Appendix 1: A quasi stepped-wedge trial design

	Steps (months)					
Cluster	**0-4**	**5-8**	**9-12**	**13-16**	**17-20**	**21-24**
Ward group 1		RTC™-Plus				
Ward group 2			RTC™-Plus			
Ward group 3				RTC™-Plus		
Ward group 4					RTC™-Plus	

Key	
Baseline (pre-intervention) period	
TPW:RTC™Plus intervention & follow-up period	

Appendix Two

The Productive Ward: Releasing Time to Care™ Plus Intervention Description

The - Productive Ward:Releasing Time to Care™ [1] shares some principles with Transforming Care at the Bedside in the US [2]. It uses methodologies from the business world, including LEAN production, [3] to improve work process and team efficiency with the aim of "releasing time" which would be used to increase caring time spent directly with patients. The intervention consists of the facilitated use of 11 work modules: three foundation modules (knowing how we are doing; well-organised ward; and patient status at a glance), and eight in-depth process modules covering: patient observations, patient hygiene, nursing procedures, ward round, admissions and planned discharges, shift handovers medicines and meals. In addition, there are: ward leader's guide, project leader's guide and executive leader's guide. Nursing teams monitor implementation of RTC™ in three ways: (i) monitoring the amount of time being spent on direct care of patients; (ii) monitoring how they have progressed against suggested targets associated with each of the foundations and process modules and (iii) monitor their performance on key clinical and safety quality indicators. They then work to reduce the time they spend in non-direct care activities using lean methodology to inform improvement activity. An evaluation of the model delivered in England reported an average 17.7% (from 42.5% to 60.2%) improvement in direct care time [4].

In NHS Tayside, it was observed that although RTC™ has the ultimate aim of improving patient care, this does not form a specific part of the training. There is an assumption that nurses will use time gained to increase direct care time and this will result in improved caring behaviours and attitudes of staff and thus patients' experiences. Consequently, the NHS Tayside practice development team have adapted RTC™ ('RTC™Plus') to incorporate three measures of quality, results from which are fed back to nursing teams and are used to focus their improvement efforts:
(i) a systematic, qualitative observation by team members of the caring practice of nurses ('Caring Observations')
(ii) asking patients to rate experiences using the 'Valuing Patients as Individuals' Scale (VIPAS)
(iii) a measure of the quality of teamwork and staff relationships called 'Team Vitality'.

'Caring Observations' involve a systematic, qualitative observation by team members of the caring practice of nurses over a predefined period of time, followed by positive feedback to the team. The VPAIS is a novel instrument which has undergone extensive validation as a patient report of person centred care. As a quality improvement tool, it is currently undergoing adaptation. The VPAIS results are summarised and also reported back to the team. In addition to this, the NHS Tayside practice development team anticipate that good teamwork and team relationships are critical to the development of positive and caring behaviours and attitudes towards patients. Poor teamwork and team relationships may act as barriers to the adoption and implementation of RTC™ but can

also be improved as a result of a team working together to effect change that improves their work environment and thus their ability to care for patients with minimal disruptions or barriers. They therefore use a measure of team culture with facilitated feedback of staffs' anonymous reports. This locally developed instrument called "Team Vitality" (Mackie S TVCQ© NHS Tayside, 2008) is completed by nursing team staff before teams begin using RTC™. The aim is that issues about teamwork and leadership are dealt with in a non-threatening and constructive manner and the facilitator and the nurse leader to improve their team dynamics support the team.

1. NHS, The productive Series 30 November 2017 https://www.england.nhs.uk/improvement-hub/publication/the-productive-series/ (accessed 4 February 2019)
2. Institute for Healthcare Improvement, 2003 Transforming Care at the bedside. http://www.ihi.org/Engage/Initiatives/Completed/TCAB/Pages/default.aspx (accessed 27 February 2019)
3. Powell A, Rushmer R, & Davies H. A systematic narrative review of quality improvement models in health care 24 February 2009) http://www.healthcareimprovementscotland.org/previous_resources/hta_report/a_systematic_narrative_review.aspx (accessed 27 February 2019)
4. NHS Institute for Innovation and Improvement, Rapid Impact Assessment of the Productive Ward Releasing time to care ™, January 2011, https://webarchive.nationalarchives.gov.uk/20150401100152/https://www.institute.nhs.uk/images//documents/Quality_and_value/productiveseries/Rapid%20Impact%20Assessment%20full%20report%20FINAL.pdf (accessed 27th February 2019)

