manipulation of the serum chloride concentration could be a central therapeutic target for controlling body fluid in HF patients.
Purpose: The present study examined the effects of the chloride-regaining diuretic acetazolamide on plasma volume, serum electrolytes and renal function in comparison with conventional chloride-depletion diuretics.
Methods: I retrospectively analysed 13 data from treated with acetazolamide (Diamox treatment; group A, n=13) or conventional diuretic treatment with a combination of loop diuretics, aldosterone blockade, and thiazide diuretics (group B, n=13), which were matched based on diuresis-induced weight reduction (≥1kg) during resolution of worsening HF. Changes in plasma volume (Strauss method), renal function, and serum electrolytes under treatment were determined by peripheral blood tests.
Results: Treatment duration (27.6±12.7 vs. 26.7±15.8 days) and body weight reduction by treatment (-2.23±1.11 vs -2.22±1.06 kg; Figure 1A) did not differ between the A and B groups. After each treatment, the serum chloride concentration markedly increased in group A, but decreased in group B (+5.31±4.91 vs. -4.54±4.68 mEq/L, p<0.0001; Figure 1B). Plasma volume (0.63±13.1 vs. -12.1±10.5%, p<0.01; Figure 1C) and renal function based on changes in the serum creatinine (0.048±0.12 vs. 0.21±0.24, p<0.047; Figure 1D) were better preserved in group A than in group B.

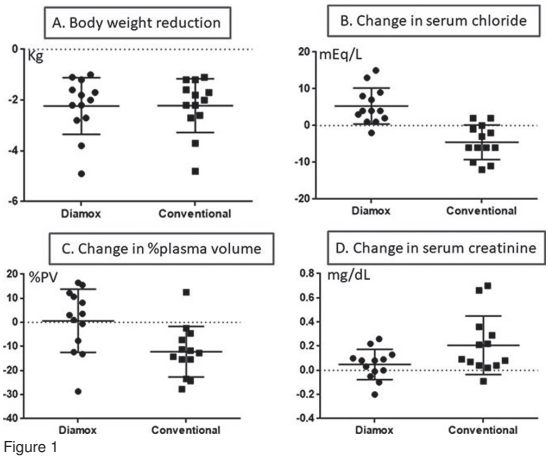

Figure 1

Conclusions: Under achievement of the same body weight reduction by diuresis, plasma volume and renal function were better preserved by diuretic treatment with acetazolamide than with conventional diuretic treatment. These differential effects are in accordance with my "chloride theory" for HF pathophysiology.

P278
Coronary artery bypass graft versus percutaneous coronary intervention in patients presented with acute heart failure

S.E. Lee[1], H.Y. Lee[2]. *[1]Asan Medical Center, Seoul, Korea Republic of; [2]Seoul National University Hospital, Seoul, Korea Republic of*. On behalf of KorAHF registry

Background: Myocardial ischemia is a leading cause of acute heart failure (AHF). However, optimal revascularization strategies in AHF are in doubt.
Objectives: We aimed to compare two revascularization strategies, coronary artery bypass graft (CABG) and percutaneous coronary intervention (PCI), in patients presented with AHF.
Methods: Among the 5,625 consecutive patients enrolled prospectively in The Korean Acute Heart Failure registry from March, 2011 and February, 2014, 717 patients who received CABG or PCI during the index hospitalization for AHF were included in this analysis. We compared adverse outcomes (death, re-hospitalization for heart failure aggravation or cardiovascular causes, ischemic stroke, a composite outcome of death and re-hospitalization for HF aggravation or cardiovascular causes) with the use of propensity-score matching.
Results: For the propensity score-matched cohort with 190 patients, CABG had a lower risk of all-cause mortality (HR 0.560, CI 0.334–0.938, p=0.0274) during median follow-up of 4 years. There was also a trend toward lower rates of rehospitalization due to cardiovascular events or HF aggravation. Subgroup analysis revealed that the adverse outcomes were significantly lower in the CABG group than in PCI group especially in patients with old age, three vessel diseases, significant proximal left anterior descending artery disease, and those without left main vessel disease or chronic total occlusion.
Conclusions: Compared with PCI, CABG is associated with significant lower all-cause mortality in patients with AHF. There should be a further study to evaluate proper revascularization strategy in AHF.
Funding Acknowledgements: This work was supported by grants from Research of Korea Centers for Disease Control and Prevention

