

Essential Skills Profile: Diagnostic Medical Sonographers

NOC 3216

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DIAGNOSTIC MEDICAL SONOGRAPHERS

Introduction

Diagnostic Medical sonographers operate ultrasound equipment to produce and record images of various parts of the body to aid physicians in monitoring pregnancies and in diagnosing abdominal, cardiac, ophthalmic, vascular and other medical disorders. They are employed in clinics and hospitals. Diagnostic medical sonographers who are supervisors or instructors are included in this unit group.

NOTE: Since many jobs in this field are specialized to a specific diagnostic area, all examples do not apply to all sonographers.

The most important Essential Skills for diagnostic medical sonographers are:

- Oral communication
- Problem solving
- Decision making

A. Reading Text

Reading Text refers to reading material that is in the form of sentences or paragraphs. *Reading Text* generally involves reading notes, letters, memos, manuals, specifications, regulations, books, reports or journals. *Reading Text* includes:

- forms and labels if they contain at least one paragraph;
- print and non-print media such as computer screen and microfiche text; and
- paragraph-length text within charts, tables and graphs.

The Reading Text Complexity Rating Scale ranges from Level 1 (least complex) to Level 5 (most complex). The typical text reading tasks of diagnostic medical sonographers are at Complexity Levels 1 to 4. Their most complex text reading tasks are at Complexity Level 4.

Examples

Diagnostic medical sonographers:

- read notes from clerical staff regarding schedule changes. (1)

- read patient charts which contain information from nurses and physicians in order to clearly understand the relevant medical history of the incoming patient. (2)
- read memos from hospital or clinic personnel about administrative matters. (2)
- read the requisition that accompanies the patient. This is the written request from the doctor indicating what area to examine and why. (2)
- read previous imaging reports written by other sonographers and radiologists to compare and review relevant findings. (2)
- read procedures manuals which deal with how to set up and use ultrasound equipment. Some manuals may be in excess of 100 pages and have technical vocabulary (3)
- read training manuals, such as Workplace Hazardous Materials Information System (WHMIS) documentation, in order to understand common workplace hazards. (3)
- interpret information in vendors' manuals regarding the use and maintenance of ultrasound machinery. (3)
- read medical textbooks and articles in professional journals, such as the Journal of Diagnostic Medical Sonography and the Echocardiography Journal, in order to gain a better understanding of ultrasound technology, methodology and to evaluate ongoing research. (4)
- may read on-line articles in preparation for responding to questions on-line as part of professional development. (4)

Reading Profile

Type of Text	Purpose for Reading			
	To <u>scan</u> for specific information/To <u>locate</u> information.	To <u>skim</u> for overall meaning, to get the 'gist'.	To <u>read</u> the full text to understand or to learn.	To <u>read</u> the full text to critique or to evaluate.
Forms				
Labels				
Notes, Letters, Memos	✓	✓	✓	
Manuals, Specifications, Regulations	✓	✓	✓	
Reports, Books, Journals	✓	✓	✓	✓

B. Document Use

Document Use refers to tasks that involve a variety of information displays in which words, numbers, icons and other visual characteristics (e.g., line, colour, shape) are given meaning by their spatial arrangement. Workplace examples of documents include graphs, lists, tables, blueprints, schematics, drawings, signs and labels.

If a document includes a paragraph of text, as may be the case on a label or a completed form, it is also included in **Reading Text**. Documents requiring the entry of words, phrases, sentences and paragraphs are also included in **Writing**.

The Document Use Complexity Rating Scale ranges from Level 1 (least complex) to Level 5 (most complex). The typical document reading tasks of diagnostic medical sonographers are at Complexity Levels 1 to 3. Their most complex document reading tasks are at Complexity Level 3.

