Health System demonstrated that the laboratory contributes as much as 94% of the objective data in a clinical record. Furthermore, this information is accessed as often as 200,000 times per day as evidenced by retrievals from an electronic medical record (15). Thus, there can be no doubt that the laboratory services are essential to the delivery of healthcare. Additionally, a knowledgeable and committed workforce that provides clinical laboratory consultative services by communicating directly to healthcare providers regarding appropriate testing protocols is now a mandate (18). This was a recurring theme at the CDC Quality Institute held in Atlanta, Ga., in April 2003, that is, the need to improve laboratory services in the preanalytical and postanalytical phases of the laboratory service continuum (2).

Engagement in preanalytical and postanalytical phases of laboratory service signals a fundamental shift in the nature of laboratory work. The shift is *away from* a focus on technology and the performance of procedures *toward* the generation of laboratory information, an "information revolution" in laboratory medicine. Inherent in this information revolution are new tasks related to gathering, distributing, and adding value to the information provided by clinical laboratories.

More than 20 years ago, Peter Drucker foresaw the transformation from an industrial society to an information society (9, 10). He noted a new era in information technology, one in which information concepts would take the place of a focus on data collection, storage, transmission, and presentation. Drucker proposed that the question, "What is the *meaning* of information and its *purpose*?" would help define a hierarchy of information. Indeed, data as simply raw descriptors may help diagnostic efficacy. Data in context become information improving diagnostic effectiveness. Information in light of experiences and judgment becomes knowledge, improving therapeutic efficacy and effectiveness. Outcome-based testing protocols support enhanced service and aggregate cost savings but do require workers with expanded roles.

Drucker coined the term "knowledge worker" for those fulfilling these expanded roles by gathering, distributing, and adding value to information. Throughout this chapter, the imperative for an information revolution in laboratory medicine practice will be described with corresponding implications for a future workforce comprised of clinical scientists as knowledge workers.

Other Emerging Imperatives

In 1995, the Pew Health Professions Commission Report described an emerging transformation of traditional healthcare practice into "systems of integrated care that combine primary, specialty, and hospital services" that require extraordinary collaboration skills across all levels and types of healthcare professions (22). Nowhere is the change more urgent than in the clinical laboratory, where institutional goals can be achieved only by effectively collaborating with other healthcare practitioners to enhance the quality of diagnostic and therapeutic decisions.

Subsequent to the Pew Report, the 1999 Institute of Medicine report "To Err Is Human: Building a Safer Health System" (18) was published indicating that as many as 98,000 people die annually in U.S. hospitals as a result of medical errors. This stunning statistic does not even represent the additional deaths associated with missing a diagnosis from failing to order a laboratory test or incorrectly interpreting test results (20). The need for educating physicians to utilize the appropriate tests and understand their clinical significance may never have been greater than it is now. This is not a new issue. The call for the laboratory to accept the responsibility to directly communicate to physicians regarding proper test utilization has been discussed for over 20 years (8). Unfortunately, the will and courage in laboratory management to do so have been lacking. The parochial view of providing only test results and algorithms will not lead to optimal patient care or financial success. In the final analysis, it is only by appropriately utilizing the clinical scientist workforce that patient safety can be enhanced and fiscal objectives met (7).

Clinical laboratory scientists/medical technologists have for decades been taught clinical correlation with disease status but have only recently been expected to apply this knowledge in practice lest they tread on turf sacred to the practice of medicine. Consequently, an underutilized laboratory workforce has contributed directly to some of the safety, efficiency, and effectiveness problems plaguing healthcare.

Engaging laboratory scientists in the pre- and postanalytical phases of testing requires a fundamental shift in operations. Few scientists are engaged in the input subsystem (physician order and requisition) despite their unique understanding of the subtle differences of testing procedures. Similarly, few scientists are consulted on the output subsystem (physician review, interpretation, and appropriate action) despite their knowledge of predictive value and potential limitations of laboratory results (19).

To prepare and deploy a knowledge worker laboratory workforce, and indeed legitimize the clinical scientist

worker title, laboratorians must be engaged in the testing process as a scientific process, from posing hypothetical answers, through generation and analysis of information to illuminate those answers, to considering the patient care outcome of those answers.

If the clinical scientist staff is more appropriately deployed in an interactive, consultative role in improving test utilization, it is expected that unnecessary testing will diminish, which will have a positive impact on the laboratory's budget in some extraordinary ways. Additionally, a laboratory is cost-effective only if the staff is used at the highest level of capability, not their lowest; thus, in a cost-effective operation you use people at their highest potential (22).

A New Workforce

The emergence of clinical scientists as consultants represents a natural evolutionary growth in the role of the clinical laboratory profession as it adapts to a changing environment. This emerging role is being fostered not only by the need to improve laboratory test utilization (25), as already discussed, but also by the extraordinary growth of decentralized testing (37). The increasing complexity of the clinical laboratory sciences is causing many physicians to seek information and interpretive guidelines necessary to make optimal and cost-effective use of the laboratory. This was first evidenced following the diagnosis-related group initiatives (40). Similarly, rapid advances in clinical laboratory technology and diagnostics have made it nearly impossible for physicians and other healthcare providers to stay abreast of available tests and their implications for diagnosis and treatment (41).

