Institution: University of Dundee
Unit of Assessment: UoA3 Allied Health Professions, Dentistry, Nursing and Pharmacy
a. Overview

Our strategy, presented in this combined submission from the Schools of Dentistry and Nursing & Midwifery (SNM) at the University of Dundee, is to lead innovative research to improve outcomes for people with long-term conditions, disability and oral disease, and ensure better futures for children, families and socially-excluded groups. Our research benefits from close collaboration with local centres (e.g. Dundee Cancer Centre), national and international partners. It contributes to and benefits from a high quality, supportive interdisciplinary research environment in the College of Medicine, Dentistry and Nursing (CMDN). Our two multidisciplinary work-streams are:

1) **Long-term conditions, disability and disease:** Our research focusses on improving outcomes for high prevalence conditions. It examines how individuals living with long-term physical health conditions, oral diseases and/or disabilities can be supported through better prevention, diagnostics, care delivery and management pathways. We have particular expertise in the understanding of psychosocial and environmental factors that influence health and well-being and in leading technology developments that improve patient outcomes and experiences with health care delivery.

2) **Maternal, child and family health:** Our aim is to use evidence to improve the health and well-being of childbearing women, babies, children, adolescents and families. This work-stream tackles inequalities and neglect, strengthening the capabilities of families made vulnerable by health or social problems. Our research is widely recognised for its life course approach, specifically for research on competent parenting, infant feeding and family nutrition promoting physical, psychological and oral health.

Two cross-cutting themes underpin both groupings:

- **Improving care delivery (including e-Health):** All our research focusses on improving health and well-being in various service and care contexts. Examples include world-leading expertise in clinical trials to assess dental treatments and remote patient monitoring to improve patient experience and the measurement of patient-reported outcomes. Moreover, we study the influences of professional behaviour and clinical practice within health and social care.
- **Reducing inequalities**: The focus of developing cutting-edge methodologies and interventions is to address social and health-related inequalities, engaging individuals from socially excluded population groups due to poverty, age, disability, ethnicity or other factors.

Our strong interdisciplinary environment is evidenced through close collaboration with the Social Dimensions of Health Institute (SDHI), the Dental Health Services Research Unit (DHSRU) and the recently-formed Centre for Applied Health Research, led by **Renfrew** (SNM), with **Freeman** (Dentistry), Sullivan and Williams (UoA2). Our research programme has reached critical mass and draws on the collective expertise of researchers in Dentistry, SNM and Medicine (UoA2) to develop knowledge and understanding by interdisciplinary research of international quality.

b. Research Strategy

Developments since 2008: Recent developments have been informed by internal and external reviews which focussed our activities from several distinct programmes in the School of Dentistry and School of Nursing and Midwifery to a single coherent programme of research organised in two strategic groups and with two key themes which ensure relevance, rigour, and currency.

Research strategy: The overall aim of our research programme is to achieve direct, measurable impact on public health through empirical research, evidence synthesis, knowledge translation for health care delivery, health policy and improved patient outcomes/experiences. This joint approach has led to a convergence of research activity and enhanced research capacity. It has been facilitated by merging the Schools' research administrations, maximising resources and enhancing

capability, and has been seminal to the new CMDN-wide Centre for Applied Health Research.

This programmatic activity will ensure:

- delivery of high quality, interdisciplinary, multi-method, collaborative research;
- participation of practitioners in our research programme;
- active translation of research findings into policy and practice;
- building capacity and capability with strategic investment, planning, realignment and development of our skills and competences;
- continued building of cross-sectoral partnerships with health, social care and voluntary organisations, locally, nationally and internationally; and
- engagement of patients and the public in all aspects of our programme.