DIGITAL HEALTH ANALYSIS

P279
Underuse of non-invasive functional imaging in patients at intermediate risk of coronary artery disease. A decision support system in the clinical practice. The ARTICA database

M. Mazzanti[1], E. Shirka[2], F. Pugliese[3], H. Gjergo[2], A. Goda[2], A. Pottle[4], E. Hasimi[2], S.E. Deane[5], N. Dent[5], N. Mackay[5], S.E. Underwood[6]. *[1]Royal Brompton Hospital, London, United Kingdom; [2]University Hospital Center Mother Theresa, Cardiology, Tirana, Albania; [3]Barts Health NHS Trust, Cardiac Imaging, London, United Kingdom; [4]Harefield Hospital, Nurse Consultant, Harefield, United Kingdom; [5]Harefield Hospital, Nurse in Cardiology, London, United Kingdom; [6]Imperial College London, RBH Nuclear Medicine, London, United Kingdom*

Background: Non-invasive functional imaging (NIFI) can accurately rule out hemodynamically significant coronary artery disease (CAD) and can act as a gatekeeper for invasive revascularization.
Purpose: To analyze an integrated approach by a clinical decision support system (DSS) vs standard care (STD) in patients (pts) at intermediate pre-test likelihood of CAD referred for stable chest pain evaluation.
Methods: 498 pts (303 males and 195 females, age 56±6 years) were referred for stable chest pain evaluation over a 16 month period in three different hospitals. A computerized browsing automated DSS and a human cardiologist STD were applied during the same day visit. Pre-test likelihood of CAD was based on Clinical score + coronary artery calcium scoring (CACS). Significant CAD (>50% coronary stenosis) criteria were applied in all pts by computerized tomography coronary angiography (CTCA).
Results: Pre-test likelihood of CAD is shown in the Table. 281 (56.4%) pts were classified as "No further test (NFT)", 182 (36.5%) "Ex test (ET)/Functional Imaging (FI)" and only 34 (6.8%) "CTCA" and 1 (0.3%) "(ICA)" by DSS. Of note, DSS "ET/FI" + "NFT" and STD "ET/FI" + "NFT" + "CTA" subgroups identified respectively 391 (78.5%) and 372 (74.6%) pts free of significant CAD or inducible myocardial ischemia (p=0.3). The diagnostic accuracy of DSS "ET/FI" + "NFT" (without "CTA" data) class resulted 92.5%.

Table 1

(n/%)	Clinical Score + CAC (n/%)		
	Low-to-intermediate (212 / 21.5)	Intermediate (277 / 28.2)	Intermediate-to-high (9 / 0.9)
CDSS (n/%)			
NFT (281 / 56.4)	121 / 57.0	160 / 57.7	0 / 0
ET/FI (182 / 36.5)	68 / 32.0	109 / 39.3	5 / 55.5
CTA (34 / 6.8)	23 / 11.0	8 / 3.0	3 / 33.3
ICA (1 / 0.3)	0 / 0	0 / 0	1 / 11.2
STD (n/%)			
NFT (6 / 1.3)	6 / 2.8	0 / 0	0 / 0
ET/FI (69 / 13.8)	34 / 16.1	35 / 12.6	0 / 0
CTA (404 / 81.1)	172 / 81.1	227 / 81.9	5 / 55.5
ICA (19 / 3.8)	0 / 0	15 / 5.5	4 / 45.5

Conclusions: The data suggests that direct visualization of the coronary arteries did not add any value for the diagnosis of CAD. However, it should be noted that "No further test +/– functional imaging" class is a powerful negative predictive value for significant CAD. Therefore DSS could represent a valid solution for prescribing the correct test for risk stratification at point-of-care.