Fueling this process are the medical-necessity guidelines released by the Centers for Medicare and Medicaid Services, formerly known as the Health Care Financing Administration, which prohibit Medicare and Medicaid from reimbursing for Part B services that are not medically necessary and reasonable for the diagnosis and/or treatment of the disease suspected (1). The clinical scientist is a natural link between the clinical laboratory and other providers or patients on matters of test selection, specimen collection, interpretation of test results in light of specimen quality and sources of interference, and patient education. Laboratory professionals are expected to provide information, solve problems, analyze situations, and implement decisions related to laboratory testing (20).

The second development, decentralized testing, is due to a variety of incentives which have caused a shift of various diagnostic testing outside of hospital and private laboratories. Decentralized testing continues to grow with respect to types and numbers of tests because technology has developed less labor-intensive, more compact, and inexpensive equipment as well as reliable diagnostic kits which offer a wide range of testing. At these sites physicians and other healthcare providers require advice and instruction on clinical laboratory practice and management (26).

This new consultative role will enrich the work of clinical scientists who desire new responsibilities that are beyond the process of producing a test result. Now an additional set of skills is also valued: skills to determine whether a test should be done at all and that assist physicians and other healthcare professionals to use the laboratory appropriately. Clinical scientists are well practiced in the science of problem solving. Now we need to take these skills outside of the laboratory to the source of potential problems and begin to prevent problems by interacting with physicians and other healthcare providers to ensure patient safety (22, 27).

It is important to recognize that clinical scientist knowledge workers do both knowledge work and "manual work" (10). Performance of a laboratory procedure constitutes manual work. Knowledge work related to the laboratory procedure begins with data analysis and the use of personal intellectual capital (experience). Knowledge work also includes consultation with other clinical service providers (pooled intellectual capital) and electronically available intellectual capital.

This new workforce of clinical scientist knowledge workers has some unique characteristics, which managers will need to recognize and support (9, 38):

- Knowledge workers are *specialized.*
- They are able to *acquire and supply* theoretical and analytical knowledge.
- They are learning based, prepared through *formal education.*
- They exhibit the habit of *lifelong learning.*
- They are effective in *teams.*
- They seek *meaning* in their work and *advancement opportunities.*
- They require flexible, fully *networked and connected* environments.
- They reach *decisions by consensus*, not command.

Obviously, development and retention of knowledge workers in laboratory medicine pose a challenge.

Laboratory Paradigms

Before describing specific consultative roles, it is useful to discuss the new interactive laboratory and compare it to the old, or traditional, laboratory. The concept of the new interactive laboratory was formulated (3) prior to the Clinical Laboratory Improvement Amendments of 1988 (CLIA '88) (12); however, regulations promulgated under this law defined a total testing process as a continuum in laboratory practice that has been universally accepted by the laboratory community. The CLIA '88 concepts of preanalytical, analytical, and postanalytical activities serve as

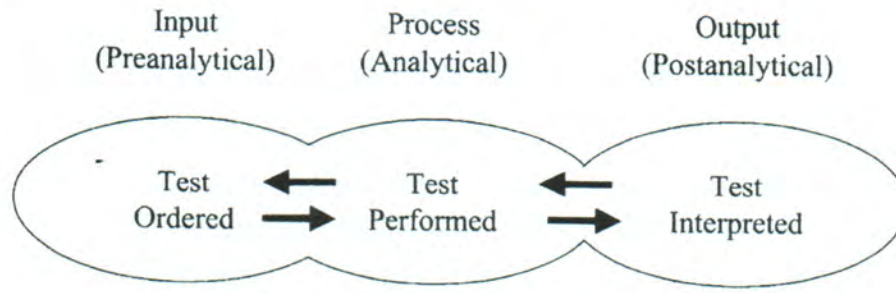

Figure 47.1 The new interactive laboratory model. (Adapted from reference 3.)

benchmarks for laboratory practice. These three phases as they occur in the new laboratory are described by Barr's (3) model of laboratory utilization (Fig. 47.1) as input, process, and output.

The Old Laboratory

Today, many clinical laboratories still operate according to the traditional laboratory model (Fig. 47.2), which is a linear, unidirectional flow process of one activity preceding the next activity. The major concern in this model is the quality of the test performance and the production features and internal organization of the laboratory (analytical phase). In the traditional model, the focus is on the science and technology and quality of test performance, and communication is almost nonexistent prior to the test request or after the result is released. In this model, the clinical laboratory is not concerned with clinical appropriateness or interpretation of test results (3).

The New Laboratory

The new laboratory model (Fig. 47.3) is an interactive process, and the scope of laboratory services is broader. In this model, the focus is not only on the quality of test data generated (process/analytical) but also on the clinical appropriateness of test requests (input/preanalytical) and the correct interpretation of and response to laboratory information (output/postanalytical). The laboratory's involvement in the entire total testing process will have a positive impact on patient outcomes, improve the clinical relevance and value of the laboratory's service, and greatly enhance the cost-effectiveness of the laboratory operation (3).

To demonstrate how appropriate test utilization will promote a better integration of laboratory services into the patient care process, Barr's model is briefly described. In the input phase, one must question if the test is appropriate for the stage of the clinical condition and if the time of specimen collection is correct. During the process phase, one must determine if, within clinically relevant guidelines, the test result is accurate and precise and timely with respect to the turnaround time needs of physicians. Finally, in the output phase, one must evaluate if the results are properly interpreted and integrated into patient care or if data overload is confusing or misleading physicians.

