

day 1, 5, and 10, and after 40 weeks adjusted for the gestational age in preterm LBW infants. Blood pressure was measured at each visit using Welch Allyn VSMTM 300 monitor.

**Results** At birth, the NBW infants had significantly lower BCD (difference  $-9.3$  cap/area, 95% CI:  $-1.5$  to  $-17.1$ ,  $p=0.021$ ) and MCD (difference  $-12.6$  cap/area, 95% CI:  $-1.5$  to  $-21.7$ ,  $p=0.025$ ) compared to the LBW infants. LBW oxygen group had a significantly lower SBP (mean difference  $-9.5$  mmHg, 95% CI:  $-1$  to  $-19$ ,  $p=0.047$ ), DBP (difference  $-13$  mmHg, 95% CI:  $-4$  to  $-22$ ,  $p=0.009$ ). At 40 weeks old, the LBW oxygen group showed a significant reduction in BCD (difference  $-19.3$  cap/area, 95% CI:  $-9$  to  $-30$ ,  $p=0.003$ ) and MCD (difference  $-22$  cap/area, 95% CI:  $-8$  to  $-36$ ,  $p=0.007$ ). Similarly the LBW non-oxygen group had a significant reduction in BCD (difference  $-29$  cap/area, 95% CI  $-17$  to  $-41$ ,  $p<0.0001$ ) and MCD (mean difference  $-29$  cap/area, 95% CI,  $-16$  to  $-41$ ,  $p<0.001$ ). Both LBW groups showed a significant rise in BP. The rise in SBP (mean difference  $24$  mmHg, 95% CI:  $14$ – $34$ ,  $p<0.0001$ ) and DBP (mean difference  $14$  mmHg, 95% CI:  $7$ – $22$ ,  $p<0.001$ ) was more pronounced in LBW oxygen group compared to the LBW control group (difference  $14$  mmHg, 95% CI:  $0.5$ – $27$ ,  $p=0.043$  and difference  $9$  mmHg,  $0.3$ – $19$ ,  $p=0.056$  respectively)

**Conclusions** We confirm that LBW infants have higher capillary density at birth but develop significant capillary rarefaction and increase in their blood pressure at 40 weeks compared to NBW infants. Oxygen therapy in the neonatal period in LBW infants was associated with higher blood pressure levels but we could not detect any effect on capillary rarefaction. Further studies are needed to investigate the humoral factors that trigger the changes of microcirculation in LBW infants during the neonatal period which may be of importance in preventing hypertension in later life.

## 102 EVOLUTION OF EUROPEAN SOCIETY OF CARDIOLOGY GUIDELINES SINCE 2000: A SYSTEMATIC APPRAISAL

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**Background** Guidelines from the European Society of Cardiology (ESC) summarise the best available evidence in the management of cardiac disease. These guidelines are graded according to ESC-predefined scales of class of recommendation from I-III and levels of evidence from A-C. We evaluated the development of ESC guidelines since 2000.

**Method** We reviewed recommendations from all ESC guidelines from 2000–14, collating classes of recommendation and level of evidence for each. We assessed the number and percentages of each class of recommendation and determined temporal changes in proportion.

**Results** Out of 52 guidelines, we extracted 4547 recommendations, with 67% being in Class I or III, indicating unequivocal guidance. Regarding the level of evidence for these recommendations, we found that only 18% were class A, indicating high quality evidence, and 50% were class C, indicating consensus opinion or small studies. From 2000–2014, there were minor changes in the proportions of different classes of recommendation and levels of evidence.

**Conclusions** Medicine is rapidly changing and cardiologists face difficult challenges in the application of a growing

number of recommendations of difference evidence level to guide clinical practice. Our analysis highlights that 33% of all guideline statements are in the equivocal class (II), with 82% of guidelines not based upon the highest level of evidence. Over 14 years there have been minimal changes in proportions of class of recommendation and level of evidence. Our findings suggest the need to improve the level of evidence underpinning current guidance to increase the proportion of unequivocal guidance recommendations.

## 103 THE ABILITY OF CARDIOGONIOMETRY COMPARED TO FLOW FRACTIONAL RESERVE AT IDENTIFYING PHYSIOLOGICALLY SIGNIFICANT CORONARY STENOSIS: THE CARDIOFLOW STUDY

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**Introduction** Cardiogoniometry (CGM) is method of 3-dimensional electrocardiographic assessment which has been previously shown to identify patients with angiographically defined, stable coronary artery disease (CAD). However, angiographic evidence of CAD, does not always correlate to physiologically significant CAD. The aim of our study was to assess the ability of CGM to detect physiologically significant coronary stenosis defined by fractional flow reserve (FFR).

**Methods** In a tertiary cardiology centre, patients with single vessel CAD were enrolled into a prospective double blinded observational study. A baseline CGM recording was performed at rest. A second CGM recording was then performed during the FFR procedure, at the time of maximal hyperaemia. A significant CGM result was defined as an automatically calculated ischaemia score  $<0$  and a significant FFR ratio defined as  $<0.8$ . After enrolment, CGM and FFR results were compared and markers of diagnostic performance (sensitivity, specificity, positive predictive value and negative predictive value) were calculated at rest and during maximal hyperaemia. Statistical agreement between CGM and FFR was calculated by the Kappa statistic.

**Results** Forty patients were included (aged  $61.1 \pm 11.0$ ; 60.0% male), of which sixteen (40%) were found to have significant CAD when assessed by FFR. Markers of diagnostic performance of CGM are shown in the table.

**Conclusion** The diagnostic performance of CGM to detect physiologically significant stable CAD is poor at rest. Although, the diagnostic performance of CGM improves substantially during maximal hyperaemia, it does not reach sufficient levels of accuracy to be used routinely in clinical practice.