Current research activity: Our research portfolio, which has been strengthened by joint working within the Unit, uses multiple methodologies spanning exploratory research, modelling, intervention development, trial design, intervention feasibility and effectiveness testing, and implementation research. It is closely integrated with the work of the NHS, as evidenced by the Tayside Academic Health Sciences Network, a joint venture between CMDN and NHS Tayside which facilitates the integration of education, quality improvement, patient safety and clinical research. This network, for which the Centre for Applied Health Research will be a major driver, is led by Prof. John Connell (CMDN) and is supported by Scottish Government, the University and NHS Tayside. Our research is embedded in NHS service environments; most senior clinical academics are Honorary Consultants or joint appointments in primary and secondary care settings (e.g. **Johnston**, **Rattray**). **Renfrew** is Director of Applied Health Research for NHS Tayside.

- **Long-term conditions, disability and disease:** Researchers in this work-stream are international leaders in dental caries (**Clarkson**, **Innes**, **Ricketts**) craniofacial anomalies (**McIntyre**, **Mossey**), psychosocial determinants of health and oral health (**Chambers**, **Freeman**), rehabilitation and disability (**Kroll**, **Morris**), remote patient monitoring in cancer care (**Kearney**) and palliative care (**Johnston**). The Dundee World Health Organisation (WHO) Collaborating Centre for Craniofacial Anomalies and Technology Transfer (**Mossey**) has nurtured international collaborations and guided the development of tools for monitoring treatment outcomes. The establishment of the Child Friendly Dentistry International Network (**Evans**, **Innes**) and the Scottish Dental Clinical Effectiveness Programme (**Clarkson**, **Richards**) Rapid Evaluation Practitioners panels has led to collaborative research links with Dental Schools across the UK and with partners in the EU, Australia and the US.

  The translation of oral health research has improved outcomes for dental caries through better diagnosis, monitoring and management (e.g. the Hall Technique (**Evans**, **Innes**)) and for clefts of lip and palate through improved care pathways (e.g. alveolar bone grafting, **McIntyre**). Our oro-facial cleft research includes laboratory research on the pathogenesis of cleft lip and palate (**Ellis**), participation in pan-European multidisciplinary collaborations on genetic/environmental aetiology and studies of cleft outcomes, quality of care and 3D imaging/volumetric analysis.

  In line with national /international health priorities, we hold three large (£8.2M) National Institute for Health Research, Health Technology Assessment programme (NIHR-HTA) funded grants: “Fillings in Children’s teeth; Indicated or Not” (FiCTION; **Clarkson, Innes**), “Investigation of NICE Technologies for Enabling Risk-Variable-Adjusted-Length Dental Recalls” (INTERVAL) and “Improving the Quality of Dentistry” IQuaD (**Clarkson**). These will shape policy and teaching by developing evidence for key dental clinical procedures. These randomised trials involve over 200 dental practices across the UK and over 80% of UK dental schools.

  Our research is underpinned by national policy on engaging with patients (Better Together, Scottish Government 2009), inequalities (NHS Scotland Quality Healthcare Strategy 2010, Department of Health Policy Research Programme), Strategy for Oral Health Research in Scotland, 2010 and using e-health (Scottish Government e-Health Strategy 2011-2017) as well as global health initiatives and human rights frameworks e.g. the 2011 WHO World Report on Disability (**Kroll**, **Morris**), Global Oral Health Inequalities Research Network and WHO Collaborating Centre on Global Burden of Disease (**Mossey**) and workplace health (**Jones**).

  We work in partnership with health, social care and voluntary organisations, focussing on accessible outcome and patient-centred care measures in a range of health conditions and

disabilities (**Jones**, **Kroll**, **Rattray**, **Symon**) and are key partners in the largest Scottish Government-funded study to measure perceptions and predictors of patient-centred care (IPEC study; **Jones**, **Rattray**). Our particular strengths lie in evidence synthesis (**Clarkson**, **Innes, MacGillivray**, **Richards**), trial development (**Clarkson**, **Innes**, **Jones**, **Morris**, **Rattray**) and the translation of knowledge into action (**Clarkson**). We have developed tools to support psychometric and real-time data collection (e.g. Modified Dental Anxiety Scale (**Freeman**), Spinal Cord Injury Exercise Self Efficacy Scale (**Kroll**), Student Nurse Stress Index (**Jones**), Intensive Care Experience Questionnaire (**Rattray**) and Mother Generated Index (**Symon**)). All of these are now in world-wide use. **Kroll** and **Morris** have designed tailored community-focussed interventions for people with disabilities. **Kroll** is engaged in family-centred rehabilitation research (with Northern Arizona University).

