2nd International Fluid Academy Day

Abstracts of the nursing sessions

Vochtbeleid Anno 2012

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Achtergrond De afgelopen jaren is infuusbeleid dikwijls, maar onterecht stiefmoederlijk behandeld. Hoewel er op dat vlak heel wat nieuwe inzichten zijn gebaseerd op goed uitgevoerde klinische studies, blijkt dat het voorschrijven van vocht nog al te frequent ondoordacht en onzorgvuldig blijft gebeuren en enkel gestoeld is op ervaring, gewoonten en traditie. Nochtans is een slordig infuusbeleid minder onschuldig dan gedacht. Zo kon bijvoorbeeld worden aangetoond dat bijna een vijfde van de geopereerde patiënten postoperatieve morbiditeit ontwikkelt (verminderde wondheling, langere verblijf in het ziekenhuis, slechtere kwaliteit van de anastomose,…) die enkel kan worden toegeschreven aan het infuusbeleid. Ook ionenstoornissen (hypokaliëmie, hypomagnesemie) en normale anion gap metabole acidose zijn frequent toe te schrijven aan ondoordachte vochtvoorschriften. ***Methodologie*** Literatuuronderzoek via Pubmed. ***Resultaten*** Recente praktische trends en wetenschappelijke evoluties in vochtbeleid zijn de volgende: [1]. Vochtoverbelasting, door het ongecontroleerd blijven vullen van patiënten die eigenlijk geen vocht meer nodig hebben, is uit den boze. Waar het oedeem –dat bij ernstige septische shock nauwelijks te vermijden blijkt door het optreden van een capillair lek – vroeger als een zuiver cosmetisch probleem werd aanzien, wordt nu met regelmaat van de klok aangetoond dat dit mortaliteit en morbiditeit verhoogt. Het vermijden van deze vochtoverbelasting vereist vooral een bewustwording van het probleem enerzijds en een laagdrempelig toepassen van hemodynamische monitoring anderzijds. Of colloïden, type Voluven/Volulyte een voordeel hebben in het vermijden van vochtoverbelasting werd lang als vanzelfsprekend aangenomen. De literatuur toont dit echter niet eenduidig aan. [2]. Meer en meer worden de voordelen van het balanceren van infuusvloeistoffen duidelijk. Door de ionensamenstelling van de vloeistof aan te passen zodat de concentratie positieve ionen (bijvoorbeeld natrium) groter wordt dan de concentratie negatieve ionen (bijvoorbeeld chloor) door het laten wegmetaboliseren van een deel hiervan (bijvoorbeeld lactaat, acetaat) kan zo een hyperchloremie en een metabole acidose worden vermeden. Recent werd retrospectief bij een enorme groep heelkundige patiënten aangetoond dat het gebruik van PlasmaLyte *vs* NaCl 0.9% leidde tot significant minder postoperatieve morbiditeit. Deze studie van Shaw et al. is meteen de eerste die bij patiënten (*vs* de vroegere studies bij proefdieren en normale vrijwilligers) de negatieve effecten van het nog steeds zeer veel gebruikte "fysiologisch 0.9%" aantoont [3]. Hoewel nog geen onomstotelijk bewijs werd geleverd, komen de colloïden hier en daar in een slechter daglicht te staan. De 6S-studie toonde aan dat patiënten met ernstige sepsis die werden geresusciteerd met een HES 130/0.4 (Tetraspan® op basis van aardappelzetmeel) een hogere kans op overlijden hadden op dag 90 alsook meer kans hadden op nierfunctievervangende therapie dan patiënten die waren geresusciteerd met Ringer's acetaat. De heel recente CHEST-studie bij meer dan 7000 patiënten toont aan dat het bij gebruik van colloiden een weliswaar kleinere totale hoeveelheid vocht nodig is om de patiënt te resusciteren, doch dat het gebruik ervan schadelijk kan zijn voor de nierfunctie. Eigenaardig genoeg leidt deze nierfunctiedaling niet tot een verwachte mortaliteitsverhoging. ***Besluit*** Vochtresuscitatie ondergaat momenteel een hele evolutie, waarbij meer aandacht komt voor het vermijden van nevenwerkingen. Er komen voor het eerst ook wetenschappelijke argumenten die de klinische relevantie van hyperchloremische metabole acidose aantonen. Het aanslepende crystalloïden *vs* colloïdendebat woest volop en is voorlopig niet gunstig voor de colloïden, hoewel de bewuste studies nog heel wat stof voor discussie opleveren.

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White lungs, dark blood: fluid mobilisation in the patient with ARDS

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Introduction and background As ventilation and oxygenation can become very difficult in patients with ARDS, fluids have to be mobilised. This can be a challenge in patients with intravasculary fluid depletion. ***Results and main message*** By looking at 3 patients, all with septic shock and ARDS, but having a totally different medical profile, the diagnosis of ARDS and intravascular *vs* extravascular volume status is explicated. Furthermore, different therapeutic approaches, all concerning fluid mobilisation, are shown. Finally, some complications as well as failure of diuretic therapy are explicated. ***Take-home message*** Diagnosis of volume status at the one side, and fluid mobilisation at the other side, can be challenging in patients with ARDS.

