Improving infant outcomes through implementation of a family integrated care bundle including a parent supporting mobile application

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ABSTRACT

Objective The aim of the Integrated Family Delivered Care (IFDC) programme was to improve infant health outcomes and parent experience through education and competency-based training.

Design In collaboration with veteran parents' focus groups, we created an experienced co-designed care bundle including IFDC mobile application, which together with staff training programme comprised the IFDC programme. Infant outcomes were compared with retrospective controls in a prepost intervention analysis.

Main outcome measures The primary outcome measure was the length of stay (LOS).

Results Between April 2017 and May 2018, 89 families were recruited; 37 infants completed their entire care episode in our units with a minimum LOS >14 days. From a gestational age (GA) and birth weight-matched retrospective cohort, 57 control infants were selected. Data were also analysed for subgroup under 30 weeks GA (n=20). Infants in the IFDC group were discharged earlier: median corrected GA (36^{+0} (IQR 35^{+0}–38^{+0}) vs 37^{+1} (IQR 36^{+3}–38^{+4}) weeks; p=0.003), with shorter median LOS (41 (32–63) vs 55 (41–73) days; p=0.022). This was also evident in the subgroup <30 weeks GA (61 (39–82) vs 76 (68–84) days; p=0.035). Special care days were significantly lower in the IFDC group (30 (21–41) vs 40 (31–46); p=0.006). The subgroup of infants (<30 weeks) reached full suck feeding earlier (median: 47 (37–76) vs 72 (66–82) days; p=0.006).

Conclusion This is the first reported study from a UK tertiary neonatal unit demonstrating significant benefits of family integrated care programme. The IFDC programme has significantly reduced LOS, resulted in the earlier achievement of full enteral and suck feeds.

What is already known on this topic?

- Family Integrated Care (FIC) programmes facilitate parents to be the primary carers of their vulnerable preterm infants in a neonatal intensive care unit.
- Based on available evidence FIC programmes are safe and effective.
- A recent multicentre cluster randomised controlled trial from Canada and Australia has demonstrated benefits in weight gain, breast feeding and reduction of parental anxiety and stress.

What this study adds?

- Integrated Family Delivered Care programme reported reduced length of stay (LOS) in the neonatal unit and earlier achievement of enteral and suck feeds. This is in line with national neonatal quality indicators aiming early discharge and may have significant economic impact on health costs.
- Technology-supported FIC programme is safe and effective.
- The benefits were more pronounced in the preterm infants who were born at <30 weeks of gestational age and usually have a prolonged LOS in a neonatal unit.

BACKGROUND

Family Integrated Care (FIC) is a relatively new model of neonatal care where parents are supported to be the primary caregivers and play an active role in their infant's care. Family-centred care (FCC) practices in neonatal units have been implemented in a variety of settings for the last 20–25 years.[1 2] Initiatives from the Indian subcontinent have reported that involving mothers in the care of their infants in hospital and in the community reduces infant mortality, especially infection-related mortality.[2–5] FCC approaches in small-scale step-down baby care units have shown reduction in length of stay (LOS).[6] FCC programmes from northern and eastern Europe have shown significant benefits in higher breastfeeding rates, reduced nosocomial infections and LOS in the neonatal unit, and improved weight gain.[1 7] Although seemingly intuitive that parental support and education will reduce parental stress, anxiety and improve infant health outcomes, a structured approach was required to demonstrate the efficacy of an FIC model.[8] A recent multicentre cluster randomised Family Integrated Care programme (FICare) from Canada and Australia have shown significant benefits in weight gain, breastfeeding rate and reduction of parental anxiety and stress.[9] FIC is based on the recognition that the highly technological environment in a neonatal unit over the last decades resulted in a parental struggle to bond with their baby, and in this powerless situation, they do not feel like 'parents' for many weeks and are hesitant to get involved in their baby's care. This experience results in a high level of anxiety and presents a risk for acute or chronic mental health problems.[10] The basic principles of FIC include developing an equal partnership with parents, empowering them and involving them in the care of their babies are increasingly being considered as the best practice.[8 9]

