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Chapter 1 : Christopher McCudden - calendrierdelascience.com

Christopher McCudden, PhD This presentation was given by Chris McCudden. I'm a clinical chemist and hormones, drugs among many other analytes. It encompasses.

Medicine, University of Ottawa, Smyth Rd. Laboratory information systems LISs are a rich source of data. LIS data can be used for numerous purposes including operations, quality projects, and research. LIS data can inform decision making, provide value additions, and ultimately be used to improve patient care. However, there are many challenges that come with LIS data re-use. These include security, access to information, the ability to analyze large volumes of data, data quality, and validation. Also provided are concrete examples where LIS data was essential and beneficial for a successful project. Collectively, laboratorians need to focus on training initiatives to empower future staff who will require these skills to do their jobs effectively. Laboratorians should also ask more of the LIS vendors in terms of data access and analytical tools. Informatics; laboratory information systems LISs ; error detection; quality assurance; laboratory operations Received: This data is rich with analytical, patient demographic, physician order, temporal, and patient location information. Laboratory information system LIS data can be re-used for many purposes such as operations, quality, and research. LIS data can guide organizational decisions, help detect errors, improve reference intervals, and facilitate discovery of areas for quality improvement. However, LIS has largely been designed for one-way transactions, in the form to getting information in, rather than getting information out. As a result, there is an array of challenges in using LIS data. Challenges include access, extraction, analysis, and validation where it can be difficult to get, use, and harvest actionable information. This manuscript describes the rich opportunity that laboratory information provides as well as the dark side of acquiring and re-using data from LIS. Consider that each LIS result contains information about the patient, ordering physician, lab results, test order, as well as date, time, and encounter location. We routinely find numerous uses for this information for operations, quality and research. Operations From an operational standpoint, LIS data it can be used to make decisions about basic workflow, such as when to send couriers, when to add or reduce laboratory staff, and how fast results get from one location to another. It can also be used for basic business planning around instrument and hardware replacement. On a daily basis, turnaround time is commonly assessed with built-in LIS applications. While these might serve a basic need, we have found it very helpful to be able to pull out raw data to calculate more robust statistics, such as median, trimmed means, and standard deviation. In addition, the ability to visualize trends and patterns without software limitations is essential for a deep understanding. With raw data in hand, additional analysis is enabled, where a model can be built to assess turnaround time and determine whether there is a significant difference from previous performance. Where data is available in real time, home-brew algorithms may be used to flag samples to staff to identify and resolve problems before they result in negative outcomes or delays. As a basis for instrument replacement or changes in technology and methods, it is very useful to identify common test users. We have found it particularly helpful in terms of who to direct communications to when a particular test has a problem. In this way, rather than making assumptions about the source and origin of orders, data will dictate where to target communication ensuring that key individuals are not missed. As a multi-site facility, we have used available LIS data to determine when best to send couriers between sites. Here, visualization of data can be very informative in terms of when the maximum specimen flow occurs Figure 1. This information serves the basis for when couriers should be sent. LIS data in the form of test volumes can also be very useful for instrument replacements and identifying maximal workload, for example to estimates how many instruments, centrifuges, and preanalytical sampling modules to install on an automation line. LIS data can also be used to identify the frequency of downtimes and clinical needs in order to determine when to perform routine maintenance. In this way, the laboratory has their own detailed information rather than relying on vendors or 3rd parties to come in and identify areas of improvement for them. Figure 1 Example of sample processing volume data visualization. Volume represents weekday hematology and biochemistry samples collected at a one hospital site. Basic LIS data is also useful to identify times and locations where demand on staff is high or