Barr's model identifies the factors that affect the clinician's decisions or actions at each step of the laboratory use process. It also demonstrates any appropriate roles for the clinical scientist at each step of this process. Starting with the clinician's assessment of the patient's condition, the laboratory utilization process proceeds in seven steps, which results in the application and integration of the test results into patient care.

All three phases are critical. If a test is not clinically indicated, or the laboratory's precision is beyond that needed for clinical judgments, or if the result is misinterpreted, then an accurate and precise laboratory result is of no value. It must be acknowledged that such tests are of no value because they unnecessarily consume the limited healthcare resources and may lead to diagnostic and therapeutic delay and patient harm (3, 22).

Clinical laboratory sciences/medical technology educational programs have historically included pathophysiology, clinical correlation, algorithms, and more recently

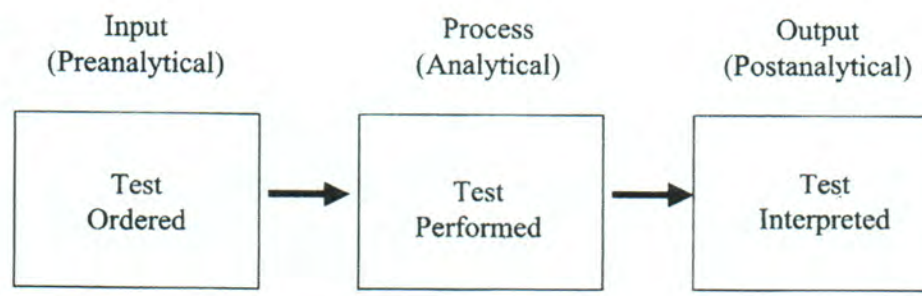

Figure 47.2 Traditional laboratory model. (Adapted from reference 3.)

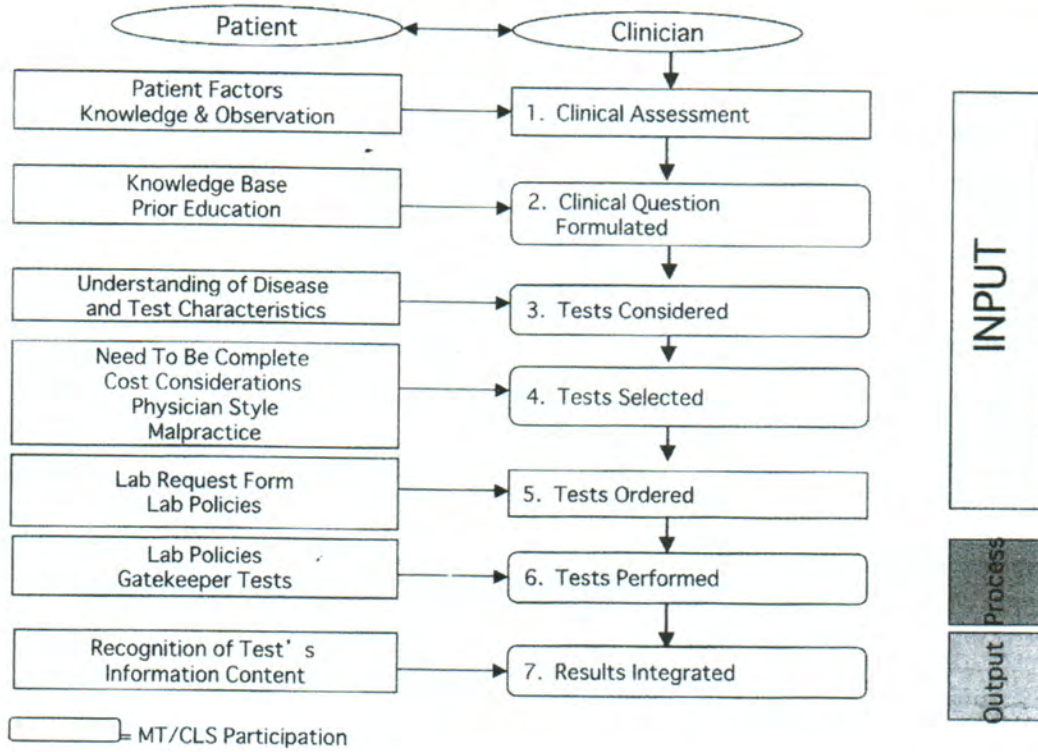

Figure 47.3 Model of laboratory utilization. MT/CLS, Medical Technologist/Clinical Laboratory Scientists. (Adapted from B. Davis, D. Mass, and M. Bishop [ed.], *Principles of Laboratory Utilization and Consultation*, W. B. Saunders, Philadelphia, Pa., 1999.)

clinical pathways in the curriculum (25). This clinical knowledge was always a part of the graduates' knowledge/skill mix, but they have not been called upon to use it due to the laboratory management's lack of vision regarding the role of this knowledge in the total testing process.