There is a growing interest in the UK neonatal units in this new care model in the last few years and several units started to implement elements of FIC; however, there is a lack of quantitative clinical and economic outcome data from the UK neonatal units.[11 12] The British Association of Perinatal Medicine (BAPM) has included Parental Partnership in care into their Neonatal Service Quality Indicators[13] which is an important strategic step towards the cultural change to achieve FIC in UK neonatal units.

Literature review and direct observation of the FICare programme in Canada (Mount Sinai Hospital, Toronto) have led us to develop our own experience co-designed care bundle called Integrated Family Delivered Care (IFDC) programme. Using quality improvement methodology (see the online supplementary materials 1–4) and with the overarching aim of improving infant and parental health outcomes and parent experience, a veteran parent focus group was created in conjunction with a core multidisciplinary team of neonatologists, nurses and allied healthcare professionals.

The IFDC programme had the core objectives of providing a structured competency based training and educational programme for the parents to become the primary carers for their babies, present in the ward round and join the discussion about management plans.[14] Our aim was to evaluate infant health outcomes and parent experience after implementation of the IFDC programme (see the online supplementary materials).

METHODS

The IFDC care bundle was developed by the Imperial Neonatal Services as a quality improvement project between 2015 and 2017. Funding was obtained from Imperial Health Charity and approval was obtained through trust governance committee. The programme was implemented in April 2017 in the neonatal units of Queen Charlotte's and Chelsea Hospital and St Mary's Hospital, London, where once the infants were medically stable, even while receiving intensive care, parents became primary carers of their infant. Medical, nursing and allied health professionals work across both sites and uniform practices and guidelines were already established. The IFDC care bundle consists of several elements based on the four pillars established by FICare programme in Canada[8]: staff education and support, parent education, neonatal intensive care unit environment and psychosocial support.

Staff were supported through a training module and 'bite size' bedside teaching sessions in this new model of care including discussion about their change in role from doers to facilitators.[15] Parents were informed about this care model on admission as part of their ward orientation. They started their training programme once their baby was felt to be medically stable (either on intensive care unit (ICU) or high dependency unit (HDU) care) and parents were confident and keen to get involved and learn more about neonatal care. They were empowered to become primary caregivers for their baby and completed competency assessments supervised by their bedside nurses or IFDC coordinators. The families received one to one support from our IFDC coordinators in lactation, achieving competencies, feeding and discharge planning from admission to discharge in addition to weekly parent teaching programme (3–4 small group sessions/week). Parents subsequently gained knowledge, confidence and control through the IFDC programme. They presented their baby's progress in ward rounds and discussed management plans with the team. They were listened to and joint decisions were reached. Parents assumed most of the care of their medically stable infants except intravenous medications, respiratory support and investigations.

As a part of the parent support and educational element of the IFDC programme, we developed a free mobile application (App) which served a dual purpose of providing reliable and detailed education about neonatal intensive care and enabled parents to use it as a diary of their neonatal journey. The App included a developmental timeline where parents can learn about their babies' development at different gestational ages (GAs) and how they can be involved in their care.[16 17] The IFDC App was developed in line with the strategy published by the National Information Board[18] which outlines how technology will transform outcomes of patients in the future, and approved by National Health Service Digital.

Additionally, the IFDC programme encompassed environmental support such as optimising parent facilities and access, providing psychosocial support to parents through psychology staff and in general creating a culture of support and mutual respect between staff and parents. The families were from a diverse social, economic, ethnic and religious background. We encouraged all parents to access their care in English and provide extra support to do this where necessary and hence did not translate any of our programme materials or the IFDC App in other languages.