P280
Usefulness of clinical decision support system as tool of good clinical practice in patients at low risk of coronary artery disease. The ARTICA co-operative database

M. Mazzanti[1], E. Shirka[2], F. Pugliese[3], H. Gjergo[2], A. Goda[2], A. Pottle[4], E. Hasimi[2], S.E. Deane[5], N. Dent[5], N. Mackay[5], R. Underwood[6]. *[1]Royal Brompton Hospital, London, United Kingdom; [2]University Hospital Center Mother Theresa, Cardiology, Tirana, Albania; [3]Barts Health NHS Trust, Cardiac Imaging, London, United Kingdom; [4]Harefield Hospital, Nurse Consultant, Harefield, United Kingdom; [5]Harefield Hospital, Nurse in Cardiology, London, United Kingdom; [6]Imperial College London, RBH Nuclear Medicine, London, United Kingdom*

Background: The use of decision support systems (DSS) at the point of care may enhance the appropriateness of clinical cardiology versus human physician standard care (STD) bringing evidence-based medicine at the point-of-care.
Purpose: To analyze DSS results vs standard care (STD) in the clinical workflow of patients (pts) at low, low-to-intermediate pre test likelihood (L-LI) of coronary artery disease (CAD).
Methods: 692 pts (403 males and 289 females, age 57±7 years) with L-LI of CAD were referred for stable chest pain evaluation over a 16 month period in three different hospitals. A browsing computerized automated DSS and a human cardiologist STD were applied during the same day visit. Pre-test likelihood of CAD was based on clinical score + coronary artery calcium score (CACS). Significant CAD (>50% coronary stenosis) criteria were applied in all pts by computerized tomography coronary angiography (CTCA).
Results: Distribution of population for DSS and STD is shown in the table. 498 (72%) pts were classified as "No further test (NFT)", 110 (15.9%) "Exercise test

(ET)/Functional Imaging (FI)", 84 (12.1%) "CTA" and 0 "(ICA)" by DSS. Of note, 483 (97%) of DSS "NFT" showed no significant CAD vs 576 (99%) of STD "CTA" (p=0.3). 110 (15.9%) pts were assigned by DSS to "ET/FI" as the first approach vs 27 (3.9%) of STD (p=0.0001). The remaining 38 of STD "ET/FI" performed the test after CTCA. The diagnostic accuracy was 97.8% by DSS in the "NFT" group.

Table 1

	Clinical Score + CAC (n/%)	
	Low (480 / 48.9)	Low-to-intermediate (212 / 21.5)
CDSS (n/%)		
NFT (498 / 72)	377 / 78.5	121 / 57.0
ET/FI (110 / 15.9)	42 / 8.7	68 / 32.0
CTA (84 / 12.1)	61 / 12.8	23 / 11.0
ICA (0 / 0)	0 / 0	0 / 0
STD (n/%)		
NFT (45 / 6.5)	39 / 8.1	6 / 2.8
ET/FI (65 / 9.4)	31 / 6.4	34 / 16.1
CTA (582 / 84.1)	410 / 85.5	172 / 81.1
ICA (0 / 0)	0 / 0	0 / 0

Conclusions: DSS is a sensitive tool for applying good clinical practice in pts with a L-LI pre-test likelihood of CAD. For the "NFT" group DSS was demonstrated to be highly accurate to exclude CAD. It could be a promising tool to substantially improve health care quality avoiding unnecessary tests and reducing costs.

P281
Impact of anemia on development of new-onset diabetes mellitus and 5-year major clinical outcomes in the korean population

S.W. Rha[1], B.G. Choi[1], S.Y. Choi[1], J.K. Byun[1], J.Y. Hong[2], J.Y. Park[3], S.H. Park[4], C.U. Choi[1], C.G. Park[1], H.S. Seo[1]. *[1]Korea University Guro Hospital, Seoul, Korea Republic of; [2]Hanil general hospital, Seoul, Korea Republic of; [3]Eulji General Hospital, Seoul, Korea Republic of; [4]Soonchunhyang University Cheonan Hospital, Cheonan, Korea Republic of*