- **Maternal, child and family health:** We lead international research in maternal and infant health (**McFadden**, **Renfrew**, **Symon**) and tackling inequalities through promotion of competent parenting and oral health (**Freeman**, **Innes**, **McFadden, Mossey**, **Renfrew**). **Symon**'s ground-breaking work has laid the foundations for work on the role of midwifery in the prevention of pre-term birth. The linkage of birth outcome data in Scotland with a UK-wide database on independent midwives has compared preterm deaths between NHS and independent midwives (**Symon**). **Renfrew** and **McFadden**'s longstanding programme of work on infant feeding for babies in neonatal units (funded by NIHR HTA), national evaluation of the Healthy Start programme (Department of Health) and economic analysis of infant feeding in the UK (UNICEF) has influenced national and international policy and practice.

  Oral health status is a marker for social deprivation and health inequality, and **Freeman** and **Chambers**' work with socially-excluded groups leads on ways of reducing health inequalities. Our innovative investigations of parenting and family function promote social capital and engagement with health services for those experiencing social exclusion (**Freeman**) while our policy-relevant interdisciplinary research on early recognition of child abuse and neglect and improving community nursing and dentistry pathways aim to mitigate adverse effects (**Innes**).

  The Framework Programme 5 Eurocran project (**Mossey**), a prime example of interdisciplinary development, was a population-based gene-environment interaction study which generated a unique oro-facial clefting Biobank and advanced research on genetic predisposition to clefts via a series of genome-wide association studies published in *Nature Genetics*. The European Science Foundation-funded EUROCleftNet collaboration (2011-2016, Principal Investigator **Mossey**) builds on this success. We have increased inclusiveness by including Eastern European States in collaboration with WHO and the European Cleft Organisation, whose aims include addressing health inequalities across Europe.

Future Plans: We will build on our single programme and extend this across CMDN to establish a cross-College Centre for Applied Health Research bringing together the substantial applied health research strength in Medicine, Nursing and Midwifery, and Dentistry (led by **Freeman**, **Renfrew** Sullivan and Williams). This centre will emphasise collaboration and collegiality, build capability and capacity and cement existing strong collaborations to deliver high-quality multidisciplinary research creating critical mass in key areas of our research programmes, building capacity to train researchers in research methodologies that inform our programmes. These initiatives underpin programmatic research, capacity and capability building, and knowledge mobilisation efforts in alignment with the School's and University's strategic direction.

- **Long-term conditions, disability and disease:** Future work will continue to focus on health, demographic change and well-being challenges across the lifespan, with a particular emphasis on socially-driven health inequalities and delivery of health care using novel technologies. We will draw on the University's expertise in informatics, geography, computing, statistics and improvement science to develop innovative methods of data collection and healthcare intervention (e.g. inclusive measurement and real time data collection (**Jones**, **Kroll**); community-based rehabilitation for cardiovascular disease and stroke (**Jones**, **Morris**); carer support after Intensive Care (**Rattray**); health promotion for homeless, imprisoned, disabled and socially-disadvantaged groups (**Freeman**, **Kroll**), evidence-based clinical caries management (**Clarkson**, **Innes**, **Richards**, **Ricketts**) and evaluation of health service provision (e.g. access to dental treatment and registration rates; **Freeman**).