We compared the demography and outcomes of the infants who participated in the IFDC care model over the first year from April 2017 to May 2018 with historical controls, matched for GA, birth weight and gender (figure 1). There has been no significant change in guidelines or culture in the neonatal unit over these two periods. For the purpose of the outcome analysis, infants were included if they were <34 weeks GA, admitted for ≥14 days and received the entire period of care in our units. The primary outcome was the total LOS in days. A significant proportion of infants cared in our neonatal unit participated in this new care model during this period but were transferred back to their local neonatal units who provided continuation of care as part of our neonatal network approach. As practice and culture at the local neonatal units would affect the LOS which is our primary outcome, we were only able to include infants in our analysis who completed all their competencies and their entire care episode was in our units. Minimum LOS was defined as 14 days, as in our experience, this was the minimum time required by the parents to complete the competencies. Secondary outcomes were the corrected GA and weight at discharge, time to full enteral feeding (defined as weaning off time for intravenous nutrition), time to suck feeds (defined as the removal of nasogastric/orogastric feeding), mode of feeding, breast milk and the breastfeeding rate at discharge and complications related to prematurity. To determine the impact of IFDC on the very preterm vulnerable population (born at <30 weeks of GA), a subgroup analysis was also performed.

Descriptive data were calculated for perinatal and neonatal characteristics. Continuous variables were expressed as median (IQR) or mean and SD. The normality of the distributions of continuous variables was assessed by the *Kolmogorov-Smirnoff test*. Comparisons of continuous variables were performed applying the *Student unpaired t-test* or the non-parametric *Mann-Whitney test*. Categorical variables were expressed as n (%) and compared with the *Pearson* χ^2 *test* or *Fisher exact test*. All tests were performed two-sided and a p-value of <0.05 was considered statistically significant (alpha=0.05). The data were analysed using SPSS Statistics V.20.0.

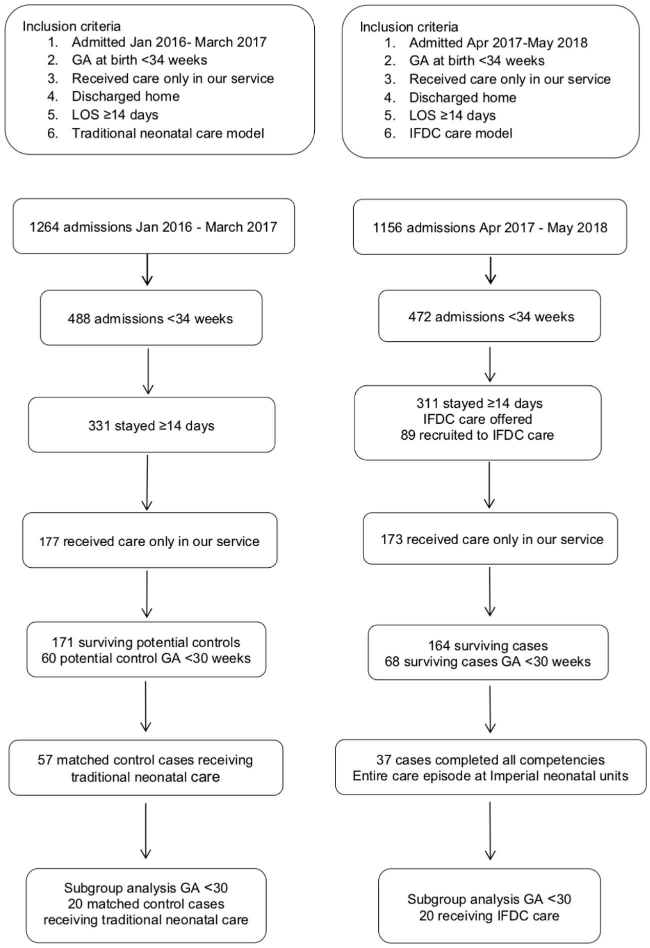

Figure 1 Flowchart for control and IFDC group. GA, gestational age; IFDC, Integrated Family Delivered Care; LOS, length of stay.