Abstract 103 Table 1

	CGM at rest (n=40)	CGM during maximal hyperaemia (n=40)
Sensitivity	31.3%	68.8%
Specificity	62.5%	54.2%
Positive predictive value	35.7%	50.0%
Negative predictive value	57.7%	72.2%
Kappa statistic for agreement	$-0.06$ , $p=0.64$	$0.21$ , $p=0.15$

## Imaging

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### A SERVICE REVIEW AND COMPARISON OF RESOURCE UTILISATION WITH THE CHANGE IN RECOMMENDATIONS FROM NICE 2010 CG95 TO THE NICE 2016UPDATE (CHEST PAIN OF RECENT ONSET: ASSESSMENT AND DIAGNOSIS)

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**Background** NICE 2010 guidelines (CG95) proposed investigation according to pre-test likelihood (PTL) of coronary artery disease (CAD) in patients presenting with stable chest pain; low risk patients are referred for CT coronary angiography (CTCA), intermediate risk should have a functional test (stress echocardiography, MPS, CMR) with invasive angiography reserved for high risk patients and those with a PTL >90% having no investigation and treated prospectively as angina. The 2016 update to CG95 now recommends referral for CTCA in all patients with typical or atypical chest pain and in those with non-anginal pain but with ECG changes, with functional imaging reserved for those who have previously documented coronary disease or revascularisation. Our aim was to compare imaging resource utilisation between the 2010 and 2016 guideline recommendations to highlight the potential service implications if followed explicitly.

**Methods** Consecutive patients referred over 4 weeks to the Leeds General Infirmary rapid access chest pain clinic (RACPC) with stable chest pain symptoms were prospectively evaluated. Non identifiable data was collected on demographics, typicality of chest pain symptoms and ECG findings and subsequently requested 1st line investigation. Patient notes were reviewed and PTL for patients was calculated in accordance with CG95 and hypothetical investigative strategies calculated according to both 2010 and 2016 guidelines.

**Results** 157 consecutive patients were evaluated between 17th October and 17th November 2016. Patient demographics are displayed in table 1. 37 (23.5%) patients had typical angina, 55 (35.0%) had atypical angina, 65 (41.4%) had non-anginal symptoms. 16 (10.2%) patients had previous infarction/revascularisation. 25 (15.9%) patients had a PTL <10%, 36 (22.9%) had a PTL of 10%–29%, 30 (19.1%) had a PTL of 30%–60%, 41 (26.1%) had a PTL of 61%–90% and 25 (15.9%) had a PTL of >90%. Table 2 shows diagnostic tests requested and hypothetical investigative strategies according to NICE 2010 CG95 and the 2016 update.

**Conclusion/Implications** Our results show that if implemented in proposed 2016 form there will be a significant increase in the referral rate for CTCA with a corresponding decrease in referral for functional imaging and angiography. Furthermore the number of patients that are not investigated would more than double following the introduction of the proposed NICE 2016 guidelines. CTCA has high sensitivity for the diagnosis of CAD but more limited specificity and concerns are that increased usage in intermediate/high risk patients may lead to increased rates of unnecessary angiography due to the overestimation of severity of CAD. The change in guidelines would lead to a significant shift in practice that has implications for both workforce planning and provision of resources.

**Abstract 104 Table 1** Patient demographics

Patient Characteristics	Number (n=157)
Age/years (mean/SD)	60.4 (13.0)
Male n/%	83 (52.8)
Hypertension n/%	62 (39.5)
Dyslipidaemia n/%	50 (33.8)
Diabetes mellitus n/%	30 (19.1)
Smoking n/%	27 (17.2)
Family History n/%	61 (38.9)
ECG Q-waves n/%	8 (5.0)
ECG ST segment change n/%	8 (5.0)

**Abstract 104 Table 2** Investigative strategy according to CG95 guidelines and per clinician request

	Actual investigation requested	2010 recommended investigation	2016 recommended investigation	P-value (difference between 2010 and 2016)
No test	22	25	62	<0.001
CTCA	14	36	79	<0.001
Functional imaging	111	30	16	0.031
X-ray	10	41	0	<0.001
Angiogram				
Treat as angina	0	25	0	<0.001

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### DIFFERENCES IN MYOCARDIAL MECHANICS BETWEEN ISCHAEMIC AND NON-ISCHAEMIC CARDIOMYOPATHY ASSESSED BY CMR: A SUB-GROUP ANALYSIS OF THE VINDICATE TRIAL

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**Background** Prognosis and treatment of patients with chronic heart failure (CHF) differs according to whether it is ischaemic (ICM) or non-ischaemic cardiomyopathy (NICM). Multi-parametric cardiovascular magnetic resonance (CMR) can distinguish these aetiologies; strain imaging however may confer incremental diagnostic and prognostic information over left ventricular ejection fraction (LVEF). We hypothesised in a prospectively recruited sample of CHF patients, ICM and NICM have different myocardial strain patterns.

**Methods** The VINDICATE trial investigated efficacy of high dose vitamin D in patients with CHF. A subgroup of the trial underwent CMR, blood and cardiopulmonary exercise tests at baseline. 53 patients (31 ICM, 22 NICM) underwent identical 3.0T CMR protocols (Achieva, Philips Healthcare, Best, The Netherlands). Tissue tagging by spatial modulation of magnetization (SPAMM) (spatial resolution  $1.51 \times 1.57 \times 10 \text{mm}^3$ , tag separation 7 mm, 18 phases, typical TR/TE 5.8/3.5 ms, flip angle  $10^\circ$ , typical temporal resolution 55 ms) was acquired in short axis slices acquired at the apex, mid-ventricle, and base.