- **Maternal, child and family health:** We will focus on nutrition, infant feeding, attachment and parenting (including perinatal loss) to implement sustainable changes in practice, developing methods to examine the long-term consequences of infant feeding (**Freeman, Renfrew**), the impact of poverty on maternal, child and family nutrition and failures in quality of care that may affect families experiencing perinatal loss. We will build on our work on quality and models of care, e.g. Bill and Melinda Gates Foundation-funded work on quality of midwifery care (**McFadden, Renfrew**) and work on outcomes of independent midwifery practice (Symona) to develop new national and international studies. Innovative photo-ethnography will be used for promotion and maintenance of healthier dietary habits in children entering adolescence (**Chambers**, **Freeman**). Child Friendly Dentistry work will be expanded; clinical trials will compare the Hall Technique to non-restorative and standard care in international settings and investigate traditional dental outcomes and child/parental perceptions of dental treatment.

  In the field of craniofacial anomalies, we will build on our existing genetics research and gene discovery in cleft lip and palate. Leadership in international collaborations will help **Mossey** to improve both the quality of care and primary prevention. The capacity for participating in or leading clinical trials will be facilitated by the Tayside Clinical Trials Unit.

c. People, including:

I. Staffing strategy and staff development

We are committed to providing a supportive, dynamic research environment to attract, recruit and retain key staff. On-going capacity development ensures the excellence of our staff. This is integral to our strategic plan and investment strategy. We support existing staff to maximise their potential and achieve promotion, having a structured pathway for early career researchers linked to PhD opportunities and research and a supportive network for developing mid-level researchers.

We benefit from central support for the development of research staff and postgraduate researchers through the University's investment in continuing personal, professional and career development. The University has a range of skill building and enhancing facilities which operate at all organisational levels. Researcher Development is integral to work of the Organisational and Professional Development unit, which provides training in a range of skills including writing, research funding, enterprise, presentation skills, coaching, and career advice. Support is also provided to enhance effective team working, objective setting and research project management. All training can be accessed via an online portal (www.dundee.ac.uk/opd). The researcher development programme has been mapped to the Vitae Researcher Development Framework, which complies with the requirements of the QAA Quality Code of Practice for Research Degrees programmes, the Concordat to Support the Career Development of Researchers and the Roberts recommendations on training for research staff and postgraduate researchers.

Link with research strategy and physical infrastructure: We have developed a research-focused workload model facilitating improved mentorship and greater transparency for research activity. Staff benefit from an annual objective setting and review process to optimise support in meeting research targets and training goals; an agreed workload plan details outputs for the academic year in line with University research and/or teaching profiles. Staff workload plans are amended on the basis of grant capture and paper output in a manner designed to incentivise staff.

Supported by the objective setting and review process, we have, on the strength of their research portfolios, promoted; a Reader to Full Professor (**Jones**); three Senior Lecturers to Reader (**Johnston**, **Kroll, Rattray**) and five Lecturers to Senior Lecturer (including **Innes**, **MacGillivray, Symon**). Other strategic appointments in the assessment period include: **Kearney** to lead the cancer portfolio; **Renfrew** with leadership and expertise in maternal and infant health; **Clarkson** and **Freeman** as Co-Directors of the internationally-renowned Dental Health Services Research Unit and **Richards** as honorary Senior Lecturer, bringing the international Centre for Evidence-Based Dentistry to the Dental School. Chadwick has been promoted to Professor in Operative Dentistry and Dental Materials Science.

Concordat/early career development of researchers: Early career researchers benefit from involvement in University and CMDN Concordat initiatives. Research assistants and PhD students

have a range of career development opportunities including mentorship from the Universities of St Andrews and Dundee. Particular efforts are made to support clinical academic careers for emergent researchers and established clinicians (e.g. Baldie, **Smith**), for example through secondments to work on University research projects, and such pathways have enabled several to become independent Principal Investigators (Baldie, Borrie, **Innes**, **Morris**, **Smith**). We have an established Clinical Academic Pathway Initiative with NHS partnership funding to support early career researchers in research skill development and PhD research. In SNM we currently have 15 PhD students, 4 of whom hold studentships. Dentistry has 22 PhD students; seven members of staff receive funding from the School, College and NHS Education for Scotland and 14 from overseas, the majority with Government funding or scholarships.