Examples

Diagnostic medical sonographers:

- refer to legends which display abbreviations such as B.P.D. and FL (biparietal distance, femur length) (1)
- enter workload information on computerized or paper-based timesheets. (1)
- complete checklists – for example, to check off areas such as kidneys and bladder that have been seen and viewed as normal during the scan. If abnormalities are discovered, they are described in the space adjacent to the check off area. (1)
- make numeric and point form entries on worksheets, or, in some hospitals, on patients' charts. (2)
- draw diagrams on worksheets or reports. For example, they may draw the location of the placenta in relation to the cervix after an obstetrical scan. (2)
- enter data on forms, such as Doppler velocity recordings on Arterial Assessments. (2)

- interpret graphs that issue from the ultrasound machinery. (2)
- complete a chronological table to show changes over time, e.g., changes in cardiovascular rhythm, or the development of a fetus. (2)
- interpret information presented in bar graphs in journal articles and texts in order to better understand the parameters or frequency of a disease or medical condition. (3)
- complete forms with brief written comments, symbols and numerical information. This may be shown in tabular format. There is a high need for precision and accuracy. (3)

Examples of Creating Documents

- may create charts and tables to present information at meetings.

Document Use Profile

Diagnostic medical sonographers:

- read signs, labels or lists.
- complete forms by marking check boxes, recording numerical information or entering words, phrases, sentences or texts of a paragraph or more.
- read completed forms containing check boxes, numerical entries, phrases, addresses, sentences or texts of a paragraph or more.
- read tables, schedules or other table-like text.
- enter information on tables, schedules or other table-like text.
- plot information on graphs (e.g., line, pie, bar).
- obtain specific information from graphs or charts.
- interpret information on graphs or charts.
- construct or draw graphs or charts.
- recognize common angles such as 15° , 30° , 45° , and 90° .
- draw, sketch or form common shapes such as circles, triangles, spheres, rectangles, squares, etc.
- make sketches.

- obtain information from sketches, pictures or icons.
- interpret sonographs and related imaging.

C. Writing

Writing includes:

- text writing and writing in documents such as filling in forms; and
- non-paper-based writing such as typing on a computer.

The Writing Complexity Rating Scale ranges from Level 1 (least complex) to Level 5 (most complex). The typical writing tasks of diagnostic medical sonographers are at Complexity Levels 1 to 3. Their most complex writing tasks are at Complexity Level 4.

Examples

Diagnostic medical sonographers:

- complete checklists on documents such as echocardiography requests. The type of document on which checklists appear differs by specialty area. (1)
- complete log sheets indicating time spent on ultrasound, and complete exam requests for outpatients. (2)
- write memos to co-workers to deal with scheduling matters, issues relating to patients and imaging machinery and methodology. (2)
- write comments and technical impressions on work sheets, flow sheets, patient charts and client consultation reports to record findings and to provide suggestions for future investigation. The comments concern the analysis of the scan and document any pathology or abnormalities found. Accurate analysis and recording, as well as clear penmanship, are necessary since these sheets are regarded as legal documents. (3)
- may write several paragraphs on a requisition form to justify a request for new equipment. (3)
- may write articles for journals or procedures for manuals. (rarely) (4)
- may write case studies for inclusion on a website. (rarely) (4)

Writing Profile

Length	Purpose for Writing						
	To organize/to remember	To keep a record/to document	To inform/to request information	To persuade/to justify a request	To present an analysis or comparison	To present an evaluation or critique	To entertain
Texts requiring less than one paragraph of new text	✓	✓	✓	✓	✓	✓	
Texts rarely requiring more than one paragraph	✓	✓	✓	✓	✓	✓	
Longer texts		✓	✓		✓	✓	

D. Numeracy

Numeracy refers to the use of numbers by workers and their requirement to think in quantitative terms in order to complete tasks. Two aspects of **Numeracy** have complexity ratings: *Numerical Calculation*; and, *Numerical Estimation*.

Numerical Calculation is rated within four different application settings as specific knowledge of concepts or procedures are exclusive to each setting:

- **Money Math** - financial transactions, such as handling cash, preparing bills or making payments;
- **Scheduling or Budgeting and Accounting Math** - managing time and money as resources, planning and monitoring their use, assessing best value, reducing waste;
- **Measurement and Calculation Math** - measuring and describing the physical world; and,
- **Data Analysis Math** - analysis of numerical data such as extrapolation of information and determination of trends or statistically significant effects.

Numerical Estimation refers to tasks involving any estimation (i.e., an approximation based on judgement) that results in a number.

Numerical Calculation

The Numerical Calculation Rating Scale ranges from Level 1 (least complex) to Level 5 (most complex). The numerical calculation tasks of diagnostic medical sonographers involve:

- Scheduling or Budgeting and Accounting Math at Complexity Level 2.
- Measurement and Calculation Math at Complexity Level 1 and 2.
- Data Analysis at Complexity Level 2.

