Aims Vein of Galen arterial malformation (VGAM) is a rare high flow cerebral arteriovenous malformation which most commonly presents with cardiac failure in infancy. VGAM is considered to be a sporadic disorder, with a population incidence of 1 in 100,000. No genetic basis or increased risk of recurrence within affected families has been identified previously. Recently, RASA1 gene mutations have been identified as causative in the autosomal dominant capillary malformation arteriovenous (AV) malformation (CM-AVM) syndrome, a condition presenting with multiple skin AV malformations. A large European study of affected kindreds identified associated non-cutaneous AV malformations and, amongst 140 individuals, identified two cases of VGAM, raising the possibility of a genetic basis for this condition[1].The aim of the present study was to assess the frequency and type of RASA1 mutations in a population presenting with VGAM malformation.

Methods A National Centre for VGAM treatment obtained consent for RASA 1 mutation analysis for all cases presented to the service from January 2011. Genomic DNA was obtained from blood samples and the 25 exons of the RASA1 gene were sequenced for each patient.

Results RASA1 analysis has been undertaken for 11 cases and four were positive for mutations: c.2912T > C(missense), c.2125C > T (truncated) and C.2119C > T (missense) (two cases). The two cases with the C.2119C > T mutation were siblings. One case, with the c.2125C > T mutation, developed the typical CM-AVM rash.

Conclusions RASA1 mutations are strongly associated with VGAM and are biologically plausible causative mutations. The autosomal dominant inheritance of this mutation, has a significant implication for counselling affected families.

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G26 LYMPHATIC DISORDERS IN NOONAN SYNDROME

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Aims To investigate the lymphatic phenotype in Noonan syndrome with reference to the medical literature

Methods Notes from patients with Noonan syndrome attending a lymphoedema clinic were located via the Geneworks database by searching for "Noonan syndrome" and then examining paper notes of those patients who had lymphoedema listed as a feature. The patients' letters and results stored in the Electronic Patient Register were also accessed and information on lymphatic abnormalities and molecular results was gathered and analysed. Images and results of lymphoscintigraphy were obtained from iSite Enterprise.

Results 7/582 Noonan syndrome patients (1.2%) had lymphoedema listed as a characteristic, and were included in this study.

The current age of patients ranged from 6 to 37 years. Onset of lymphoedema ranged from birth to 27 years, with a mean of 10.3 years.

5/7 patients had swelling of the lower limbs and genitalia. 5/7 had systemic involvement (intestinal lymphangiectasia, chylous reflux or chylothorax). 4/7 had genital lymphorrhoea.

Conclusion This study suggests that severe lymphoedema is a less common feature of Noonan syndrome than previous reports have indicated. Mild lymphoedema in the remaining patients, however, cannot be excluded. Within the patient group studied, a consistent pattern of lymphatic abnormality was seen: lower limb lymphoedema with variable age of onset, and genital involvement with chylous reflux.

G27 THE LYMPHATIC PHENOTYPE IN TURNER SYNDROME: AN EVALUATION OF PATIENTS PRESENTING TO THREE SPECIALIST PRIMARY LYMPHOEDEMA CLINICS AND LITERATURE REVIEW

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Aims This study aimed to analyse the medical records of a cohort of 19 Turner Syndrome patients attending three specialist primary lymphoedema clinics to elucidate the key features of the lymphatic phenotype of Turner Syndrome and provide vital insights into its diagnosis, progression and management. Lymphoedema of the hands, feet and cervical region is a common and key diagnostic indicator of Turner Syndrome, present in >60% of patients, though is poorly described in the literature.

Methods The study sample of 19 female patients was obtained from specialist primary lymphoedema clinics at three major centres and located by identifying all patients with Turner Syndrome and lymphoedema from hospital databases. Patient and genetic notes were identified through the use of patient-specific numerical identifiers. These notes were thoroughly analysed and examined and any important information inserted into a spreadsheet pro forma.