Mid-career researcher support: Mid-career research staff are helped to focus and embed their research in practice by a range of secondments to NHS and charity organisations e.g. **Johnston** has an honorary position with NHS Tayside for half a day per week to conduct research in palliative care and mentor clinicians in the NHS. **Rattray** is an Honorary NHS Consultant, leading developments in clinical academic careers. Joint posts between NHS Tayside and SNM generate NHS practice-relevant research and facilitate its transfer into routine care, e.g. Cardiac Nurse Consultant (**Smith**), Honorary Nurse Consultants (**Johnston**, **Rattray**, Baldie (NHS Tayside)).

Supporting equality and diversity: Equality and diversity are key considerations, both in terms of recruiting new staff and for those in post. Women and men from many nationalities are represented at all levels. Staff completion of equality and diversity training is monitored and enforced.

Dissemination and published output: We have invested to advance the quality of publication output, resulting in at least 397 (SNM) and 297 (Dentistry) academic publications since RAE 2008. The overall publication output of staff increased by 46% (SNM) and by 59% (Dentistry) in 2008-12.

Effective integration of clinical academics/NHS staff: The Tayside Academic Health Sciences Network is strengthening links with NHS Tayside and supporting practice-relevant research and improvement science. Clinical academic links are evidenced by joint (**Morris**, **Smith**) and honorary clinical appointments (**Humphris**, **McKenna**, **Richards**) and an honorary strategic appointment (Renfrew, Director of Applied Health Research). Reflecting CMDN strategy, we aim to develop research skills and building capacity to improve patient outcomes and ensure evidence-based practice. In Dentistry, NHS Education for Scotland supports research via senior academic and specialist trainee posts. Support for research infrastructure and translational research is facilitated through the Scottish Dental Clinical Effectiveness Programme and Translation Research in a Dental Setting programmes, run in partnership with NHS Tayside and the University.

c. II. Research students

Effective and sustainable doctoral research training: Research students benefit from postgraduate research fora and workshop series, linking with University level Concordat initiatives, which involve practitioners and cover key methodological and practical issues (e.g. systematic reviews, research designs, recruiting, viva preparation, writing for publication). College Research and Postgraduate Symposia provide opportunities for collaboration, research development and dissemination while School and College Research Away days allow researchers and students to engage with colleagues across CMDN, promoting interdisciplinary research collaborations.

The number of students shared with other disciplines (e.g. computing, geography, SDHI, medicine, life sciences) has increased, providing enhanced educational opportunities across CMDN and partner universities. Doctoral students are supported by experienced, accredited staff and novice supervisors shadow more experienced ones, thus building sustainable supervision capacity. Integration of research and teaching allows skilled research staff to be involved in the research training of undergraduate (e.g. intercalated BMSc) and postgraduate (PhD and Masters) students.

Evidence of strong and integrated research culture: PhD students are closely aligned with the Unit's research programme, being situated and supported within the research groups. PhD students in this Unit currently number 37 (SNM=15, Dentistry=22), 21 of whom have external funding (SNM=7, Dentistry=14). Funding sources include the Chief Scientist Office, Economic and Social Research Council (ESRC)/Forestry Commission, Capability Scotland, the Fellowships

through Health Foundation, NHS Education for Scotland and Remote and Rural Dental Fellowships. The University's internationalisation lead, Professor Margaret **Smith** OBE, is also Dean of SNM, placing CMDN at the heart of international research initiatives. Research collaborations have evolved across the EU, China, India, Australia, New Zealand, Brazil, sub-Saharan Africa and the Middle East. We are increasing PhD student numbers by building on existing initiatives: University links are being exploited by the College Graduate School (Head, **Bearn**) to maximise international PhD opportunities via programmes including China Scholarship Council, Science without Borders (Brazil), ICETEX (Columbia) and DIKTI (Indonesia), and in 2012 SNM introduced a new "1+3" PhD studentship programme (led by **Rattray**), allowing international students to develop key skills during Year One before progressing to a three year PhD studentship.