RESULTS

The IFDC care model recruited 89 families (out of 164 eligible) to the programme over the first year. Approximately 70% of all the eligible parents said that they used the App during their neonatal journey. Out of the 89 families, 37 infants completed all their competencies and their entire care episode was in our two neonatal units with a minimum LOS ≥14 days. Results were analysed for infants who spent the entire period in the neonatal units receiving IFDC care (n=37) and the subgroup born at <30 weeks GA (n=20) (figure 1). As the IFDC care model is likely to have a dose-dependent effect, the subgroup analysis for infants under 30 weeks' gestation was particularly important as they usually have a longer LOS. For the control group, 57 infants were retrospectively matched by birth weight, GA and gender admitted between January 2016 and March 2017. Similarly, a matched control subgroup was selected born under 30 weeks' gestation (n=20) (figure 1).

Baseline characteristics of the infants in both groups and the subgroups under 30 weeks' GA are presented in tables 1 and 2. GA, birth weight, gender, antenatal steroid and surfactant administration were all comparable in both groups. Maternal age (years) was lower in the IFDC group (31±6.2 vs 35±5.1; p<0.001). The families in both groups were from a diverse social, economic, ethnic and religious background. There was no difference in deprivation level defined by the index of multiple deprivation rank and deciles based on Lower-layer Super Output Areas derived from postcodes.[19]

Table 1 Baseline characteristics of the IFDC and control groups

	IFDC (n=37)	Controls (n=57)	P value
Gestational age at birth	29^{+5} (27^{+4}–31)	30^{+1} (27^{+1}–31^{+3})	0.510
Birth weight	1225 (1000–1490)	1234 (978–1482)	0.923
Maternal age	31±6.2	35±5.1	<0.001
Index of multiple deprivation rank	10785±6634	10599±6418	0.891
Index of multiple deprivation decile	3 (2–5)	3 (2–5)	0.962
Marital status, married/ living together	16 (64)	35 (76)	0.169
Singleton	23 (62)	34 (60)	0.832
Antenatal steroids, complete course	35 (95)	50 (88)	0.482
Mode of delivery, CS	23 (62)	42 (74)	0.278
Gender, male	22 (60)	31 (54)	0.675
Surfactant given	18 (49)	38 (51)	0.842

Continuous variables expressed as mean ±SD or median (IQR). Categorical variables expressed as n (%). P value of the Student *t* test. P value of the Pearson χ^2 test.
CS, caesarean section; IFDC, Integrated Family Delivered Care.

Infants in the IFDC group were discharged earlier (table 3) with a median corrected GA (36^{+0} (IQR 35^{+0}–38^{+0}) vs 37^{+1} (IQR 36^{+3}–38^{+4}) weeks for controls; p=0.003). The median LOS was shorter for infants cared for in the IFDC model (41

Table 2 Outcome data comparison between the IFDC and control groups

	IFDC (n=37)	Controls (n=57)	P value
ICU stay, days	3 (0–6)	2 (0–7)	0.958
HDU stay, days	5 (2–11)	7 (1–24)	1.000
SCBU stay, days	30 (21–41)	40 (31–46)	0.006
Total LOS, days	41 (32–63)	55 (41–73)	0.022
Corrected gestation at discharge	36 (35^{+0}–38^{+0})	37^{+1} (36^{+3}–38^{+4})	0.003
Weight gain, g/day	13 (10–19)	14 (11–18)	0.666
Body weight at discharge	1822 (1685–2182)	2047 (1782–2342)	0.085
Full enteral feeds achievement, day	6 (4–9)	8 (6–13)	0.008
Full suck feed achievement, day	40 (32–52)	47 (39–71)	0.022
Maternal milk at discharge (BF/MEBM/mixed)	34 (92)	54 (95)	0.206
Exclusive maternal milk at discharge (BF/bottle)	25 (68)	31 (54)	0.282
Exclusive breast feeding at discharge	17 (46)	22 (39)	0.525
Invasive ventilation duration	0 (0–2)	0 (0–2)	0.857
Non-invasive ventilation duration	4 (2–15)	7 (1–26)	0.652
Oxygen duration	1 (0–16)	8 (1–47)	0.041
Discharge on home oxygen	5 (14)	5 (9)	0.530
Intraventricular haemorrhage III-IV	1 (3)	2 (4)	1.000
Retinopathy of prematurity	6 (16)	10 (18)	1.000
Necrotising enterocolitis	0	2 (4)	0.518
Late onset sepsis	4 (11)	3 (5)	0.428
Bronchopulmonary dysplasia	11 (33)	19 (33)	1.000