The Changing Workforce

The clinical laboratory profession is experiencing unprecedented vacancy rates that will not be resolved in the near future (43). Statistical projections show that an overall expanding population that includes a large elderly group with chronic health problems will require a greater supply of healthcare professionals that currently are in short supply (6). Meeting staffing needs has become the laboratory manager's most pressing problem on a daily basis. As the shortage of certified medical technologists/clinical laboratory scientists continues to grow due to fewer graduates entering the workforce and baby boomers beginning to retire, laboratory managers are evaluating staffing patterns needed for various testing methodologies. While laboratory managers prefer to hire the most highly educated personnel, the fact that these personnel are dwindling is causing managers to assess the requisite skills necessary to perform more routine procedures and hire less educated personnel to fill this need (4).

The appropriate role of the various levels of clinical laboratory personnel is the focus of much discussion and contention today. While the crisis of the shortage of staffing is creating much debate as to the appropriate levels needed to perform various types of testing, the crisis of patient safety needs is unveiling a major contribution that must be provided to improve patient outcomes, that is, better utilization. These two concurrent challenges must be faced with creativity, innovation, and courage by laboratory management in order to provide laboratory services that not only are reliable but also add value to patient care.

Pontius interviewed the chief executive officers of the major laboratory manufacturers in a series of published articles. It is not surprising that most chief executive officers believe that technology, automation, and robotics will substitute for large numbers of personnel (30–36). Indeed, this has been industry's mantra for 30 years (25). Many laboratories have moved to increasingly automated operations. This direction, however, has proved inadequate, as the declining workforce has deprived the operation of the cognitive abilities necessary to provide accurate laboratory information in direct patient care. It is now evident that technology and automation cannot substitute for qualified personnel in the numbers originally suggested (28).

In the absence of state personnel licensure for clinical laboratories, the mix of people with various levels of training and credentialing has created a nightmare for laboratory management. In a profession dictated by stringent

rules regarding test performance, it is ironic that rules regarding personnel are so ambiguous and inconsistent.

The implementation of CLIA '88 in 1992 forever changed laboratory management's perception of the laboratory workforce. In essence, CLIA '88 regulations gave many laboratory managers permission to use less qualified personnel to perform moderate-complexity tests. This option allowed these managers to hire less trained individuals. In some laboratories, such as large reference laboratories, this option may work well if there is sufficient oversight. In other laboratories, particularly community hospital laboratories, this experiment may have proven to be disastrous (28).

Forecasting or speculation regarding workforce needs has almost become sport in various circles. Laboratory financial officers claim that they can effectively operate a laboratory with individuals who can simply function routinely. It is a fact that workforce needs can vary according to laboratory function and tasks. For example, a high-volume chemistry department in an urban reference laboratory with highly automated, sophisticated instrumentation may use supportive-level personnel to operate the equipment. However, if the instrumentation is highly sophisticated and complicated, supervisory oversight is even more necessary. Every laboratory operation will need to determine the appropriate staffing pattern for their unique analytical processes (4). Assuming that test information is reliable and accurate, the more important question with regard to service to the physician, and thus the patient, will be, what does this result mean with respect to patient safety (20)?

Creating Conditions of Good Work

Contributing to the unprecedented vacancy rates in the clinical laboratory is not only the lack of graduates and predictable retirements but also the purposeful defection of qualified people for other opportunities which grant them respect, value their intellectual worth, and financially reward their contributions (29). In the search for profit, clinical laboratories have neglected to provide meaningful and challenging opportunities for their workforce, who are being underutilized.

In the global economy and now within the broader scope of laboratory practice as described above, knowledge workers are identified as the route to success (38). Using the clinical scientist workforce as the knowledge workers in ensuring patient safety will lead to clinical scientist careers that are viewed as meaningful, challenging, and rewarding (15). In addition, the fulfillment of good work leads to personnel recruitment and retention, which contribute to a much-needed stable workforce that will improve the budget's bottom line (29).

By the same token, supportive personnel with appropriate oversight can perform the more routine analytical processes in the laboratory. However, it should be kept in mind that there are analytical processes that require a more educated scientist because of the requirements for problem solving and diagnostic interpretation. Best conducted a task analysis to determine the appropriate staffing levels for various types of tests. It was found that in the laboratory environment, there does exist a need for clinical scientists to perform various functions that are scientific and technical in nature as well as a myriad of roles in a supervisory and administrative capacity (4). The idea here is that many talented scientists prefer work that typically exists in the traditional laboratory (internal operations and sophisticated technical analytical processes), while others prefer to be involved with patient care in a consultative capacity. All functions are necessary, however, and the latter needs to be cultivated and encouraged (15).

Limiting laboratory work to the application of technology to produce patient care information, devoid of the connection to why the information is requested or how the information is used has led to more than just underutilization; it has led to a sense of "invisibility," to a lack of recognition, and ultimately to declining self-worth and the search for more challenging work. For work to be intrinsically rewarding to individuals, there must be a link between behavior and reward with the following psychological conditions (17):

- Experienced meaningfulness
- Experienced responsibility
- Knowledge of results

Unfortunately, job design for laboratory personnel has traditionally been accomplished using a technical approach based in scientific management rather than a psychological approach. The technical approach extracts "maximum efficiency from workers by designing narrow, repetitive jobs" (5). By contrast, a psychological approach to job design seeks to motivate workers with responsibilities which are broad and relatively autonomous from supervisors. Proponents of the technical approach advocate that simplifying work enables the worker to develop proficiency through repetition of tasks, making a highly skilled worker who is productive. Advocates of the psychological approach argue that repetitive tasks are not rewarding to individuals and that work should represent whole tasks with which the worker can identify, e.g., the preanalytical through postanalytical process in laboratory testing.