d. Income, infrastructure and facilities

Income: Research income has grown from £1,115,646 (SNM £215,951; Dentistry £899,695) in 2008/09 to £2,401,703 (SNM £959,701; Dentistry £1,442,002) in 2012/13. The average value of awards each year has increased from £1.88m (SNM £500,000; Dentistry £1.38M) during the RAE period (2001-2007) to £3.55M (SNM £1.21M; Dentistry £2.34M) for the REF period up to May 2013 and grant capture has diversified from four principal funders to ten government, charity and industry funders. Our grant capture includes £8.2M UK funding (**Clarkson, Innes**), European funding (~£5.1M from Framework Programme 7 with 11 European, US, Australian and UK partners, **Kearney**) and £1M funding from government, industry (Philips Healthcare), charity (including the Gates Foundation) and NHS partners for remote patient monitoring in cancer care (**Kearney**).

Income from bodies that fund health research was £1,983,135 over the assessment period, i.e. £88,454/submitted staff FTE (£86,223/headcount), including £1,919,587 from the Chief Scientist Office (CSO) which was misallocated to BIS Research Councils in the HESA returns and therefore is not shown in the health research category in Ref4b (the remaining £63,548 in this category is correctly allocated income). Excluding the CSO income, BIS Research Council income for the period was £225,991 equating to £10,080/FTE (£9,826/headcount).

Nature and quality of research infrastructure and facilities, including research facilities and facilities for research students: The close relationship between SNM and Dentistry is facilitated by dedicated administrative support. A designated research manager and team of highly skilled administrators support the capture and management of research projects. In 2012 the Dental School invested £70K to create facilities for the Dental Health Services Research Unit, providing dedicated research facilities for primary dental care underpinned by the Scottish Dental Practice Based Research Network. Key infrastructure developments have seen the provision of hub areas for PhD students and research assistants supported by state of the art library and IT facilities.

Capacity and capability have been enhanced by linking with key research groups and infrastructure resources across CMDN (including Population Health Sciences and the Dundee Cancer Centre) and collaborating with national and international colleagues to deliver research outcomes with maximum beneficial impact on health and well-being. We have strong links within CMDN and with other partners across the University including the College of Life Sciences, Centre for Environmental Change and Human Resilience, School of Education, Social Work and Community Education, the College of Art, Geography, Computing, Mathematics and Engineering.

Researchers in our programmes lead or are involved in formal cross-university collaborations including the Mother and Infant Research Unit (led by **Renfrew**) and provide leadership in well-established interdisciplinary platforms such as the SDHI (**Jones**, **Kroll**). In alignment with the University's strategic direction these initiatives underpin knowledge mobilisation efforts, programmatic research, capacity and capability building. **Renfrew** and **MacGillivray** lead plans to formalise College-wide expertise in evidence synthesis while **Clarkson**'s Clinical Effectiveness Research Programme and **Richards**' Centre for Evidence-Based Dentistry provide additional and international research expertise. **Freeman** and **Jones**' formal links with the Health Informatics Centre (HIC) allows us to benefit from developing technologies, data warehousing, safe access mechanisms for e-health records and associated NHS and research datasets.

