**BACKGROUND-AIM**

The prevalence of cobalamin and folate deficit ranges around 2.9%, reaching up to 35% among elderly people. This fact leads to an increase in the demand for both tests. However, the NICE does not recommend the repetition of cobalamin and folate in the follow-up of patients with replacement treatment, and suggests the complete blood count (CBC) instead. Others scientific societies recommend checking cobalamin levels every six months for patients treated with metformin or patients whose cobalamin deficiencies have been corrected.

In accordance with international guidelines, our laboratory established a measure of demand adequacy for primary care (PC). The laboratory information system (LIS) retains the determinations of cobalamin and/or folate with normal previous results within a six-month period. The decision on its processing is based on: diagnostic suspicion, CBC results, iron status panel. For the repetition of folate, previous cobalamin values are also considered.

Our aim was to evaluate the adequacy of the rule implemented, through the number of tests avoided.

**METHODS**

Retrospective observational study performed in a tertiary care hospital between 12/04/2019-31/07/2019. Requests from PC including cobalamin and/or folate were considered. Requests with normal previous results for at least one of the two tests (B12: 138-652pmol/L; folate: 7.05-46.59nmol/L) within a six-month period, were retained by the LIS. The percentages of B12 and folate determinations retained and not performed were evaluated.

**RESULTS**

This study included 2033 requests from PC containing only cobalamin, 1368 only folate and 12779 with both tests. The adequacy rule (retention) was activated for 1141 requests (7.1%). 791 requests showed normal prior results in less than six months for both tests (69.3%). Cobalamin was responsible for the retention of 199 requests (17.4%) and in 151 the cause was folate (13.3%).

Among all requests retained by the LIS, 480 cobalamin tests were rejected and not performed (48.5%), along with 453 folate tests (48.1%), in accordance with the abovementioned items.

**CONCLUSIONS**

Given the increasing demand of cobalamin and folate from PC, clinical laboratories need to offer not only true results, but also become the cornerstone in the optimization of resources.
Education and Training in Laboratory Medicine

T005

 PENETRATION FORCE TESTING OF A NEW GENERATION OF SEMI-AUTOMATED SAFETY BLOOD COLLECTION SETS

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BACKGROUND-AIM

To enable healthcare personnel to perform venipunctures with minimal pain for the patient, sharp needles without deformities are required. Needles vary in terms of shape, size and number of bevels. Though needle gauge is determined by outer diameter, the cannula wall thickness and, inner diameter may vary as well. The 21G and 23G needles of safety blood collection sets (SBC) are available with thin walls (TW), extra thin walls (ETW) or ultra thin walls (UTW). This study focuses on the comparison of a newly developed VACUETTE® EVOPROTECT SAFETY Blood Collection Set (EVO), comparing the penetration force, which correlates to perception of pain, with two competitive devices.

METHODS

Two studies involving mechanical testing were performed by Melab, a German laboratory accredited to carry out tests according to the standard DIN 13097-4 to include the piercing, cutting, dilatation and friction phases of venipuncture. The forces of each phase correlate to the sensation of pain felt during venipuncture. The needles were also optically inspected by microscope to assess for potential tip defects.

RESULTS

A total of 10 products were evaluated using two test methods. The results of penetration force testing showed that both 21G and 23G UTW needles have the lowest piercing force but are associated with the highest maximum penetration force (cutting and dilatation phases). The 21G UTW device also has a considerably higher value during the friction phase. It was found that the 21G EVO-product has a higher piercing value than the 21G SED with UTW (5-beveled needle), but is associated with lower maximum penetration force similar to the semi-automatic SED with 3-beveled needle. Comparing the 23G devices, EVO showed an even slightly lower maximum penetration force than the SED 3-beveled needle. The only optical variation was seen with the 21G UTW SED, showing an extended tip length with 5-bevel-points indicating a tendency for tissue coring.

CONCLUSIONS

It can be concluded that the EVO-device achieved remarkably low results which correlate to minimal sensation of pain. The needle quality of the EVO is comparable to the competitive 3-bevel, semiautomatic SED. It is, however, manufactured with the added benefit of ETW needles without requiring higher penetration forces as seen with UTW needles.
ANTIOXIDANT THERAPIES AND CLINICAL CHEMISTRY: FROM THE PHANTOM MENACE TO THE INTERFERENCE STRIKES BACK.

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BACKGROUND-AIM

Antioxidants such as Vitamin C, N-acetylcysteine (NAC) and reduced glutathione are well tolerated by patients and are often administered in high doses both therapeutically and in clinical trials, especially during Covid-19 pandemic. We therefore wondered whether other antioxidants might also interfere with clinical chemistry measurements such as glucose measurement on glucose meters and other routine assays.

METHODS

First, we studied the impact on Vitamin C therapy on assays performed on Cobas 8000® C502 analyzer (Roche, Bâle, Switzerland). Second, we studied the impact of Vitamin C, NAC and reduced glutathione therapies on a set of glucometers. Finally, we aimed to list routine assays that could be disturbed by antioxidant therapies.

RESULTS

On one hand, our results show that TG, cholesterol and uric acid assays are disturbed by high levels of vitamin C leading to falsely low values. On the other hand, glucose is strongly overestimated on some glucometers on plasma supplemented with Vitamin C or NAC, these false high results could lead to mismanagement of patient care by inappropriate insulin injection.