Results The majority of patients presented at birth with 4-limb lymphoedema which often resolved in early childhood but frequently recurred in later childhood. There was 1 case of systemic involvement (e.g. intestinal or pulmonary lymphangiectasia). The swelling was confined to the legs and hands with no facial or genital swelling. The most significant discovery from this research was a pattern observed from the lymphoscintigraphy results, which suggested that the lymphatic phenotype of Turner Syndrome may be due to lymphatic functional hypoplasia of lymphatic tracts.

Conclusion Turner Syndrome frequently presents at birth with 4-limb lymphoedema which often resolves in early childhood but may recur at any age. The lymphoscintigraphy results suggested that the lymphatic phenotype in Turner Syndrome may be due to lymphatic functional hypoplasia, a new perspective which may highlight the importance of this test as a baseline assessment of lymphoedema in Turner Syndrome patients.

G28 A NOVEL MISSENSE MUTATION IN KERATIN 1 UNDERLYING CLINICALLY MILD EPIDERMOLYTIC ICHTHYOSIS MIMICKING EPIDERMOLYSIS BULLOSA SIMPLEX SUPERFICIALIS

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Inherited skin peeling may be autosomal recessive (AR) or autosomal dominant (AD). When AR, this can be localised, as in acral peeling skin syndrome (APSS); or generalised, as in peeling skin syndrome (PSS) types A (non-inflammatory) and B (inflammatory). When AD, this can present in association with ichthyosis as either epidermolytic ichthyosis (EI) or superficial epidermolytic ichthyosis

(SIE); or as a further, poorly characterised form of AD skin peeling, termed epidermolysis bullosa simplex superficialis (EBSS), previously described in two families.

We report 6 affected individuals from 2 generations with generalised AD skin peeling. All presented neonatally with erosions at trauma-prone sites including the axillae, back and thighs, with ongoing skin fragility caused by friction. All 4 affected children reported slightly dry skin in the first decade of life with very mild hyperkeratosis of the axillae and neck. Some individuals had peeling of fingertips and soles, and one adult had mild diffuse plantar hyperkeratosis. There was no erythema, mucosal, nail or hair involvement. Initially, EBSS was considered based on AD inheritance, the generalised distribution, and lack of inflammation and ichthyosis at presentation.

A biopsy of rubbed, uninvolved skin from one affected individual showed a thickened stratum corneum but no signs of blistering or ultrastructural abnormalities at the dermal-epidermal junction or within the epidermis. Sequencing of *KRT5* and *KRT14* (keratins 5 and 14) showed no mutations, but whole exome sequencing demonstrated a heterozygous missense mutation in *KRT1* encoding keratin 1, p.Ser338Pro, in the 4 probands tested. This amino acid substitution is located within the L12 linker region, close to where other pathogenic mutations in keratin 1 have been reported in unrelated individuals with EI. Therefore, the most likely diagnosis in this family is EI due to a novel mutation in *KRT1*.

This clinically mild disorder and new *KRT1* gene pathology extends genotype-phenotype correlation in EI and underscores the value of next generation sequencing in diagnosing clinically atypical genodermatoses.

G29 A CASE OF PHYLLOID HYPOMELANOSIS – A RARE BUT SPECIFIC PRESENTATION OF CHROMOSOMAL MOSAICISM

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This 18 month old boy presented with a history of hypopigmented macular lesions, mild neurodevelopmental delay and recurrent episodes of acrocyanosis with tachycardia and increased tone. The cutaneous lesions developed from the age of 3 months, affecting the right trunk and right upper and lower limbs. Examination revealed large well-defined hypopigmented macules in a classical phylloid pattern, with a midline cut-off anteriorly and posteriorly on the trunk, compatible with a diagnosis of phylloid hypomelanosis. Mild facial dysmorphism was noted. Neurodevelopmental assessment at the age of 12 months suggested mild global delay; EEG and MRI of the CNS are pending. Cardiovascular examination was normal, however 24 hour ECG revealed non-specific ST segment changes. Ophthalmologic assessment was normal. Array comparative genomic hybridisation on a peripheral blood sample was normal. Karyotyping of affected and unaffected skin fibroblasts is underway.