low. Review of the workload identified only one to two specimens over the course of several hours, thereby confirming that minimal staffing was reasonable. This is another area that is amenable to data visualization, which be readily identifies issues with workload. As a final operational use, LIS data may also be used for billing purposes and for reagent contracts. For example, where cost per reportable test is contracted, volumes need to be tallied. LIS data extraction may eliminate manual volume counts and save substantial time and tedious effort. Quality Another rich area available for data re-use is quality. Two commonly encountered preanalytical errors are hemolysis rupture of red cells and short samples inadequate tube fill volume due to poor phlebotomy technique. Hemolyzed samples can either yield inaccurate results or prevent reporting of any results, potentially delaying treatment 1. We have used LIS data analysis to identify the emergency department ED as the primary source of hemolyzed and short samples. Based on this preliminary data, we did a study in collaboration with the ED to test the effect of having a phlebotomist in the ED. Using LIS data, we identified significant improvement in the frequency of short Figure 2 and hemolyzed samples Figure 3. This approach can be used on a prospective basis to target educational efforts and improvement initiatives. In another project, open access to the LIS data facilitated e-mailing of automated reports directly to units to reduce the frequency of preanalytical errors. The utility and flexibility of open LIS data access is essential to these projects. Figure 2 Comparison of the percent of samples with low volumes short before and during an experimental trial. During the trial a phlebotomist was stationed in the emergency department. Figure 3 Comparison of number of hemolyzed samples during an experimental trial. Another beneficial re-use of LIS data is for confirmation and development of reference intervals. Several studies have identified methods which rely on patient data to generate and confirm the appropriateness of implemented reference intervals 2 - 4. This is particularly beneficial given the challenges and expenses of drawing samples from healthy volunteers on a routine basis. The availability of LIS data essentially allows continuous monitoring of reference interval. As a real time quality measure, LIS data can be used to identify shifts and trends in assay performance, classically in the form of moving averages. While many LISs have simple moving averages available, few if any provide enough flexibility to use alternative and more sophisticated methods, such as moving medians, moving variance, and moving deltas 5. Because most LISs have fairly primitive monitoring parameters, extracting data from the system can be helpful for error detection. With complete data, elaborate quality monitoring may be done with multivariate analysis 6. Multivariate analysis may offer better signal to noise for error detection and identify subtler or complex patterns that single moving averages would otherwise miss. Last but not least, laboratory utilization is greatly facilitated by the availability of LIS data. Beginning with a few basic fields, such as tests, provider, and time, patterns are readily identified that can be used to focus efforts at utilization. Beyond simple descriptive analysis, high level audits can help identify areas of miss-use and direct efforts to apply test controls, limits, feedback, and educational initiatives. Indeed, providing data back to the providers who order tests can be a very effective method for audit and feedback to implement changes and test utilization initiatives. Research Beyond operations and quality, there are an infinite number of research projects that rely on LIS data. While many of these projects focus on basic quality initiatives, there are also opportunities for more elaborate projects such as epidemiological studies. This is particularly true where large healthcare organizations or multicentre facilities have LIS data readily available. In summary, there is no limit to the utility of LIS data. Fundamentally, availability of this information is key to many quality and improvement initiatives as well as answering simple operations and workflow questions. Exploration of information tends to lead to many ideas and solutions, such that there is a real benefit to investing in data access. Access Access to LIS data is often the first challenge for data reuse. The basis for access problems are manyfold. First, is authorization for access the software system itself, where only select personnel might have the necessary permissions to use the data. This can be common in hospital environments where there is separation between those who administrate and maintain the system and those who need access to the data in it. In reality, healthcare data access comes with important security and privacy concerns. Indeed, providing data access and availability comes with risk. This high risk scenario frequently leads to use of virtualization environments, such as Citrix, which make system administration easier, but make data extraction harder and often slower. Of course, none of these systems are immune. For many hospitals, software may be outdated,

making them particularly susceptible to attack. Extraction Beyond security risks and with permissions in hand, the next common hurdle in LIS data re-use is the software. LIS software often presents challenges in terms of ease of extraction of raw information. Consider that LISs are primarily designed for transmission of information into the system rather than extraction of information out. As a result, the design of LIS software is often limited in terms of accessing large volumes of data effectively. The availability of database integration into external software applications is extremely limited if not unknown. Database access from outside of the LIS software is advantageous because it facilitates LIS queries to be part of analytical coding and analysis rather than as part of a patchwork of several separate scripts used to extract, transform, and load information into a database before any queries or analysis can be done. Analysis In the rare instance that data is fully available and can be queried by authorized personnel, there remains the limitation of analytical skills. Most laboratory and medical scientific staff are not trained to query databases and analyze large datasets. For example, common spreadsheet software, such as Excel, is not capable of effectively crunching millions or rows of data. This is compounded by the common principle of hiring and promoting people from laboratory positions into LIS positions in the absence of computer, data science, statistical, mathematical, or analytical backgrounds. It will require a new breed of personnel to take advantage of the LIS data re-use opportunity. Analysis of large LIS datasets requires a new set of software tools, analytical skills, and programming capabilities, which are not part of most education and training programs. Because of the challenges and limitations of skill sets required for extracting data, some LIS vendors have added separate modules for analysis and extraction, often at significant financial expense to the customer. In the last decade there has been the emergence of or entire industry to take advantage of this gap. There is now a host of software and software as service entities and consultants who will readily sell analytical packages, services, and dashboards to willing laboratories and hospitals. In our opinion, training programs have a responsibility to hospitals and laboratories to teach the necessary skills for analysis of LIS datasets.