Additional insight about creating conditions for good work is found in the *motivating potential* of a job. Hackman et al. (17) expressed a job's motivating potential score (MPS) as follows:

$$\text{MPS} = 1/3\,(\text{skill variety} + \text{task identity} + \text{task significance}) \times \text{autonomy} \times \text{feedback}$$

The higher the MPS, the higher the motivation for the employee.

peuvent être exploitées conduit à plus qu'une simple sous utilisation des informations : à une « transparence »,à un manque de reconnaissance, à la baisse d'estime de soi et finalement à la recherche d'un travail plus motivant.

Pour que ce travail soit intrinsèquement plus gratifiant pour le biologiste, les conditions psychologiques suivantes doivent être réunies (17) :

- Signification de l'examen
- Responsabilité de l'acte
- Maîtrise des résultats

Malheureusement la profession a été conçue selon une approche exclusivement scientifique et non psychologique. L'approche purement technique « une efficacité maximum du personnel pour des tâches répétitives est un concept étroit ».
Inversement l'approche psychologique du métier cherche à motiver le personnel par une responsabilisation plus large.
L'approche technique postule que la simplification des tâches rendues répétitives permet à l'employé de développer une sorte de maîtrise faisant de lui quelqu'un de hautement qualifié et productif.
Les défenseurs de l'approche psychologique soutiennent que les tâches répétitives ne sont pas enrichissantes et qu'au contraire le travail doit consister en toutes les tâches dans lesquelles l'employé peut être impliqué y compris le pré-analytique et le post-analytique.
Un aperçu supplémentaire concernant la création de « bonnes conditions travail » est mentionné dans le *potentiel de la motivation* d'un métier. Hackman et al (17) représentent le score potentiel d'une motivation pour un métier (MPS) comme suit :

MPS = 1/3 (variétés de compétences + nature de la tâche = signification de la tâche) x autonomie x commentaires
Plus élevé est le MPS, plus grande est la motivation de l'employé.

Les professionnels du savoir ayant un fort besoin d'évolution de carrière et de réussite personnelle seront plus motivés s'il leur est offert des opportunités d'utiliser leur connaissance et leur potentiel par le biais d'activités consultatives.

La nature de changement du travail

La consultation et le déroulement du processus :

Le consultant est un professionnel de santé, c'est une personne ayant une connaissance reconnue. La valeur primordiale d'un consultant se reconnaît par son expertise pour identifier avec précision, analyser et résoudre les problèmes et comprendre les besoins du patient.

Knowledge workers with a strong need for achievement and personal development will be most motivated if they are given full opportunity to use their education and potential through consultative activities and have a sense of accomplishment in how patient care was affected by laboratory information rather than simple accomplishment of a procedure.

The Changing Nature of Work

The Consultation Role and Process

Consultants are individuals with recognized expertise who are asked by a client, in this case a healthcare provider, to apply their knowledge and skills to a given situation. A consultant is a facilitator and a specialist in determining needs and identifying resources. The primary value of a consultant lies in the expertise to accurately identify, analyze, and resolve the problems and needs of the client.

Consultants can be categorized as either internal or external. Internal consultants are employees of the organization for which they consult, and many clinical scientists have been serving in this capacity without being formally identified as such in a job description. External consultants are proprietors of private consulting businesses. These individuals have total responsibility, authority, and accountability for their professional practices (24). The acceptance and legitimization of clinical scientists as consultants have been demonstrated by the federal regulatory authority of CLIA '88, which specifies the position of a "technical consultant" who is responsible for the technical and scientific oversight of laboratory testing in moderate-complexity laboratories (12). In the last 10 years, clinical scientists have performed the functions as outlined in the regulations and have proven their abilities to occupy this role. Now, this role must be internalized in the clinical setting, where test utilization questions require clinical scientist input to ensure patient safety.

The consultation process can involve the following general functions: evaluation of a problem, research, advising, planning, implementation, supervising, training, and evaluation of problem resolution. Consulting is aimed at helping a person or a group deal with confrontation of problems and efforts to change. "Change" is the operative word, because consultants deal primarily with the effect of change on an organization and on its staff.

Consulting involves people dealing with people, as opposed to people dealing with machines or mathematical solutions. Successful consultants understand organizational dynamics and the unique functions and boundaries of the consultant role. They are aware of the effects and conflicts of using new technologies. They understand change processes and the powerful influence of individual and organizational resistance. They are clear about the boundaries of their role, and they do not become involved in unproductive conflicts over authority and responsibility. They avoid using a narrow set of techniques without evaluating their relevance to a particular situation. The inability to understand these concepts and to apply these skills can produce barriers to positive outcomes, resulting in consultant services that are ineffectual (11, 16, 21, 24, 42).

Consultant Skills

The consultant's potential to affect the quality of laboratory testing depends on the effectiveness of the consulting practice. A combination of four interactive skills makes a successful consultant. A consultant must excel in the area of *technical knowledge and skill*. The successful consultant translates expert knowledge into useful application. The consultant's knowledge must encompass the leading edge of the client's technology; he or she should be aware of emerging technologies and should evaluate their application. If consultants have the best information and approach, or the most effective solution to a problem, but they do not have the ability to work with the client, then the result is negative and failure is inevitable. Therefore, a consultant must excel in *interpersonal skills*, the second area, which includes skills in leadership, communication, understanding value structures, conflict resolution, and teamwork. Good *conceptual skills* are another important requirement. A consultant must be able to see beyond the immediate problem, relate all of the pieces, and integrate them into a conceptual working whole (24). And finally, *empowerment skills* enable the consultant to demonstrate the confidence necessary to influence others (29).