Phylloid hypomelanosis (Greek phyllon = leaf, eidos = form) is characterised by congenital hypopigmented macules resembling a floral ornament, with round, oval or oblong patches (1), distinct from the commoner Blashko-linear distribution. It is a rare but highly specific sign of chromosomal mosaicism, universally associated thus far in the literature with mosaicism for duplications of 13q (1.2). Associated extracutaneous anomalies vary, and can include neurological, ocular, dental and skeletal defects (2). Cardiovascular abnormalities have not been reported thus far, and follow-up in our patient will clarify whether this is an associated or incidental feature. Affected individuals require multi-disciplinary assessment and long-term follow-up. As this is a somatic mosaic condition the possibility of fully affected offspring from the probands should be addressed at an appropriate age.

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G30 DEVELOPING PAEDIATRICIANS AS FUTURE CLINICAL LEADERS: ENABLING DOCTORS IN QUALITY IMPROVEMENT AND PATIENT SAFETY (EQUIP) PROGRAMME DESIGN AND EVALUATION

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Aims Paediatric postgraduate training needs to prepare paediatricians for the future delivery of high quality care. Doctors in Postgraduate Training (DrPGT) are often best placed to identify safety/quality concerns and can innovate across organisational boundaries. To address this, a programme was developed at a large tertiary centre providing a supportive educational environment. Its aims are to allow experiential learning on an improvement project alongside teaching of quality improvement (QI) and systems theory.

Methods EQuIP (Enabling Doctors in Quality Improvement and Patient Safety) supports DrPGTs through a QI project within their department, aligned to Trust's objectives. A three level approach to the programme ensures DrPGT engagement. All DrPGTs participate in a 1hr workshop to understand the importance of QI (level 1). Level 2 is a 6-month rotational programme with 2 full day workshops on improvement methodology, project surgeries facilitated by managers, and mentoring with senior clinicians. Level 3 is more intensive, over a 9 month period, to develop expertise and deliver level 1 workshops. The innovation involves a peer-designed programme while being work-based, delivering organisational strategies. Pre- and post- programme questionnaires allow Kirkpatrick 4-level evaluation.

Results All 40 participants agreed that the project was a valuable learning experience and that the programme met their expectations (level 1, reaction). Level 2, learning, was demonstrated by an improvement in QI definitions post programme, awareness of QI resources and confidence in using methodologies including PDSA and process mapping ($P < 0.001$). Post programme, all but one participant said they are planning another QI project and that they are more aware of improvement work in their unit (behaviour change, level 3). Benefits to the organisation (level 4) are evident from successful projects presented to the executive team showing reduction in DNA rates, improved theatre efficiency, improved quality of medical notes etc.

Conclusion EQuIP changes the way DrPGTs view healthcare as they become quality champions for their department. The design and evaluation of EQuIP may inform similar educational programmes in other organisations. This capacity building is crucial to ensure future Paediatric leaders have the skills and motivation to improve the effectiveness of our healthcare system.

G31 USE OF TRANSLATED VERSIONS OF ROYAL COLLEGE OF PAEDIATRICS AND CHILD HEALTH (RCPCH) APPROVED PREM TOOL FOR PATIENT FEEDBACK IN AN ACCIDENT AND EMERGENCY DEPARTMENT DEALING WITH A MULTIETHNIC POPULATION

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Aims The aim of our study was to collect feedback by using the RCPCH PREM tool for paediatric urgent and emergency care (A&E),

G28 A Novel Missense Mutation in Keratin 1 Underlying Clinically Mild Epidermolytic Ichthyosis Mimicking Epidermolysis Bullosa Simplex Superficialis

AI MacKenzie, PJ Dopping-Hepenstal, L Ozoemena, L Liu, K Stone, MA Simpson, JA McGrath, AE Martinez and JE Mellerio

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