

The golden years and the impact on the clinical laboratory

As the baby boom generation enters the golden years, the demand on our healthcare system, including laboratory services, will expand significantly. According to a 2006 report from Statistics Canada, the number of Canadians aged 55-64 has jumped by 28 per cent in the past five years to 3.7 million¹. Furthermore, the average life expectancy continues to increase with the average age projected to be over 72 by 2020².

Although the last stage of life is often referred to as the golden years, this period creates numerous challenges as age-related health and quality of life issues increase dramatically. Those older than 65 generally have some type of health related problems and disabilities requiring a greater need for healthcare and laboratory services³. As the geriatric population grows, the effect on laboratory services and costs will escalate, and the cur-

Elderly patients may also have troubles with balance that can make it harder to provide a sample and problems with mobility that may necessitate assistance or even homecare services. The need for mobile phlebotomy services will likely grow as the population in extended care facilities expands and the number of elderly, immobile individuals living alone rises. As mobile services increase, specimen transportation issues to maintain specimen integrity and continuity will need to be addressed.

The decrease in functionality of aging organ systems also impacts specimen collection. Blood collection can be difficult in the geriatric population due to the fact that elderly patients have thinner, less resilient skin and their veins are more fragile. Fragile veins are more susceptible to collapsing during venipuncture, yielding an insufficient sample. In addition, older patients are more prone to

specimen procurement; this can be traumatic and dangerous for both staff and patient. Informed consent is another issue that must be considered in elderly patients with diminished mental status and judgment is required.

Specimen analysis and interpretation of results from samples taken from geriatric patients can be complex and problematic as chronic disease, age related changes, medications and nutritional factors could interfere and affect test results. Reference values for testing in the elderly population have not been well established and could result in incorrect interpretation. Values that are normal for this age group may be viewed as abnormal, leading to misdiagnosis and inadequate treatment. Further studies need to be conducted to determine accurate reference ranges specific for geriatric patients to ensure clinically relevant laboratory results for this population.

In summary, proper specimen collection in all age groups is a challenge for clinical laboratories but it is more problematic with the geriatric population. The quality of the specimen collected directly impacts the reliability of laboratory results, diagnosis, and ultimately treatment. Geriatric patients are a unique sub-group in the adult population and require accurate assessment as multiple underlying conditions, medication and age-related changes could impact test results and outcomes. Careful interpretation of laboratory results in the elderly is necessary because the reference ranges for many tests do not take into account the effects of age and co-morbidities.

As the life expectancy and geriatric population expands, the need for laboratory services will increase. The clinical laboratory will continue to have a significant role in healthcare as the baby boom generation ages, although the types of service delivered will change as consolidation of laboratories, centralized and point-of-care testing increases. Maintaining a high quality and cost effective laboratory service will be a challenge especially with the burden of increased testing, labour shortages, and the unique analytical problems associated with geriatric patients.

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rent shortage of qualified laboratory personnel will intensify. In addition to the operational issues, there are significant challenges in analytical testing. The normal physical and psychological changes associated with aging that affect all phases of laboratory analysis will magnify and create more problems for the laboratory.

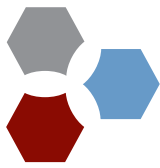
The pre-analytical phase, which includes specimen collection, is an important part of laboratory testing and is essential to maintaining analytical quality. Although there are specimen collection issues in all populations, the challenges are greater in the geriatric population. Elderly patients are more likely to have hearing, visual, and cognitive impairments that can affect their ability to follow and understand specimen collection instructions or provide personal information relevant to laboratory testing. This is likely to result in incomplete data or unacceptable samples for testing and consequently lead to unreliable laboratory reports and potential misdiagnosis.

substantial bruising following the procedure.

The collection of other specimens is equally challenging. Asymptomatic bacteriuria and urinary tract infection is the most frequently documented condition in elderly patients and proper collection and handling of urine sample is critical for accurate diagnosis³. Identifying urinary tract infections and other diseases is difficult in aged patients as the clinical presentation of disease is not always straightforward. This also impacts laboratory testing, as distinguishing between colonization and infection in the elderly can be difficult.⁴ Factors such as incontinence, catheterization and increased antibiotic usage are common in institutionalized elderly patients and further complicate urine collection and analysis.

As well as the physical changes, there are the cognitive changes that impact collection. Decline in mental status, confusion and dementia can result in physical and verbal aggression towards laboratory personnel during

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Rust among the gold

Fred retired at 60. He and his wife sold their home and moved to a country retirement community. They were looking forward to spending their golden years together but after only a few months his wife collapsed and died from an acute myocardial infarction. Fred was broken hearted; perhaps without realizing it, he had always depended on her to care for his needs. He soon lapsed into depression but refused to seek medical care. He spent most of his time in bed and rarely left his apartment. A neighbour kindly took on the job of getting Fred's weekly groceries as well as a 48 oz. bottle of rye whiskey. Fred was no cook and the neighbour noticed that a lot of food was going out in the garbage. After several months, the neighbour realized that Fred was now seriously ill. She called the V.O.N. (Victoria Order of Nurses.) Arrangements were then made to have him transferred to the nearest hospital located in a nearby city.

A thorough medical examination included a battery of laboratory tests. The abnormal results included the following: blood hemoglobin, serum iron, folate and B12 were all low. His serum albumin was low and his alkaline phosphatase (AP) and aspartate aminotransferase (AST) were both elevated. It was clear from Fred's physical state that he was malnourished and the hematology results

confirmed that he was iron deficient.

His serum albumin, AP and AST results would be compatible with liver disease perhaps due to alcohol abuse however this turned out to be only partly correct. He was transferred to a nursing home where Fred was encouraged to get out of bed for most of the day and to participate in the home's exercise program. He received regular counseling and was soon weaned back onto a proper diet – as prepared by the hospital.

Within a few weeks all of his laboratory results had returned to normal. His earlier results, where the AP was raised and the albumin was low, was attributed in part to excessive immobility caused by all the time he spent in bed (astronauts, while weightless in space, have similar changes). His elevated AST was caused by what is called 'enzymes induction' – the alcohol he was consuming had stimulated his liver to boost the level of AST. The reduced level of folate and B12 could also be attributed in part to alcohol abuse and this was reversed by intramuscular injection of these vitamins.

Discussion

The aging process is very complex; it manifests itself in different ways and at different times in people's lives. Without appropriate physical exercise and mental stimulation, old

age comes with a loss of muscle mass and a gain in fat deposits; the brain tends to conform to the saying "use it or lose it". In some cases an older person may lapse into a poor diet not because they lose their appetite but because of more mundane things: they cannot chew their food because of dental problems; they may have difficulty in swallowing, especially liquids and in this case they are encouraged to add a thickening agent to their coffee and other liquids (this tastes as bad as it sounds!). Chronic constipation is very common and daily ingestion of laxatives may result; and of course chronic diseases, often two or three affect many senior citizens; and cancer in its many forms will be common.

Older people are placed in long-term care facilities where they are susceptible to nosocomial infections such as infections of the uro-genital tract and the respiratory system. Details of this topic are given in another article that appears in this issue of *Advocate*.

It has been shown in many studies that a person will consume the majority of their "healthcare costs" in the last few years of their life.

Gerontology is the study and practice of dealing with geriatric cases. The percentage of older people is rising and although gerontology is a certified medical specialty, family doctors provide most care in this area. JLB ❖

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With the above age-related issues one wonders why the last stage of life is called the "golden years". Perhaps the actual start of the golden years is now and it belongs to the generation Y who, as boomers age, will benefit from the increased job opportunities and long-term security in the healthcare industry. ❖

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