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What if Furosemide does not work anymore? CRRT at ICU

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Introduction and background CRRT (continuous renal replacement therapy) is no longer a rare phenomenon at intensive care units. Hence, ICU nursing staff are often faced with this therapy and the conveniences and inconveniences involvedEven though CRRT is a standard therapy in critically ill patients at ICUs, many issues about this therapy still have not been fully clarified, for instance the issue of the optimal therapy dose, the choice of anticoagulantia, continuous therapy *vs* intermittent therapy, etc. The text below is the result of some recent reviews illustrating the actual state of the art concerning CRRT. ***Results and main message*** *Optimal dose of CRRT*: this discussion is about the ideal quantity of effluent (UF + substitution liquid) that needs to be set in order to obtain the best result, i.e. a decrease of mortality. A consensus has been reached on the optimal CRRT dose, being 20—25 ml/kg/h (1). *Anticoagulantia on CRRT*: a major disadvantage of CRRT is the need for anticoagulantia. This aspect always requires to strike a balance between decoagulation of the extracorporeal circuit and the patient. Regional citrate anticoagulantia is a good alternative to the use of Heparine (2). It causes less risks to haemorrhage than Heparine (4). *CRRT vs intermittent dialysis:* the discussion between both therapies remains controversial yet there is an international consensus to preferably use CRRT in hemodynamically instable patients. CRRT also offers a better imitation of normal kidney functioning (1). Despite of this consensus there is no indisputable evidence (decrease of mortality) that CRRT is better than intermittent dialysis. Intermittent therapy is much cheaper than CRRT and therefore also qualifies as a therapy in critically ill patients. A good alternative for CRRT is SLEDD (sustained low-efficiency daily dialysis) (3). ***Take-home message*** CRRT and intermittent dialysis rather complete each other at ICUs than being each other's competitor. If CRRT is used, the choice for a regional anticoagulant such as citrate is an underpinned option in case a good metabolic monitoring can be guaranteed. It is obvious that high flow CRRT (>25 ml/kg/h) has no added value for critically ill patients.

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Not all fluids must go IV! – Update in respiratory humidification

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Learning objectives In general medicine, the fact that fresh air could have a positive influence on patient´s health, was already well known for many years. The introduction of a basic oxygen therapy was easily made. Medical gases are industrially made and stored under high pressure so that the gas becomes smaller and is therefore easier to transport and store. Because of this, medical gases are very pure and contain almost no water. From the mid 1950´s the modern anesthesiology was introduced with the massive use of positive pressure ventilation. Large quantities of extremely dry gases were used and very soon it was apparent that the respiratory epithelium

cannot withstand very dry circumstances for a prolonged period and symptoms of respiratory dysfunction will be shown (1). ***Introduction and background*** Starting with the invasive ventilation therapies the idea came to moisten and heat the inspired air so that prolonged ventilation with a minimum of adverse effects was possible. Later this idea spread to the other forms of oxygen therapy, including the non-invasive variants. The very first question that one may ask himself: ´Is it really necessary to moisten and heat oxygen before administering it to the patient? ´ A lot of these strategies will cost a significant financial investment and if there is no essential evidence, why go for it? Second question: ´Why is it necessary for nurses to understand the idea of (under)humidification? ***Results and main message*** To answer the first question: Underhumidification of inspired air will always lead to a certain degree of respiratory dysfunction (2). This will not mean that symptoms will be shown directly, but they will intensify with lower absolute humidity and a prolonged period of exposure. To conclude: In a perfect world all forms of oxygen therapy should be adequately moisturized to 100 percent relative humidity at body temperature. It is easier to grasp the context of underhumidification if we have a look at the different stages of mucocilliary dysfunction. First of all the mucous layer that lines the respiratory epithelium will thicken resulting in the cessation of debris transport. The next stage is that the small hairs (cilia), that normally transport the mucous layer towards the pharynx, will also stop moving. In a final stage the respiratory epithelium itself will undergo severe damage. All these stages will inhibit an efficient and comfortable gas exchange in the lungs, and is therefore essential for the success of a respiratory oxygen therapy. According to research, humidification in high-flow therapies, such as endotracheal ventilation and non-invasive BiPAP/CPAP, controlled humidification/heating is absolutely necessary. In low-flow therapies, such as the use of an oxygen mask or a nasal cannula, the scientific evidence is not as single-minded. When the oxygen flow is very low, such as with use of a nasal cannula, humidification is not necessary. With higher flows, patient comfort will increase with adequate humidification/heating, but it is not absolutely certain that humidification/heating is necessary for the success rate of the therapy. Further thorough research is desirable. ***Take-home message*** Why is this essential information for (acute care) nurses? In most cases it is the nurse's job to adequately titrate the needed amount of oxygen for a patient with an increased oxygen demand (according to the institution´s standing orders). It is therefore absolutely necessary that nurses know different humidification/heating strategies and also have a basic understanding if humidification is needed for this patient, because of the underlying high costs. Secondly, all forms of mucocilliary dysfunction will only become symptomatically after a relative long period. In the acute phase the therapy will seem to succeed, but it is the nurse that will be able to detect the first subtle symptoms of a failing therapy due to underhumidification.