Background: Studies on anemia in diabetic patients are well known. However, the impact of anemia on the development of new-onset diabetes mellitus (DM) is very limited. The aim of the present study was to evaluate the impact of anemia on the development of new-onset DM and major clinical outcomes in a series of the Korean population during 5-year clinical follow-up.
Methods: The patients were retrospectively enrolled using the electronic database of our Hospital from January 2004 to February 2013. A total of 10,588 patients without a history of DM were analyzed. Anemia was defined as hemoglobin levels <13 g/dL in men and <12 g/dL in women, in accordance with the World Health Organization's criteria. Baseline fasting glucose, hemoglobin (Hb) A1c and glucose tolerance tests were measured in all patients. Included patients had HbA1c <5.7% and fasting glucose level <100 (mg/dL). The patients were divided into 2 groups according to the presence of anemia (the anemia group, n=1,751patients; the no- anemia group, n=8,837 patients). Various clinical outcomes up to 5 years were estimated by the Kaplan-Meier analysis, and differences between the groups were compared with the log-rank test. To adjust baseline potential confounders, a propensity score matching (PSM) analysis was performed using logistic regression model.
Results: After PSM analysis, two matched groups (1,643 pairs, n=3,286pts) were generated and their baseline characteristics were balanced. During 5-year follow up, the anemia group had a higher incidence of new-onset DM (HR: 1.59, 95% CI: 1.02–2.47, p=0.036) and total death (HR: 2.93, 95% CI: 2.30–6.60, p=0.006) compared to the no-anemia group. The incidence of total death was higher and there was a trend toward higher incidence of major adverse cardiac and cerebral events (MACCE) in the Anemia group (Table).

Table. Cumulative Clinical Outcomes up to 5-year.

Incidence (%)	Anemia (n=1751)	No anemia (n=8837)	P value	HR (95% CI)
Entire cohort				
New-onset diabetes	58 (9.0)	139 (4.2)	< 0.001	2.12 (1.56 - 2.88)
MACCE	56 (7.2)	118 (3.3)	< 0.001	2.37 (1.72 - 3.25)
Total death	25 (2.9)	29 (0.8)	< 0.001	4.22 (2.47 - 7.21)
Cardiac death	11 (1.2)	6 (0.1)	< 0.001	8.87 (3.28 - 23.9)
Myocardial infarction	12 (1.4)	11 (0.3)	< 0.001	5.37 (2.37 - 12.1)
PCI	29 (4.2)	65 (1.8)	< 0.001	2.22 (1.43 - 3.44)
Stroke	8 (1.2)	34 (1.2)	0.642	1.19 (0.55 - 2.59)
Matched cohort				
New-onset diabetes	48 (7.9)	34 (5.3)	0.036	1.59 (1.02 - 2.47)
MACCE	48 (6.8)	34 (4.7)	0.057	1.52 (0.98 - 2.37)
Total death	22 (2.8)	8 (1.0)	0.006	2.93 (1.30 - 6.60)
Cardiac death	9 (1.1)	2 (0.2)	0.028	4.74 (1.02 - 21.9)
Myocardial infarction	9 (1.3)	4 (0.5)	0.123	2.44 (0.75 - 7.95)
PCI	24 (3.8)	19 (2.7)	0.288	1.38 (0.75 - 2.52)
Stroke	8 (1.3)	11 (1.8)	0.662	0.81 (0.32 - 2.03)

HR: hazard ratio, CI: confidence interval, MACCE indicates major adverse cardiac and cerebral events, PCI: percutaneous coronary intervention.

Conclusion: In the present study, the anemia was associated with higher rate of new-onset DM and mortality during 5-year clinical follow-up. A randomized trial is needed to determine whether this results can be reproducible or not for the final conclusion.