Continuous variables expressed as median (IQR). Categorical variables expressed as n (%). P value of the Student *t* test or Mann-Whitney test. P value of the Pearson χ^2 test or Fisher exact test.
BF, breastfeeding; HDU, high dependency unit; ICU, intensive care unit; IFDC, Integrated Family Delivered Care; LOS, length of stay; MEBM, mother expressed breast milk; SCBU, special care baby unit.

Table 3 Subgroup analysis: baseline characteristics of the IFDC and the control groups GA <30 weeks at birth

	IFCD (n=20)	Controls (n=20)	P value
GA at birth	27^{+4} (26^{+5}–29^{+2})	27^{+1} (26^{+4}–28^{+6})	0.288
Birth weight	1090 (830–1313)	945 (793–1100)	0.223
Index of multiple deprivation rank	7392±3592	9214±6009	0.243
Index of multiple deprivation decile	3 (2–3)	3 (2–5)	0.506
Maternal age	30±6.5	35±5	0.005
Marital status, married/living together	8 (57)	9 (64)	1.000
Singleton	16 (80)	13 (65)	0.480
Antenatal steroids, complete course	19 (95)	14 (70)	0.109
Mode of delivery, CS	8 (40)	11 (55)	0.182
Gender, male	17 (85)	12 (60)	0.155
Surfactant given	16 (80)	16 (80)	1.000

Continuous variables expressed as mean ±SD or median (IQR). Categorical variables expressed as n (%). P value of the Student *t* test. P value of the Pearson χ^2 test.
CS, caesarean section; GA, gestational age; IFDC, Integrated Family Delivered Care; LOS, length of stay.

Table 4 Subgroup analysis: outcome data comparison between the two groups GA <30 weeks at birth

	IFCD (n=20)	Controls (n=20)	P value
ICU stay, days	6 (4–11)	9 (5–12)	0.271
HDU stay, days	10 (4–38)	19 (8–27)	0.892
SCBU stay, days	35 (20–46)	49 (45–59)	0.001
Total LOS, days	61 (39–82)	76 (68–84)	0.035
Corrected gestation at discharge	36^{+4} (35–40)	38^{+2} (37^{+3}–39^{+3})	0.076
Weight gain, g/day	15 (10–20)	16 (14–21)	0.137
Body weight at discharge	1955 (1746–2380)	2435 (2015–2732)	0.042
Full enteral feed achievement, day	9 (7–10)	13 (9–18)	0.003
Full suck feed achievement, day	47 (37–76)	72 (66–82)	0.006
Maternal milk at discharge (BF/MEBM/mixed)	19 (95)	20 (100)	0.264
Exclusive maternal milk at discharge (BF/bottle)	15 (75)	12 (60)	0.501
Exclusive breast feeding at discharge	7 (35)	9 (45)	0.748
Invasive ventilation duration	1 (0–8)	2 (0–7)	0.814
Non-invasive ventilation duration	15 (4–41)	31 (12–45)	0.372
Oxygen duration	14 (1–29)	48 (19–62)	0.002
Discharge on home oxygen	5 (25)	3 (15)	0.695
Intraventricular haemorrhage III-IV	1 (5)	1 (5)	1.000
Retinopathy of prematurity	6 (30)	6 (30)	1.000
Necrotising enterocolitis	0	1 (5)	0.487
Late onset sepsis	4 (20)	0	0.106
Bronchopulmonary dysplasia at 28 days	10 (50)	14 (70)	0.333
Bronchopulmonary dysplasia at 36 weeks	7 (35)	9 (45)	1.000