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Hemodynamic monitoring anno 2012: choose the right tool for the right patient

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Introduction and background After the publication of the negative outcome results related to the use of the pulmonary artery catheter (PAC), many ICU physicians stopped monitoring and returned to the basic clinical "physiological" findings like hourly urine output, skin temperature and global hemodynamic parameters like heart rate and mean arterial blood pressure (MAP). However some colleagues also looked for less invasive methods to calculate cardiac output (CO). Today a variety of different techniques are available and they range from invasive to truly noininvasive, or from advanced to basic hemodynamic monitoring: calibrated transpulmonary thermodilution CO with either saline as indicator (PiCCO and EV1000) or lithium-dilution (LiDCO), esophageal Doppler or ultrasound (hemosonic, deltex, Uscom), partial CO_2 rebreathing (NiCO), electrical impedance (Cheetah) or other uncalibrated techniques looking at arterial pulse contour obtained via a radial or femoral line like Vigileo, Flotrac, LidCo rapid, Pram, PulsioFlex, or even completely noninvasive like the Bmeye based on fingercuff arterial waveform analysis or esCCO that calculates CO based on ECG and spO_2 curve. This lecture will review the current literature on hemodynamic monitoring in the ICU to guide fluid management.***Methods*** Pubmed review of pertinent peer-reviewed articles on hemodynamic montoring. ***Results and main message*** Different techniques should be analyzed upon their merits and with respect to the patient in whom we want to use them. In the emergency room (ER) and the operating room (OR) the main focus goes to the continuous measurement of MAP and the correct assessment of fluid responsiveness and the capability of correct trending. As such in the ER and OR less invasive (uncalibrated) techniques based on arterial pulse contour analysis may be sufficient to provide the relevant answers. However in the unstable ICU patient with ever

changing conditions of preload, afterload and contractility with the use and administration of fluids, vasopressors and inotropes a more advanced (and thus more likely more invasive) hemodynamic monitoring technique may be needed like the PiCCO (Pulsion Medical Systems) or EV1000 (Edwards) or even a volumetric PAC in some conditions like ARDS or patients with pulmonary hypertension to assess a specific treatment (like NO inhalation). The use of more advanced monitoring also allows to obtain new, extra and more specific information on the fluid status (volumetric preload indicators like global enddiastolic volume, right ventricular enddiastolic volume), contractility (global and right ventricular ejection fraction, dpmax, cardiac function and power index) and the possible risks of fluid overload (extravascular lung water, pulmonary vascular permeability index), in addition to the readily available information with regard to continuous CO and functional hemodynamic parameters based on pulse contour like SVV and PPV. ***Take-home message*** Non invasive technologies offer useful additional information. This can alter our treatment strategy. There is a learning curve with any new technology. Each technology is different and needs to be assessed on its own merits. By knowing the pitfalls we can obtain new and important information. This can eventually also alter our treatment.

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Clash of the Titans. Intensieve Zorgen in België vs Nederland – Hemodynamic assessment and filling in the Netherlands. Restrictive filling based on hemodynamic monitoring and echocardiography

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Introduction and background Septic patients need hemodynamic stabilisation during their stay in the ICU. To achieve this goal, we can resort to intravascular volume expansion and vasopressor/inotropic agents. The correct choice is not always evident from the mere clinical examination. ***Results and main message*** Research shows that an initially liberal fluid management needs rapidly to give way to a more restrictive fluid therapy. The fluid of choice should clearly be a balanced crystalloid solution. The fastest and most accurate evaluation still is echocardiography, closely followed by intravascular continuous cardiac output measurement techniques. Solitary intermittent Central Venous Pressure (CVP) is no longer supported by current literature. ***Take-home message*** hemodynamic assessment should be tailor made based on the individual patient, cardiac ultrasound is the gold standard, while the use of the CVP became obsolete.

The do's and don'ts of fluid administration. Interactive case discussion

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Introduction and background During last year's IFAD nursing session, it was my pleasure to be the moderator of an interesting interactive case discussion about rational use of fluids, diuretics, inotropics and vasopressive agents. ***Results and main message*** This year, we go on step further by challenging the nurses with 5 picked out of real life cases on the type of fluids that should be used in a particular patient. When should we use crystalloids, colloids and albumin? When and how to use (un)balanced fluids? We give the typical critical Antwerp nurses the unique opportunity (allowed only once a year!) to judge whether treating junior physicians performed well (green card) or poor (red card) in the presented cases. I'm looking forward to meet you all in the finishing interactive case discussion of the nursing session of this year's IFAD II!***Take-home message*** Allow me to give away already the take home message and a hint to solve the presented cases: saline sucks (but not always)!

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