Consultative competencies have been identified and grouped according to the knowledge, skills, and attitudes necessary for success. These competencies are identified in Table 47.1 (21, 27). If we examine these competencies and relate them to a similar set for clinical laboratory sciences, we will find a great disparity. Since the traditional role and environment of clinical laboratory personnel are remarkably different from those of a consultant, this should be expected. Consulting is based on the behavioral sciences, an area that has not been stressed in the highly technical education of clinical laboratory personnel.

The Internal Consultant

Internal consultants include clinical scientists who attend patient rounds in teaching hospitals and advise physicians on the selection of laboratory tests, or those who work for reference laboratories as sales or client representatives and advise physicians on proper screening methods with appropriate reflex (follow-up) testing. The internal consultant role is one that usually does not require the establishment of a formal consultant-client relationship each time service is provided. When clinical scientists who are internal consultants earn the respect of their colleagues in the organization, they often become essential participants on the healthcare team.

Le processus de consultation intègre les fonctions générales suivantes : évaluation d'un problème, recherche, conseils, planification, mise en œuvre, supervision, formation et évaluation de la solution.
Le consultant vise à aider une personne ou un groupe de personnes à affronter les problèmes et faire les efforts pour aborder le changement. « Changement » est le maitre mot, parce que les consultants en mesureront les effets sur le personnel.
Leurs fonctions et limites spécifiques font parties de leur rôle de consultants. Ils sont conscients de la nécessité d'utiliser de nouvelles technologies. Ils comprennent les processus de changement et l'influence puissante de la résistance organisationnelle et individuelle. Ils sont conscients des limites de leur fonction, ils ne s'impliquent pas dans des conflits improductifs d'autorité et de responsabilité.
L'incapacité de comprendre ces concepts et d'appliquer ces compétences peut être préjudiciable et rendre la mission de consultant totalement inefficace (11,16,21,24,42)

Compétences du Consultant

Le potentiel du consultant pour influer sur la qualité des examens de laboratoire dépend de son efficacité dans la pratique du Consulting.
Une combinaison de quatre compétences intriquées fait un consultant performant.

- 1) Le consultant doit exceller dans le domaine du savoir et de la compétence technique. Le consultant performant traduit le savoir en une application. Le savoir du consultant doit s'étendre à la connaissance parfaite de la technologie du laboratoire; il ou elle doit avoir connaissance des technologies émergentes et réfléchir à leur application.
- 2) Le consultant doit parfaitement maîtriser les compétences de chaque personne, c'est son second domaine, qui inclut des qualités d'encadrement, de communication, de compréhension, de résolution de conflits, et d'esprit d'équipe.
- 3) De bonnes compétences conceptuelles sont également nécessaires. Un consultant doit être capable de voir au-delà du problème immédiat, analyser toutes les pièces, et les intégrer dans un ensemble de travail conceptuel (24).
- 4) Finalement leur indépendance permet aux consultants de donner la confiance nécessaire pour influencer les autres. (29).

Ces compétences sont identifiées ci dessous (21.27) Elles sont variées. Le Consulting s'appuie sur les sciences comportementales, un domaine qui n'a pas encore été exploré chez le personnel de LABM.

Domaines de compétences:

Domaine du savoir
Formation dans le domaine administratif, la réglementation, grand sens pratique.
Initié aux techniques pédagogiques et de formation.
Compréhension de l'organisation à l'échelon individuel, du groupe et de l'entreprise.
Aptitude de concevoir et aider au processus de changement.

Table 47.1 Consultant competencies

Knowledge areas
Foundation in administrative philosophies, policies, and practices
Knowledge of educational and training methods
An understanding of the stages in the growth of individuals, groups, and organizations
Knowledge of how to design and help a change process
Knowledge and understanding of human personality, attitude formation, and change
Knowledge of oneself: motivations, strengths, weaknesses, and biases
Skill areas
Communication skills: listening, observing, identifying, and reporting
Teaching and persuasion skills: ability to impart new ideas and insights effectively
Counseling skills to help others reach meaningful decisions
Skill in designing surveys, interviewing, and other data-collecting methods
Skill in using problem-solving techniques and in assisting others in problem solving
Ability to work with groups and teams in planning and implementing change
Ability to be flexible in dealing with all types of situations
Ability to form relationships based on trust
Attitude areas
Attitude of a professional: competence, integrity, feeling of responsibility
Maturity: self-confidence, willingness to take necessary risks, ability to cope with rejection, hostility, and suspicion
Open-mindedness, honesty, intelligence
Possession of a humanistic value system

The consultant within the hospital environment can function in a variety of ways to improve patient care and enhance the efficiency of the facility. Too often the role of the laboratory has been perceived to begin with receipt of a specimen and end with reporting of a result. On the contrary, there are numerous opportunities in the preanalytical and postanalytical phases of the testing process that require consultation in addition to clarification regarding the various aspects of the analytical phase. One important utilization activity that should be increased is the clinical scientist's involvement in interpreting and integrating laboratory information in the management of the patient's condition. Recent studies conducted at the Center for Quality Improvement and Patient Safety confirm this need (44). A successful program to improve laboratory utilization described by Luckey and Davis uses clinical scientists as "laboratory resource consultants." Initially the program focused on the more frequently ordered tests and diagnosis-related groups. With time, the program expanded and provided other needed services. Refer to Table 47.2 for an example of internal consultant functions conducted by the laboratory resource consultant (22).