Examples

Diagnostic medical sonographers:

- schedule patients into time slots of varying lengths, from 20 minutes to 1 ½ hours, depending on the reason for the appointment. While they may not make up the original daily schedule, they are responsible for coordinating rescheduling in response to no-shows, lates or last-minute additions. (Scheduling or Budgeting and Accounting Math) (2)
- establish comparative benchmarks such as identifying the extent of stenosis in an artery over time. (Data Analysis Math) (2)
- compare fetal growth in time intervals or compare the growth of a mass from one time period to another. (Data Analysis Math) (2)
- make various measurements, such as the girth of patients' legs, or the length between an abnormality and typical landmark on or within the body. They also measure blood pressure. (Measurement and Calculation Math) (1)
- measure the size of a mass, such as a tumor, using ultrasound equipment, on-screen. (Measurement and Calculation Math) (2)

Numerical Estimation

The Numerical Estimation Rating Scale ranges from Level 1 (least complex) to Level 4. The numerical estimation tasks of diagnostic medical sonographers are at Complexity Level 2.

Examples

Diagnostic medical sonographers:

- estimate the extent of stenosis, using a diagram to record the estimated extent of the artery narrowing. (Numerical Estimation) (2)

Math Skills Profile

a. Mathematical Foundations Used

Number Concepts

Whole Numbers

Read and write, count, round off, add or subtract, multiply or divide whole numbers. For example, they calculate an Ankle/Brachial Index (ABI) by dividing the ankle sector by the arm sector.

Integers

Read and write, add or subtract, multiply or divide integers. For example, they record the shrinkage or growth of a tumour in plus or minus values from a base measurement.

Rational Numbers – Fractions

Read and write, add or subtract fractions, multiply or divide by a fraction, multiply or divide fractions. For example, they use ejection fractions.

Rational Numbers – Decimals

Read and write, round off, add or subtract decimals, multiply or divide by a decimal, multiply or divide decimals. For example, they record peak systolic velocity ratios in decimal values – e.g., 1.9, 4.0.

Rational Numbers – Percents

Read and write percents, calculate the percent one number is of another, calculate a percent of a number. For example, they classify stenosis as mild, moderate or severe, with mild being less than 50%, moderate being 50% to 75% and severe being greater than 75% occluded.

See *Document Use* for information on:

- using scale drawings.

Shape and Spatial Sense

Measurement Conversions

Perform measurement conversions. For example, they calculate fetal weight in kilograms and convert to pounds and ounces.

Areas, Perimeters, Volumes

Calculate areas, calculate perimeters, calculate volumes. For example, they calculate the volume of a round object.

See *Document Use* for information on:

- recognizing common angles;
- drawing, sketching and forming common forms and figures.

Statistics and Probability

Summary Calculations

Calculate averages, calculate ratios other than percentage; calculate proportions or ratios. For example, they use multiple blood pressure readings from different parts of the body to calculate ratios in order to extrapolate the significance of velocity in terms of an arterial blockage during a vascular study; they calculate AFI (amniotic fluid index) during an obstetrical ultrasound scan.

Statistics and Probabilities

Use statistics and probability (e.g., collecting, classifying, analysing and interpreting data and, by using mathematical theories of. Probability, making conclusions about a population or about how likely it is that some event will happen). For example, they interpret acquired data prior to writing a research paper.

See *Document Use* for information on:

- using tables, schedules or other table-like text;
- using graphical presentations.

b. How Calculations Are Performed

Diagnostic medical sonographers perform calculations:

- in their head.
- using a pen and paper.
- using a calculator.
- using a computer.

c. Measurement Instruments Used

Diagnostic medical sonographers measure:

- time. For example, using a watch, for taking pulse.
- weight or mass. For example, using a scale.
- distance or dimension. For example, using electronic callipers on the screen and a measuring tape.
- temperature. For example, using a thermometer.
- pressure. For example, using a blood pressure cuff.
- angles. For example, using callipers.
- heart functions. For example, using electrocardiograph machinery.
- velocity of blood flow. For example, using electronic callipers and instrumentation inherent in the ultrasound machine.