Chapter 2 : Publications Authored by Christopher McCudden | PubFacts

The George F. Grannis Award For Excellence In Research And Scientific Publication. Christopher McCudden, PhD, DABCC was honored with AACC's George F. Grannis Award for Excellence in Research and Scientific Publication.

McCudden and Amelia Byford. His father had been in the military for most of his life. He joined the Royal Engineers as a teenager and served in No. During combat he rescued a wounded soldier while under fire and was recommended for an award. However, when it emerged he was acting against orders he was denied any honours. Nevertheless, his father had a long career in the Engineers and eventually became an instructor at the School of Military Engineering as a non-commissioned officer. McCudden and Amelia Byford â€" married. John and William McCudden became fighter pilots but both were killed whilst flyingâ€"John would be killed in action during the war. McCudden took a post at the Air Ministry at the rank of warrant officer after the Great War, but would die tragically at Clapham Junction railway station on 7 July When he stood up to offer a woman his seat the compartment door flew open, knocking him into the path of an oncoming train. He died of colitis the following year, leaving a widow and small daughter. He learned to shoot at the rifle range , box and was a reasonably intelligent student. He filled the time from the age of 14 to the age of enlistment by working as a Post Office messenger boy. In nearby Leysdown , on the Isle of Sheppey , one of the first aviation centres was built. It was here John Moore-Brabazon became the first Englishman to fly. McCudden and his brothers often went to see the pioneer aviators gather. McCudden expressed a desire to become a pilot after spending hours watching these early flying machines. The family required further income after his father retired. Unable to wait for that opportunity to arise he joined the Royal Engineers on 26 April , as No. On 24 February he set sail for Gibraltar on the southern tip of Spain. McCudden spent eighteen months in Gibraltar before returning to England in September While in Gibraltar he read Flight manual magazine habitually, which explained the theory of flight , aircraft construction and aero engines. He excelled in his service and by 26 April he had become a qualified Sapper. He also held the grade Air Mechanic 2nd Class, No. On 9 May he was posted to Farnborough depot as a mechanic. The same day he was granted a request to travel as an observer in a Royal Aircraft Factory B. Instructed to familiarise himself with the aircraft around the airfield he examined a Caudron Type A , and proceeded to turn over the engine. The aircraft was listed as unserviceable and McCudden saw no danger in leaving the throttle fully open. Suddenly the engine started and it accelerated out of the hangar and into a Farman MF. He was able to reach the cockpit and switch off the ignition but not before extensive damage had been done. Sykes was pleased with his overall progress, which likely saved him, but sentenced McCudden to seven days detention and a forfeiture of 14 days pay for the incident. Five years later Sykes again met McCuddenâ€"then at the height of his fameâ€"and chaffed him on the episode, even jokingly threatening to send him a bill for the car. In August he travelled to France as a mechanic with 3 Squadron after war was declared , which followed the German invasion of Belgium. It operated as a reconnaissance unit and McCudden began to fly as an observer. After stopping at Amiens for several days, the unit began reconnoitering enemy positions. That month McCudden saw his first German aircraft on 22 August. On 25 August the British began their retreat, south-west, toward Paris. Eventually they settled at Melun , south of Paris. McCudden flew these missions with a rifle since aircraft lacked any fixed armament. During this period, the First Battle of Ypres was being fought and the Squadron re-equipped with the higher performing Morane-Saulnier L aircraft. Several months later, on 1 April , he was promoted to sergeant and made NCO in charge of all engines in his flight. Just a week later, his eldest sister Mary lost her husband in an explosion which destroyed the minelayer HMS Princess Irene on 27 May His reputation as a mechanic had spread since his supervision in the unit had led to a record-low number of engine failures. He continued to fly as an observer despite the recommendation of his rejection letter. The enemy succeeded establishing a period of air superiority at this time. McCudden still flew regularly as an observer with the new commanding Officer, Edgar Ludlow-Hewitt , who had taken over command on 20 November He recorded a flight of 2 hours 40 minutes on the 27 November which included an abortive chase after a Albatros C. On 16 December he acted as aerial gunner , when he drove off an attack on his flight by the German ace Max Immelmann. While firing