Table 47.2 Laboratory resource consultant tasks[a]

Monitor utilization reports of high-volume test usage patients
Communicate opportunities for improved utilization to case managers, physicians, and service line administrators
Assess need for involvement of pathologists/administrators in utilization issues
Review care paths to affirm appropriate laboratory utilization
Consult with physicians, nurses, and laboratory professionals on current guidelines and protocols for proper test ordering
Educate physicians and nursing groups on current and new policies and procedures regarding laboratory utilization, medical-necessity, and compliance issues
Consult with laboratory administrators and practitioners about current laboratory utilization practices

[a]Adapted from reference 22.

Clinical scientists should be involved in ordering tests. What test will provide the most information? What type of specimen should be obtained? Under what conditions should the specimen be collected? When and how often? Involvement in discussions with physicians about the patient's situation could avoid delays and inadequate or inappropriate samples, reduce the patient's trauma due to unnecessary venipunctures, and improve the cost-effectiveness of patient care.

The laboratory's responsibility does not end when an accurate test value is obtained. The clinical scientist must ensure that the physician, nurse, therapist, pharmacist, or other healthcare provider understands the *meaning* of the results. The care these persons give depends on such understanding. Whether the test results are inconclusive or appropriate, subsequent steps are indicated; the clinical scientist should discuss these steps with the physician or follow up with institutionally sanctioned protocols (3, 22, 23).

Summary

It is clear that today both the nature of work in laboratory medicine and the workforce to perform testing and provide relevant information are in transition. Spurred by continued demands for efficiency and effectiveness and new demands for safety and better utilization, managers are challenged to rethink the development of clinical scientists.

The broadened role of clinical scientists, engaged with other healthcare providers in an interactive process about the supportiveness of clinical tests (input/preanalytical), the generation of value-added test data and information (process/analytical), and the correct interpretation of and response to laboratory information (output/postanalytical), begs the advent of laboratory knowledge workers.

The laboratory manager of the 21st century has the obligation not only to introduce a new laboratory paradigm but also to create, foster, and nourish a new workforce to bring about substantive change.

Connaissance et compréhension des personnalités, des comportements, des niveaux de formation, des aptitudes au changement.
Connaissance de sa propre motivation, de ses forces, de ses faiblesses et de ses préjugés.

Domaine des compétences
Compétence en communication : savoir écouter, observer, identifier et rédiger des rapports.
Capacité d'enseigner et don de persuasion : aptitude à répandre des idées nouvelles et des points de vue de manière efficace.
Compétence dans le domaine du conseil afin d'aider les autres à prendre les bonnes décisions.
Capacité d'initiative à récolter des informations.
Compétences dans les techniques utilisées pour résoudre des problèmes et dans l'assistance aux autres pour résoudre les problèmes.
Aptitude à travailler en équipe.
Flexibilité de négociation dans tous types de situations.
Compétence pour établir un relationnel sur la base de la confiance.

Domaine comportemental
En milieu hospitalier, le consultant peut opérer de différentes façons afin d'améliorer la prise en charge d'un patient ou améliorer la performance d'un équipement. Trop souvent le rôle du laboratoire commençait à la réception de l'échantillon pour s'achever par la signature du compte rendu de résultats alors qu'il existe de nombreuses possibilités lors des phases pré-analytiques et post-analytiques justifiant un avis pertinent pour clarifier les différents aspects de la phase analytique.
Son rôle de consultant sera d'autant plus important que le biologiste sera impliqué dans l'interprétation des données biologiques (44).
Un programme de prestation efficace pour améliorer l'utilisation du laboratoire bien décrite par Luckey et David s'appuie sur les biologistes pour assurer ce rôle de « consultant ».
Le tableau ci-dessous rend compte de quelques fonctions du consultant :

Tâches du consultant en biologie

Superviser la teneur des comptes rendus de résultats destinés aux patients.
Communiquer à la direction, aux médecins et divers responsables toutes possibilités d'amélioration de la prestation du laboratoire.
Passer en revue les différentes disciplines médicales afin de proposer les meilleurs services du laboratoire.
Consulter les médecins, infirmiers et professionnels du laboratoire pour la rédaction d'un guideline.
Informer les médecins et infirmiers de la réglementation en vigueur relative aux LABM.
Consulter la direction et le personnel technique en vue d'améliorer les tests de routine.

KEY POINTS

- Work and the workforce in laboratory medicine are in transition.
- The broadened role of clinical scientists will require those who can gather and distribute information with a value-added component.
- The total testing process will become very interactive; the focus will encompass the preanalytical (appropriateness of test requests), analytical (generation of test data), and postanalytical (correct interpretation of and response to laboratory information) aspects of testing.
- Only clinical laboratory personnel effectively collaborating with other healthcare practitioners to enhance the quality of diagnostic and therapeutic decisions can achieve institutional goals.
- In the global economy and now within the broader scope of laboratory practice, knowledge workers (those who are specialized, acquire and supply theoretical and analytical knowledge, possess learning based through formal education, engage in lifelong learning, are effective team players, seek meaning in their work, are fully networked and connected, and reach decisions by consensus) are identified as the route to success.