They use the:

- System International measurement system. (Frequently) For example, measuring velocity (cm/s or m/s), length (mm or cm), mass or weight (g or kg), pressure (mm Hg).
- Imperial measurement system. (Rarely) For example, calculating fetal weight in pounds and ounces.

E. Oral Communication

Oral Communication pertains primarily to the use of speech to give and exchange thoughts and information.

The Oral Communication Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). The typical oral communication tasks of diagnostic medical sonographers are at Complexity Levels 1 to 4. Their most complex oral communication tasks are at Complexity Level 4.

Examples

Diagnostic medical sonographers:

- give simple instructions to patients, such as “Hold your breath.” (1)
- interact with patients to explain ultrasound procedures, answer questions and provide reassurance. They use simple vocabulary that will be understood by the general population. (daily) (2)
- liaise with clerical staff to coordinate appointments and request files. (2)
- may communicate with nurses about the well-being of specific patients. (2)
- use persuasion to coax patients to hold positions that may be awkward for them during a scan. (2)
- communicate with computer technicians and other technical support personnel about the repair of machines. (2)
- speak to radiologists and other doctors to relay information and offer suggestions. Clarity and conciseness is an important aspect of this communication. They use technical and specialized vocabulary in these interactions. (3)
- provide information to family members of patients, who may be worried or distraught. Body language, tone and careful choice of words are elements of this communication. (3)
- communicate with other sonographers to discuss the operation of machinery and to share knowledge and techniques. (3)
- may use persuasion to convince colleagues or managers of the need for review of procedures which may need updating. (3)
- may instruct or mentor students assigned to learn sonography by observation and practice. (3)
- may calm aggressive patients or family members through diplomacy and non-threatening demeanor. (4)

Modes of Oral Communication Used

Diagnostic medical sonographers communicate

- in person.

- using the telephone.
- using videoconferencing.
- using paging systems within the department.

Environmental Factors Impacting Communication

There are no environmental factors impacting communication.

Oral Communication Profile

Type	Purpose for Oral Communication											
	To greet	To take messages	To provide/ receive information, explanation, direction	To seek, obtain information	To co-ordinate work with that of others	To reassure, comfort	To discuss (exchange information, opinions)	To persuade	To facilitate, animate	To instruct, instill understanding, knowledge	To negotiate, resolve conflict	To entertain
Listening (little or no interaction)												
Speaking (little or no interaction)												
Interact with co-workers			✓	✓	✓		✓	✓		✓	✓	
Interact with those you supervise or direct			✓	✓	✓		✓			✓	✓	
Interact with supervisor/ manager				✓	✓		✓	✓				
Interact with patients, clients/ public	✓		✓	✓	✓	✓		✓		✓	✓	
Interact with suppliers, servicers			✓	✓			✓					
Participate in group discussion			✓	✓			✓	✓				
Present information to a small group												
Present information to a large group												

F. Thinking Skills

Thinking Skills differentiate among six different types of cognitive functions. However, these functions are interconnected and include:

1. *Problem Solving*
2. *Decision Making*
3. *Critical Thinking*
4. *Job Task Planning and Organizing*
5. *Significant Use of Memory*
6. *Finding Information*

1. Problem Solving

Problem solving involves problems that require solutions. For example, a mechanic solves problems, e.g., the car shakes when driven over 80 km./hr., by eliminating probable causes until the correct one is identified and remedied. Most problems concern mechanical challenges, people or situations.

The Problem Solving Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). The typical problem solving tasks of diagnostic medical sonographers are at Complexity Level 2. Their most complex problem solving tasks are at Complexity Level 2.

Examples

Diagnostic medical sonographers:

- may face scheduling problems when patients do not arrive at the scheduled time for their appointment. They liaise with the clerical/reception staff to take other patients who are ready. (2)
- may find that a heavy workload limits their ability to communicate effectively with patients. They monitor the workload in order to assess the need for additional resources. (2)
- may encounter a machine breakdown or malfunction that prevents them from conducting the scans of some or all of their patients. They contact the supervisor who will take the appropriate steps to get a repair technician and advise on the rescheduling required. (2)

2. Decision Making

Decision making refers to making a choice among options.

Decision making occurs during problem solving, but not all decision making is part of problem solving. It is, therefore, presented as a separate thinking skill. For example, buyers for retail outlets regularly make decisions about which suppliers to buy from, i.e., they select from the options for particular types of merchandise. This is not problem solving.