Continuous variables expressed as median (IQR). Categorical variables expressed as n (%). P value of the Student *t* test or Mann-Whitney test. P value of the Pearson χ^2 test or Fisher exact test.
BF, breastfeeding; HDY, high dependency unit; HDU, high dependency unit; ICU, intensive care unit; IFDC, Integrated Family Delivered Care; LOS, length of stay; MEBM, mother expressed breast milk; SCBU, special care baby unit.

(32–63) vs 55 (41–73) days in the control group; p=0.022). Similar difference was found in the subgroup <30 weeks (61 (39–82) vs 76 (68–84) days; p=0.035). When median LOS was further analysed by level of care, there were no differences noted in intensive care unit (ICU) or HDU days, but the special care (SC) days were significantly lower in the IFDC group (30 (21–41) vs 40 (31–46); p=0.006). The difference between median SC days in the two groups was more apparent in the infants born at <30 weeks' gestation (35 (20–46) vs 49 (45–59); p=0.001).

Infants in the IFDC group reached full enteral feeding earlier, a median of 6 (IQR 4–9) days for IFDC compared with 8 (IQR 6–13) days for control group (p=0.008). They also reached full suck feeding earlier, 40 (31–52) days for IFDC and 47 (39–71) days for controls (p=0.022). These differences remained significant in the infants born before 30 weeks' gestation (table 4). The average daily weight gain was similar in both groups 13 (10–19) and 14 (11–18) g/day. Infants in the IFDC group were discharged at an earlier corrected GA, hence had a smaller discharge weight, but this was not significantly different between the groups. The rate of any maternal breast milk feeding at discharge (table 3) was above the national average[20] in both groups (IFDC: 34/37 (92%) vs control: 54/57 (95%)). Rates of exclusive maternal milk (breastfeeding or bottle) (IFDC: 25 (68%) vs control: 31 (54%)) and exclusive breastfeeding at discharge were comparable between the two groups (17 (46%) vs 22 (39%)). This comparison was similar in the subgroup under 30 weeks' gestation (table 4).

The median duration of oxygen therapy was similar in the IFDC and control groups (1: 0–16 and 8: 1–47 days respectively); however, infants at higher gestation (>30 weeks) required minimal ventilatory support. In the subgroup of infants born before 30 weeks' gestation, oxygen was weaned earlier in the IFDC group (median 14 (1–29) days) compared with the control group (48 (19–62) days; p=0.002). There was no significant difference in bronchopulmonary dysplasia (BPD) defined at oxygen requirement at 28 days of life (IFDC: 10/20 (50%) vs control: 14/20 (70%); p=0.333) and in BPD (defined as oxygen requirement at 36 weeks) and oxygen at discharge home. There were no significant differences in other secondary outcomes such as mortality, intraventricular haemorrhage, necrotising enterocolitis, retinopathy of prematurity or late-onset sepsis.

DISCUSSION

The implementation of this structured FIC bundle has demonstrated that infants in the IFDC group had a shorter median LOS in the neonatal unit, this was more evident in the subgroup of infants born at <30 weeks of GA. These findings were similar to earlier reported studies from across the world.[4 6 7 21] The current study is the first report from a UK tertiary neonatal unit showing statistically significant reduction of the LOS in the neonatal unit. The infants in the IFDC care model reached both enteral and full suck feeds earlier and this is strongly linked to the shorter time spent in SC. Additionally, both groups achieved high, above the national average, maternal milk feeding at discharge (92% and 95%) and exclusive breastfeeding rates (46% and 39%).