Cross institution sharing of research infrastructure: Our research is underpinned by core

University research facilities, including:

- **Health Informatics Centre:** The HIC exploits Tayside and Scotland's exceptional data resources and long tradition of excellence in health informatics to support large-scale data linkage projects. We have benefited from CMDN's investment in health informatics capacity, a >£1.22M development to build infrastructure in programming support and hardware which created the environment allowing Dundee to take the lead role in attracting inward investment from the MRC (£7.5M) in order to develop the Scottish e-Health Research Network (led by **Morris**, UoA1). This has led to the establishment of the UK Farr Institute, of which Dundee is lead institution, and the Scottish hub (award value to Scotland £11.5M), and created a strong environment for e-health and informatics research supporting and informing our research in data linkage across health, education and social records. The Farr@Dundee centre, based in newly refurbished facilities, provides a research safe haven and major programming expertise to underpin our work on health outcomes and their relation to other social demographic data.
- **Tayside Academic Health Sciences Network (TAHSN):** TAHSN provides infrastructure facilitating clinical research for all health professionals and promotes a strong culture of research within the NHS. It is led by Connell and Belch (UoA1), and oversees the Clinical Research Centre, Clinical Imaging Centre, Tayside Clinical Trials Unit and Tayside Tissue Bank as well as providing a supportive governance framework for all clinical research carried out in Dundee. TAHSN manages the >£7 million per annum that goes into developing and supporting our excellent patient-oriented research infrastructure and provides a single organisational framework bringing together the existing functions of:
  - **TAHSN R&D office** manages research advice, project registration, cost calculations, generic and local review of research governance issues, contracts, site agreements, R&D approval, pharmacovigilance, quality assurance and Good Clinical Practice monitoring.
  - **Tayside Clinical Trials Unit (TCTU)**, established in October 2008 as a collaboration between the University and NHS Tayside to deliver excellence in the design, conduct and governance of clinical trials, became a UKCRC Registered Clinical Trials Unit in December 2009. It offers scientific, funding, technical and IT expertise from conception of the trial to analysis and reporting, and includes the Dundee Epidemiology and Biostatistics Unit.
  - **The Clinical Research Centre (CRC)** provides state-of-the-art facilities, a unique imaging suite and a dedicated, professional infrastructure to promote and facilitate high quality clinical research and experimental medicine throughout Tayside.

We interact with colleagues in other universities via the SDHI, a collaborative conduit for public engagement, research dissemination and social science expertise, which aims to increase the quantity and quality of interdisciplinary research in relation to the social dimensions of health, well-being and social participation within the member universities (Dundee and St Andrews). It serves as a knowledge exchange network for strategic collaborations between academic and health, social, and voluntary sector organisations and promotes national and international collaborations.

e. Collaboration and contribution to the discipline or research base

Contributions to the scientific base and practice: Our research has had considerable influence on the discipline, extending professional development, contributing to public engagement and awareness, and improving practitioner knowledge and research capacity. In addition to the SDHI and Scottish Dental Practice Based Research Network we have academic partnerships with Universities across the UK. Examples of our contributions to collaborative research include:

- A WHO Collaborating Centre in Cleft Lip and Palate (**Mossey**). To complement work with cleft lip and palate research initiatives in India, Sub-Saharan Africa, Brazil and the Middle East, the Dundee University WHO Collaborating Centre engages with other major funding bodies including the US National Institutes of Health, having particular trans-Atlantic research links with the University of Iowa and Utah State University.
- Three multi-centre dental randomised controlled trials, led by **Clarkson** and **Innes** which will have direct impact on dental practice and national policy. Participants in these NIHR-funded

(£9M excluding NHS service support costs) trials include the 13 Dental Schools, the University of St Andrews and NHS Education Scotland. The stable UK collaborations and long-term nature of these trials contribute to vitality and sustainability.