The Decision Making Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). The typical decision making tasks of diagnostic medical sonographers are at Complexity Levels 1 to 3. Their most complex decision making tasks are at Complexity Level 3.

Examples

Diagnostic medical sonographers:

- decide the order in which they will see patients. (1)
- decide when it is necessary to ask for assistance when the need arises to move an obese or immobile patient. (1)
- decide on the quality of the image and decide which slices to capture on the hard copy. (2)
- decide where to begin the scan and how to position the patient to obtain the most effective image. (2)
- decide whether to do an additional scan when the patient complains about pain at a different location of the body than the part being scanned. (2)
- may find, during a fetal ultrasound, that the fetus is dead. They decide what steps to take, such as arranging for the patient to have an immediate visit with the doctor. (3)

3. Critical Thinking

Critical Thinking is the process of evaluating ideas or information, using a rational, logical thought process, and referring to objective criteria, to reach a rational judgement about value, or to identify strengths and weaknesses.

Critical Thinking may be an element in other thinking skills. For example, judgement is

sometimes required to evaluate the choices offered during the course of *Decision Making* and to evaluate solutions proposed as a result of *Problem Solving*. In other cases, Critical Thinking is an independent job task.

The Critical Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). The typical critical thinking tasks of diagnostic medical sonographers are at Complexity Level 3. Their most complex critical thinking tasks are at Complexity Level 3.

Examples

Diagnostic medical sonographers:

- use judgment and experience to assess whether a medical situation has become acute, requiring an emergency response. Their evaluation must be quick and accurate since there may be instances of respiratory or cardiac arrest. (3)
- use analytical skills to evaluate the potential seriousness of a situation when they see something abnormal on a scan. Based on their experience and judgment, they determine whether or not the patient's condition warrants the immediate attention of a doctor. (3)

4. Job Task Planning and Organizing

There are two aspects to *Planning and Organizing: Job Task Planning and Organizing* and *Organizational Planning*.

Job Task Planning and Organizing refers to the extent to which the workers plan and organize their own tasks.

Organizational Planning refers to the job incumbent's involvement in the organization's broader planning and organizing tasks (i.e., planning and organizing the work of others, operational planning, strategic planning).

The Job Task Planning and Organizing Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). Diagnostic medical sonographers plan and organize their job tasks at Complexity Level 2.

Description

Diagnostic medical sonographers plan their schedules with the assistance of clerical staff. On average they see 10 to 15 patients a day. While a master list of patients is provided to the sonographer for each workday, the sonographer has authority to determine which patients to see first, based on triage. This sequencing is an essential part of daily planning. Much of the work is

repetitive. Most planning is short range and is based on day-to-day tasks. Some planning is required to keep track of inventory, equipment and re-supply needs.

5. Significant Use of Memory

Significant Use of Memory includes any significant or unusual use of memory for workers in the occupational group. It does not include normal memory use that is a requirement for every occupation.

Examples

Diagnostic medical sonographers:

- memorize the sequence of commands required to operate computer programs.
- remember at what point on a scale there is a departure from the normal to abnormal range.
- remember the names and faces of repeat patients so that they may greet them by name.
- remember the location, appearance and approximate size of anatomical or physiological abnormalities seen during the course of a study.

6. Finding Information

Finding Information involves using any of a variety of sources including text, people, computerized databases or information systems.

Finding Information is highlighted in this section as an essential job skill. However, workers' use of various information sources may be referred to in other sections such as *A. Reading Text*, *B. Use of Documents*, *E. Oral Communication* and *H. Computer Use*.

The Finding Information Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). Diagnostic medical sonographers' tasks that involve finding information are at Complexity Level 2.

Examples

Diagnostic medical sonographers:

- refer to text books to find information about medical conditions. (2)
- go on-line to look up recent research studies in their field. (2)
- peruse files within their clinics/hospitals to obtain the medical history of specific patients. (2)

G. Working with Others

The Essential Skill of *Working with Others* examines the extent to which employees work with others to carry out their tasks. Do they have to work co-operatively with others? Do they have to have the self-discipline to meet work targets while working alone?

The Working with Others Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). Diagnostic medical sonographers work with others at Complexity Level 2.