Appendix 3: Full list of Secondary Outcome Measures

Patient outcomes	1. Positive And Negative Affect Scale (PANAS) (48). 2. Hospital Anxiety and Depression Scale (HADS) (43). 3. HCAHPS: General health subscale (35). 4. HCAHPS: Experience subscales (other than nurse communication) (35). 5. HCAHPS: Pain subscale (35) . 6. HCAHPS: Fatigue and nausea symptoms adapted from HCAHPS (35). 7. Patient enablement instrument (PEI) (44). 8. EORTC: pain, fatigue and nausea (42). 9. Beliefs about medicine (BMQ) General and Adherence to Medication Sub Scales (58). 10. Brief illness perception questionnaire (59). 11. ENRICHD Social Support Instrument in cardiac patients (60). 12. Any emergency admission for same diagnosis within 6 months of discharge.
Nursing outcomes	13. MBI: Maslach Burnout Inventory. Depersonalisation and Personal achievement component scales (39). 14. Positive And Negative Affect Scale (PANAS) (48). 15. AHCOP: Quality of person-centred care (37). 16. AHCOP: Nursing team climate. There are ten separate measures, with each item being scored in a similar way to 'shared philosophy of care': Having resources; Supporting each other; Feeling safe; Improving practice; Having a say; Developing our skills; Too much to do; Multidisciplinary team working; Leading by example; Support from the top (37).
Senior Charge Nurses outcomes	17. Global care rating: This global rating from 0 to 100 relates to confidence in necessary treatment being given in the ward to family or friends. 18. Caring Professional Scale: The CPS measure is adapted from a tool to evaluate healthcare providers on their practice relationship style (45). There are two subscales: 19. Compassionate Healer 20. Competent Practitioner.

Appendix 4

Patient Characteristics

		RTC™-Plus Wards (n=691)	
		Before	**after**
Female	n/N (%)	145/314 (46.2%)	190/377 (50.4%)
Age	Mean (SD), N	62.4 (16.3) 314	62.3 (16.2) 377
Deprivation (SIMD 2012 quintile)			
1 (Area of greatest deprivation)	n/N (%)	41/310 (13.2%)	63/371 (17.0%)
2	n/N (%)	35/310 (11.3%)	70/371 (18.9%)
3	n/N (%)	58/310 (18.7%)	63/371 (17.0%)
4	n/N (%)	106/310 (34.2%)	105/371 (28.3%)
5 (least deprived)	n/N (%)	70/310 (22.6%)	70/371 (18.9%)
Religion			
Religious and a regular attender	n/N (%)	48/278 (17.3%)	56/352 (15.9%)
Religious but not a regular attender	n/N (%)	115/278 (41.4%)	168/352 (47.7%)
No religion	n/N (%)	111/278 (39.9%)	124/352 (35.2%)
Other	n/N (%)	4/278 (1.4%)	4/352 (1.1%)
Highest educational qualification			
Higher education	n/N (%)	66/297 (22.2%)	78/355 (22.0%)
Further education	n/N (%)	77/297 (25.9%)	96/355 (27.0%)
School certificates (aged 16/17)	n/N (%)	29/297 (9.8%)	40/355 (11.3%)
School certificates (aged 14/15)	n/N (%)	44/297 (14.8%)	57/355 (16.1%)
None	n/N (%)	81/297 (27.3%)	84/355 (23.7%)
Employment			
Employed	n/N (%)	87/300 (29.0%)	109/362 (30.1%)
Unemployed due to ill health	n/N (%)	29/300 (9.7%)	46/362 (12.7%)
Unemployed due to other reasons	n/N (%)	9/300 (3.0%)	7/362 (1.9%)
Retired	n/N (%)	167/300 (55.7%)	196/362 (54.1%)
Student	n/N (%)	8/300 (2.7%)	4/362 (1.1%)
Household			
Living alone	n/N (%)	60/297 (20.2%)	95/357 (26.6%)
Shared with other adult(s), no children	n/N (%)	174/297 (58.6%)	177/357 (49.6%)
Shared with children	n/N (%)	53/297 (17.9%)	63/357 (17.7%)
Communal	n/N (%)	5/297 (1.7%)	9/357 (2.5%)
Other	n/N (%)	5/297 (1.7%)	13/357 (3.6%)