- A multi-centre randomised controlled trial, "Improving the Quality of Dentistry", comparing oral hygiene advice and periodontal instrumentation for the prevention and management of periodontal disease in dentate adults attending dental primary care. To date 63 general dental practices, 1877 participants have been recruited in this £2,589,888 project.
- "Fillings in Children's Teeth; Indicated or Not?" (FiCTION) comparing pain and sepsis over three years in children's teeth with three caries management strategies. This £2,931,139 trial is contributing to capacity building in primary care by training 251 dental health professionals.
- The £2,670,030 **"**Investigation of NICE Technologies for Enabling Risk-Variable-Adjusted-Length Dental Recalls" (INTERVAL) trial is recruiting 60 practices (2244 participants) to investigate whether risk-based recall or a fixed-period 24 month recall is more effective and cost-effective in maintaining oral health than the traditional fixed-period six-month recall.
- The quality and reach of our research is reflected in Scottish Intercollegiate Guidelines Network and NICE guidelines, Cochrane reviews and via organisations such as Healthcare Improvement Scotland (**Clarkson**), Scottish Critical Care Interdisciplinary Research Liaison Group (Paul, **Rattray**) and charities including the Stroke Association (**Kroll**, **Morris**).
- The *Lancet* Series on Midwifery, funded by the Bill and Melinda Gates Foundation (£74.2K), led by **Renfrew** and **McFadden,** and involving collaborators from five continents, comprises a series of systematic reviews providing an evidence base on new quality maternity frameworks, statistical modelling to estimate the scale of maternal/newborn lives that midwifery could save, health systems factors, human rights aspects and a new research agenda to influence future research commissioning by national and international agencies.

Research leadership: Since 2008, top research honours were awarded by the International Association of Dental Research (IADR) to **Clarkson** (IADR Distinguished Scientist 2013) and **Innes** (International Senior Clinical Researcher Unilever/Hatton Award 2011). Unit researchers occupy roles in key national and international organisations including the IADR Global Oral Health Inequalities Research Network **(Mossey)**, charities and academic and professional organisations including the International Confederation of Midwives (**Renfrew**), the UK and Ireland Palliative Care Research Society (**Johnston**) and the National Infection Prevention Society **(Burnett**).

Other contributions to the discipline include visiting professorships and scholarships in Australia (**Freeman**, **Rattray**, **Symon**), New Zealand & Ireland (**Kearney**) and the US (Yale, **Chambers**); Economic and Social Research Council-funded international summer schools for early career researchers in intensive and critical care in 2010 and 2011 (**Jones, Rattray**) and capacity building in the NHS through research secondment and grant writing schemes, which support nurses, midwives and allied health professionals to develop fundable research proposals from clinical problems identified in practice (**Kroll**, **Morris**).

The Unit's staff are represented on a range of editorial and peer review boards:

- Several staff sit as peer reviewers on national and international funding panels: South Africa Research Council (**Renfrew**), New Zealand (**Freeman**), Chief Scientist Office (e.g. **Freeman**, **Rattray**), Research Councils, NIHR (**Freeman**, **Johnston**, **Jones**, **Kroll**, **Rattray**, **Renfrew**), Health Research Board, Ireland (**Jones**).
- Eleven staff are editors or on editorial boards for twelve journals, including *International Journal of Palliative Nursing* (**Johnston**), *Rehabilitation and Outcome* (**Kroll**), *BMC Pregnancy and Childbirth* (**Symon**), *Journal of Dental Research* (**Innes**), *Cleft palate–Craniofacial Journal* (**Mossey**), *Evidence-Based Dentistry* (**Innes, Richards**) *BMC Implementation Science and Trials* and the Cochrane Oral Health Group (**Clarkson**), Maternal and Child Health (Renfrew). Staff contribute to the review boards of journals including *Nursing Reports* (**Jones**), *BioMed Central* (**Renfrew**), *Health Education Journa*l (**Freeman**) and peer review for >100 journals, e.g. *European Journal of Oncology Nursing* (**Kearney**), *International Journal of Nursing Studies* (**McFadden**), *British Journal of Health Psychology* (**Jones**) *BMJ* and *Lancet* (**Renfrew**).