P282
Application of machine learning for predicting new-onset diabetes mellitus during 5-year follow-up in non-diabetic patients with cardiovascular risk

S.W. Rha[1], B.G. Choi[1], S.Y. Choi[1], J.K. Byun[1], J.Y. Hong[2], J.Y. Park[3], S.H. Park[4], C.U. Choi[1], C.G. Park[1], H.S. Seo[1]. *[1]Korea University Guro Hospital, Seoul, Korea Republic of; [2]Hanil general hospital, Seoul, Korea Republic of; [3]Eulji General Hospital, Seoul, Korea Republic of; [4]Soonchunhyang University Cheonan Hospital, Cheonan, Korea Republic of*

Background: The purpose of this study was to develop a predictive model of type 2 diabetes mellitus (T2DM) using the electronic medical records (EMR) database and a machine learning method and to compare the performance with predictive models developed using existing statistical methods.
Methods: The data used in this study were obtained retrospectively from the EMR of our hospital. The subjects of the study were 8,454 patients without a history of T2DM, fasting blood glucose <110 mg / dL, glycated hemoglobin <6.0% and no anti-diabetic agent treatment who visited the cardiovascular center of our hospital from January 2004 to December 2008.The follow-up period was from January 2004 to February 2014, and all subjects completed 5 years of follow-up. The T2DM prediction model was generated using selection of features using "information gain attribute evaluation", "cross-validation", "boosted ensemble", "logistic regression (LR)", "linear discriminant analysis (LDA)", "quadratic discriminant analysis (QDA)", "K-nearest neighbor (KNN)" classification algorithm for machine learning.
Results: In this study, the prevalence of T2DM during follow-up was 4.78% (404/8454). The performance of the LR learning model showed the highest performance with AUC = 0.78. The learning models of the LDA, QDA, and KNN algorithms did not show a statistically significant difference in comparison with the LR algorithm learning model.
Conclusion: We developed a prediction system using machine learning algorithms. It successfully predicted the 5-year T2DM, and showed similar prediction performance
Conclusion: We developed a prediction system using machine learning algorithms. It successfully predicted the 5-year T2DM, and showed similar prediction performance.

P283
Could social media improve students knowledge in cardiology?

Q. Fischer, P. Nhan, F. Picard, O. Varenne. *Hospital Cochin, Cardiology, Paris, France*

Aims: The recent expansion of e-learning in universities contributed to improve students' knowledge through new educational tools. Among the means used to these distance learnings, social networks, like Facebook, remain underused platforms. Our aim was to develop a new, easy-to-use, daily learning management system to improve students' knowledge in cardiology.
Methods: We developed a database of almost 300 multiple choice questions (MCQs) for medical students of a University in Paris. MCQs were sent daily through a dedicated group on Facebook network. A final evaluation was performed at 3 months, including 25 MCQs previously answered by students (part 1 on 25 points) and 25 unanswered new MCQs (part 2 on 25 points). The primary endpoint was this final evaluation score according to daily participation of each student.
Results: A total of 255 medical students (64% female) participated in the MCQ program, with a daily participation rate of 71%. The majority of participants (61.6%) used their smartphone to answer the MCQs, with a mean time to answer of 50 seconds. Correct answers rate was globally noted in 26%. 190 students underwent the final evaluation at 3 months. Students with daily participation rate more than 90% had a better total score than students with participation rate inferior than 10% (26.3±7.1 points vs. 13.2±7.5 points, p<0.0001). Furthermore, there was a strong positive correlation between participation rate and total score to the evaluation (R^2=0.28, p<0.001), primarily due to part 1 score (including 25 previously answered MCQs). The surveyed participants rated their satisfaction with an average of 8.8 on 10

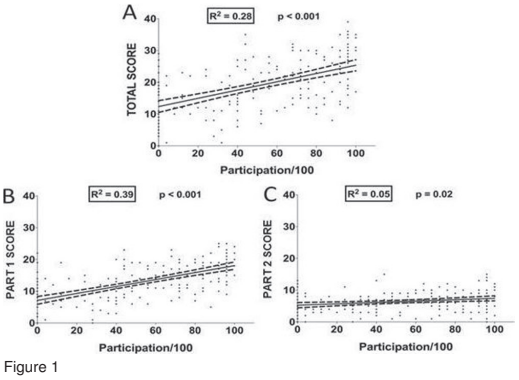

Figure 1