CONCLUSIONS

As biotin, a few years ago, interference from antioxidants is beginning to seriously disrupt biological assays. The consequences of false biological results can have a major impact on patient management. This interference remains poorly known and underestimated despite a major risk for patient monitoring. Glucometers capable of detecting antioxidant treatments should be preferred for patient management care. Moreover, erroneous results of TG, cholesterol and uric acid determinations should be considered in patients undergoing antioxidant therapies.
INTERACTIVE TOOLS FOR LEARNING AND TRAINING: THE FUTURE OF MEDICAL EDUCATION APPLIED HERE TO THE NEW CONCEPT OF THE INTERACTIVE SCIENTIFIC POSTER.

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BACKGROUND-AIM

In laboratory medicine, training and learning are important. Essential component of medical education is critical thinking and active learning improves it. Interactive assessment systems for the interactive participation of medical students have emerged and especially during Covid19 outbreak. Many offers of audience response system (ARS) accessible by personal electronic devices such as smartphone, tablet or computer have recently emerged. First, we aimed to first evaluate interactive pedagogical tools (IPT) during real school lectures and also during distance lessons on medical students. Second, we aimed to evaluate use of interactive tools on poster here in Euromedlab 2021.

METHODS

Interactive classroom has been tested during medical laboratory lessons at Lille University, faculty of pharmacy. 60 medical students will have attended at least one session using IPT. After lessons, an online questionnaire with 9 questions was submitted to students on their interest in each system. Questions measured student perception using a 1 to 10 scale. To evaluate interactive poster, we submitted directly question to our reader through QR code during our Euromedlab session.

RESULTS

Overall, higher mean scores are reported for ARS (Wooclap, Socrative and Votar) compared to traditional lesson (p<0.05). The most appreciated points are learning, understanding and participation during class. Medical students also reported that they liked the tool because of its ease of use via smartphone. Results of evaluation of our interactive poster will be directly generate during Euromedlab session scanning QR code on our poster.

CONCLUSIONS

This study showed the importance to have direct interaction with a teacher and feedback during a lecture and to not exclusively perform distance learning without direct contact and feedback. Hence, especially in the present context, we encourage teacher to use this type of tools to maintain direct interaction with students - which is essential in pedagogy - and ensure a qualitative pedagogical continuity. These systems are currently being developed for the training of laboratory medicine student but also for continuing education of specialist in laboratory medicine and also use in scientific congress through conferences and poster sessions.
The Institute of Chemistry, Clinical Chemistry and Laboratory Medicine of the Slovak Medical University provides at the Faculty of Medicine education in medical chemistry, medical biochemistry, and laboratory medicine in Slovak and English in the study of general medicine and dentistry in undergraduate, as well as education in laboratory medicine and clinical biochemistry for physicians and doctors non-physicians in graduate school with 4 teachers. In the last year, as a result of organizational measures forced by the pandemic, the university introduced elements of distance education, which added additional biochemistry education for students of nursing, midwifery, emergency health care, clinical nutrition, and dental hygiene at the Faculty of Nursing of the Slovak Medical University.

METHODS

We evaluated the impact of the covid pandemic on pedagogical activities based on the analysis of the pedagogical burden, which we divided into direct (lectures, seminars), indirect (exams), and others (preparation of teaching texts, elaboration of accreditation files). In the winter semester, the teaching lasted 15 weeks, the exam period 6 weeks, the same was true for the summer semester, in addition, we created an autumn exam period lasting 4 weeks.

RESULTS

Before the pandemic, in the winter semester, we provided lectures, seminars, and exams for 159 students in the undergraduate, and 60 students in the postgraduate. A total of 239 students. In the summer semester, we provided lectures and exams for 212 students in the undergraduate, and 79 students in the postgraduate. A total of 291 students. The average number of students for the whole school year was 265. The average pedagogical workload for each teacher was as follows:

**Direct pedagogical activity 1 year Hours**
- Undergraduate
  - Medical biochemistry 60
  - Medical Biochemistry 60
  - Laboratory medicine 60
  - Laboratory Medicine 60
- Postgraduate
  - Control day 8
  - Laboratory medicine entry 8
  - Clinical laboratory 8
  - Molecular pathology 8
  - Clinical biochemistry 8
  - Urine and medical microscopy 8
  - Cytogenetics 8
  - HLA 8
  - Hematology 8
  - Coagulation 8
  - Clinical microbiology 8
  - Immunopathology 8
  - Transfusiology 8
  - Labmed innovation 8
  - Laboratory, molecular, biochemistry 40
  - urine, HLA, cytogenetics 40
  - Hematology, coagulation, microbiology 40
  - Immunopathology, transfusion medicine 40
  - Total 512
- Indirect pedagogical activity (exams)
  - Undergraduate 128
  - Postgraduate 112
  - Total 240

With the addition of biochemistry teaching at the Faculty of Nursing, where it was necessary to provide teaching for 44 nursing students, 21 midwifery students, 33 emergency care students, 20 nutrition physiology students, 20 dental hygiene students, and 33 external students - a total increase of 171 students to 436, which is 39%. The introduction of the subject of biochemistry manifested itself in the pedagogical burden as follows:

**Nursing and midwifery 30 hours**
Urgent health care and dental hygiene 30 hours
Clinical nutrition 30 hours
A total of 90 hours
This represents an approximate increase in the pedagogical burden by 27%

CONCLUSIONS

Before the pandemic, we provided teaching for 265 students in the above spectrum and with the above pedagogical workload. During the pandemic, the number of students increased by 171, and the teaching of biochemistry increased by 90 hours. This represents an increase in the number of students by 39%, in the pedagogical burden by 27%. We note that during the pandemic, we prepared textbooks "Laboratory Diagnostics in Internal Medicine" for students of undergraduate laboratory medicine and laboratory medicine, clinical biochemistry, internal medicine, and general medicine for postgraduate students. We did not include the work on teaching texts in the analysis of the pedagogical burden.