GLOSSARY

Barr's model of laboratory utilization A model that identifies the factors that affect the clinician's decisions or actions at each step of the laboratory utilization process.

Clinical laboratory consultative services Services that provide direct communications to healthcare providers regarding appropriate testing protocols.

Clinical Laboratory Improvement Amendments of 1988 (CLIA '88) technical consultant One who is responsible for the technical and scientific oversight of laboratory testing in moderate-complexity laboratories.

Clinical scientist A title that currently represents the clinical laboratory scientist/medical technologist.

Consultants Individuals with recognized expertise who are asked by a client, in this case a healthcare provider, to apply their knowledge and skills to a given situation.

Information revolution in laboratory medicine A change in laboratory services that includes tasks related to gathering, distributing, and adding value to the information provided by clinical laboratories.

Knowledge work Work that begins with data analysis and the use of personal intellectual capital and includes consultation with other clinical service providers.

Knowledge workers Those who fulfill expanded roles by gathering, distributing, and adding value to information.

New laboratory model A model that describes the total testing process as an interactive process; the focus is not only on the quality of test data generated (process/analytical) but also on the clinical appropriateness of test requests (input/preanalytical) and the correct interpretation of and response to laboratory information (output/postanalytical).

Value-added service Laboratory service which addresses effectiveness as well as cost and efficiency.

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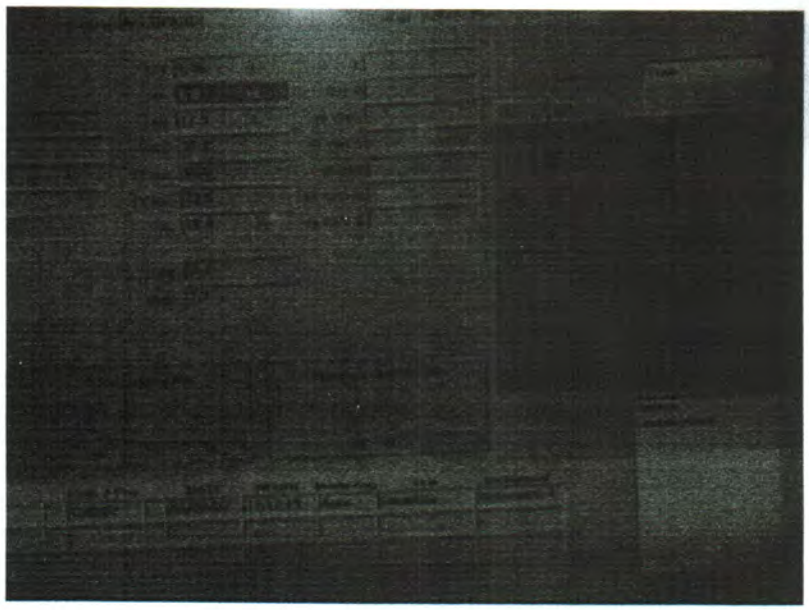
Les biologistes doivent être impliqués lors de la prescription d'examens biologiques. Quel test sera le plus 'informatif ? Quel type d'échantillon allons-nous obtenir ? Dans quelles conditions l'échantillon sera-t-il prélevé ? Quand et à quel rythme ?
Ils sont également concernés par la maîtrise des délais, la réduction des ponctions veineuses inutiles (réduction des volumes de sang prélevés, du traumatisme du patient) ainsi que par l'amélioration du rapport coût/efficacité.
La responsabilité à l'égard du patient ne se termine pas avec le compte-rendu de résultats. Le biologiste doit s'assurer que le médecin, l'infirmière, le pharmacien ou autres fournisseurs comprennent la signification des résultats. Les soins dispensés par ces professionnels de santé dépendent de l'interprétation de ces résultats. Lorsque les résultats sont peu informatifs, d'autres explorations seront indiquées. Le biologiste discutera de ces explorations complémentaires utiles avec le clinicien.

Résumé

Il est clair qu'actuellement la nature du travail de laboratoire ainsi que le rôle du personnel de laboratoire pour réaliser les examens et fournir les informations sont en pleine mutation. Stimulés par des demandes permanentes d'efficacité, de rendement, de nouvelles exigences en matière d'hygiène et de sécurité et de meilleure prestation, les dirigeants de LABM ont désormais pour challenge de repenser la fonction des biologistes. Le rôle élargi des biologistes, 1) engagés avec d'autres professionnels de santé dans un processus interactif pour le choix opportun des tests (entrée/pré analytique), 2) pour la production de tests fiables (process/analytique) et 3) dans l'interprétation correcte des résultats (sortie/ post-analytique), donne naissance au spécialiste du savoir en biologie, c'est-à-dire au consultant.
Le dirigeant du laboratoire du 21ème siècle a non seulement obligation d'introduire un nouveau paradigme de laboratoire, mais également de créer, de favoriser, et faire s'épanouir des compétences nouvelles pour qu'enfin s'accomplissent les réformes nécessaires.

Traduction Française de Gilbert CARRON



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