at the Fokker, McCudden witnessed a piece of paper or fabric fall off the German machine. Although the ground was diligently searched, no trace of it was found. S Lewis who commanded the headquarters Flight fitted his B. He was killed a year later when he was shot down by ground-fire. It is unknown whether McCudden participated in these pioneering ventures. He started with a minute flight in a Henry Farman pusher. McCudden had already flown hours as a passenger with 25 different pilots including 46 hours as a regular observer since November and had much experience with his surroundings. His instructor was impressed with his grasp of the mechanics and theory. He practiced six landings and progressed to the more powerful Avro as the last Farman had been written off by another student. Later that day he was awarded his Royal Aero Club certificate after completing four figure-of-eight turns, a glide from 1, feet and a landing within forty yards of a selected mark. He completed 22 flights at Gosport, the longest a minute flight to 7, feet. He passed as Second Class Flier. He was good enough to be selected as an instructor and took his first pupil after having flown only nine hours of solo flight himself. McCudden narrowly avoided a crash, pulling up feet above the ground. An impact would certainly have killed them both. The grade was based upon his achievements; he had achieved a dead-stick landing within a fifty-yard marker, a minute flight at 6, feet, a mile cross-country flight and 15 hours solo flying. On 24 May he passed his final test with a two-hour flight from Salisbury, to Southampton and onto Basingstoke. His 74 hours flying experience was well above the minimum. By the time he left for France in June he had accumulated flying hours, given lessons as instructor, and had personally tutored 40 student pilots. The unit was equipped with Royal Aircraft Factory F. He flew his first operational sortie two days later and continued as the Battle of the Somme raged. The Squadron was ordered to intercept and shoot down German reconnaissance aircraft. He patrolled the Ypres and Roulers region. He did not spot any enemy reconnaissance machines but did come into contact with a single Fokker near Lille. Flying in formation, the British were well placed to deal with lone German fighters since they could use their gunners to form a formidable defence screen. This particular German would climb above the British, make a diving attack at the rear-most aircraft and dive away if he did not score a decisive hit. Two days later McCudden ran out of fuel in the Lille district. Disorientated because of heavy mist , he force-landed in Allied territory, crashing and coming to halt in the garden of a French farmhouse. Little damage was done to the machine. The flight was unmolested, though the familiar lone Fokker made an appearance and then withdrew without attacking. McCudden was pleased to be flying scouts, finding it "light after flying the F. He engaged an all-white Albatros B. II , and shot it down. He then chased another but it escaped through superior speed. He engaged a Fokker monoplane but his gun jammed. Switching off his engine, he rectified the damage but the Fokker pilot took the opportunity to pursue him. Restarting his engine as the German closed, McCudden outmanoeuvred him and was presented with a close-astern shot, but once again his gun jammed and the battle ended inconclusively when the faster Fokker dived away. Flying from Arras to Monchy on patrol, his flight of six DH. McCudden rushed to the aid of Alexander James, a member of his flight, who had been attacked by a German fighter. He attacked the Albatros head-on but his gun jammed after 20 shots. As he fought to clear the jam he found himself amid a number of German fighters. One soon latched onto him and began firing. McCudden dived steeply but the enemy pilot remained behind him. At feet McCudden began a spinning dive until the German, now some distance behind, abruptly turned away. The enemy aircraft was fired at by British ground forces and McCudden, who by now had unjammed his Lewis machine gun, turned to give pursuit. The enemy pilot, apparently unaware of this, was already too high and McCudden watched as he re-joined his flight and departed the area. Richthofen was credited with a "two seat Vickers biplane" that afternoon, which has usually been listed as the F. He received his commission on 28 December which came into effect on 1 January He was granted two weeks leave and returned to England. As a second lieutenant , McCudden returned to France on 21 January. He was determined to build up his personal tally despite the limitations of his DH.

Chapter 3 : Publications Authored by Christopher R McCudden | PubFacts

by Christopher R. McCudden Calcium is an essential mineral required for numerous biological functions. In circulation,

calcium is found in three different fractions, anion-bound, protein-bound and free or "ionized".

Chapter 4 : What Is Your Guess? The Solidification of Mr. M | Clinical Chemistry

Note: Citations are based on reference standards. However, formatting rules can vary widely between applications and fields of interest or study. The specific requirements or preferences of your reviewing publisher, classroom teacher, institution or organization should be applied.

Chapter 5 : Good Patient Care: Getting Blood Gas Sampling Right

Other Analytes Christopher McCudden Caffeine Theophylline Library of Congress Subject Headings for this publication: Drug monitoring -- Handbooks, manuals, etc.

Chapter 6 : McCudden, Christopher | Department of Pathology and Laboratory Medicine | University of Otta

Christopher R McCudden's 11 research works with citations and reads, including: Stanniocalcin-1 secretion and receptor regulation in kidney cells. Christopher R McCudden has expertise in.

Chapter 7 : James McCudden - Wikipedia

A year-old man with a history of multiple myeloma and hypertension presented for mobilization and collection of hematopoietic progenitor cells (HPCs) by apheresis.

Chapter 8 : Table of contents for Therapeutic drug monitoring data

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Chapter 9 : Articles by Christopher R. McCudden

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