Description

While diagnostic medical sonographers may work alone with the patient, they must be able to exchange information accurately and effectively with physicians and other medical and clerical staff. This requires the ability to work well with others.

Participation in Supervisory or Leadership Activities

Diagnostic medical sonographers:

- participate in formal discussions about work processes or product improvement.
- have opportunities to make suggestions on improving work processes.
- monitor the work performance of others
- inform other workers or demonstrate to them how tasks are performed.
- orient new employees.
- assign routine tasks to other workers.
- assign new or unusual tasks to other workers.
- identify training that is required by, or would be useful for, other workers.

H. Computer Use

Computer Use indicates the variety and complexity of computer use within the occupational group.

The Computer Use Rating Scale ranges from Level 1 (least complex) to Level 5 (most complex). The Computer Use tasks of diagnostic medical sonographers are at Complexity Levels 1 to 3.

Computer Use Profile

Diagnostic medical sonographers:

- use word processing. For example, they write memos and lists of equipment purchases. (2)
- use graphics software. For example, they may use Power Point to craft presentations or prepare graphics and may use Publisher to prepare flyers. (3)
- use a database. For example, they retrieve patient information. (2)
- use a spreadsheet. For example, they may enter workload information/statistics. (2)
- use e-film to share images across facilities. (1)
- send information to various workstations by computer, and print labels. (1)
- use computerized ultrasound machinery, using the transducer and keyboard. (3)
- use communications software. For example, they use the Internet to access medical information and research vendors on-line, and communicate with other medical personnel by e-mail. (2)
- may use specialized software, such as Platypus, which assists in making a diagnosis. (3)

I. Continuous Learning

Continuous Learning examines the requirement for workers in an occupational group to participate in an ongoing process of acquiring skills and knowledge.

Continuous Learning tests the hypothesis that more and more jobs require continuous upgrading, and that all workers must continue learning in order to keep or to grow with their jobs. If this is true then the following will become Essential Skills:

- knowing how to learn;
- understanding one's own learning style; and
- knowing how to gain access to a variety of materials, resources and learning opportunities.

The Continuous Learning Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). Diagnostic medical sonographers perform Continuous Learning tasks at Complexity Level 3.

Description

Diagnostic medical sonographers must acquire 30 education credits every 3 years through taking on-line courses or correspondence courses, attending conferences and participating in case study reviews. They keep current with new machinery and methodology by attending vendor seminars and professional meetings. They need to be flexible and adaptable to respond to ongoing learning needs.

How the Learning Occurs

Learning may be acquired:

- as part of regular work activity.
- from co-workers.
- through training offered in the workplace.
- through reading and other forms of self-study:
 - at work.
 - on the workers own time.
 - using materials available through work.
 - using materials obtained through a professional association or union.
 - using materials obtained on worker's own initiative.
- through off-site training:
 - during working hours at no cost to the worker.

- partially subsidized.
- with costs paid by the worker.

J. Other Information

Other Information summarizes additional information collected during interviews with job incumbents and focus groups with occupational experts.

In addition to collecting information for this Essential Skills Profile, our interviews with job incumbents also asked about the following topics.

1. Physical Aspects

Strength

Diagnostic medical sonographers use manual dexterity and eye-hand coordination. They need strength in wrists, arms, shoulders and back to apply the necessary pressure with the transducer for substantial periods of time. Strength is needed to move patients into the appropriate position for a scan. Some patients must be lifted from wheelchairs.

Sensory

Good hearing is required when doing a Doppler Study as the sonographer listens to the blood being pumped through an artery. Acute vision is needed to discern minute variations on a scan. In addition, the ability to assess nuances of colour is useful when using Colour Doppler. The ability to understand and apply spatial relationships is also essential.

2. Attitudes

Diagnostic medical sonographers must be personable, caring and enjoy working with people. They must be confident, professional and sensitive in dealing with delicate medical situations. They must be able to multi-task. They must be exacting and precise, since precision is at the core of this occupation. They must display cultural and generational sensitivity.

3. Future Trends Affecting Essential Skills

As ultrasound machinery and equipment becomes more sophisticated, diagnostic medical sonographers will require a higher level of knowledge and a greater focus on detail. This will mean that continuous learning will become more important if sonographers are to keep abreast of new developments.