Although in the recent large multicentre cluster randomised controlled trial (RCT) there was a significant increase in the weight gain (z-score) between the FICare model compared with the control group,[9] we failed to demonstrate the difference in weight gain between the two groups. There was also a trend noted towards a reduction in the median days of oxygen used in the IFDC group especially in the group born at <30 weeks' GA. We are not entirely sure about the clinical implications of this finding but can speculate whether the earlier establishment of suck feeds can have some bearing into this. We believe that the difference in maternal age between the two groups was only by chance.

Despite the benefits of the programme, there were several limitations to this study. Although the sample size in our study was small, it is the largest reported from any UK neonatal units and similar in size to the Canadian pilot study.[8] A comparison with retrospective controls creates possible bias, which may have impacted on LOS or other outcomes. But this has the advantage that there was no contamination of dose effect and cultural changes of the unit, as the controls were taken from the time preceding the implementation of the IFDC programme. In this report, we compared infants who spent the entire episode in our neonatal units (37/89), thereby creating a selection bias. We selected these infants who therefore were not affected by different practices, interventions and culture of other neonatal units, which could have had an effect on outcomes, especially on LOS. It was also noted in the cluster RCT that despite the same FICare programme as the intervention, the delivery was variable because of the variety of practices, staff culture and different patient populations in the different neonatal units.[9] We believe this is perhaps the reason why similar benefits were not noticed in the RCT. While the IFDC programme demonstrated significant benefits in infant health, the RCT demonstrated the effectiveness and generalisability of an FIC programme in similar neonatal units. Although not measured in our programme, the RCT showed significant improvement in parental stress and anxiety in the FICare group.[9] We instead performed a qualitative study with parent experience questionnaires at discharge and semi-structured interviews for the parents recruited to the IFDC programme; the results of which are awaited.

Use of technology to deliver standardised education across all the neonatal units should be embraced in healthcare services. One of the main domains to improve healthcare delivery using technology as documented by the National Information board[18] was to empower patients through technology-driven healthcare resources. The free IFDC mobile App formed the basis of the parental education in this new care model which enabled the parents to self-acquire reliable knowledge about neonatal intensive care at their own pace; and not relying on reading at the bedside or in the hospital, where they can get more involved with hands-on care of their infants. Among the various FIC programme across the world, the IFDC mobile App is unique in its dual function of an educational element as well as a diary where parents can chart their memory, upload photos, skin to skin care, breast milk expression and plot the growth of infants.[17] The parental educational element of the IFDC programme included self-directed learning using the IFDC App, group teaching sessions and competency-based training of neonatal procedures such as taking and charting temperature, nasogastric tube feeding, mouth care and nappy changes (see the online supplementary material—Steps to home booklet). As the App was part of the educational programme, the benefits of the App as a separate entity cannot be discerned. Many parents commented on the benefits of being part of the IFDC care model but also complimented on the user-friendliness and functionality of the App. Based on parental feedback, we believe that the IFDC programme along with the App helped to improve parent experience. It helped parents in gaining significant knowledge and confidence to enable and empower them to look after their baby in the neonatal care unit and take them home earlier. The parents in the IFDC care model truly became partners in their baby's care, participated in the ward round conversations regularly and helped to form the daily management plans together with health professionals. Better parental confidence may translate into improved parent–infant bonding, thereby resulting in significant long-term benefits of the infants. We plan to collect data on long-term outcomes of these infants at 18–24 months and follow them up to school age.

Our evidence suggests that alongside benefits in infant health outcomes, this care model may also be cost effective as it resulted in a shorter LOS. The financial benefits outweigh the funds that were utilised for this programme. Also, the economic impact on parental satisfaction cannot be quantified. A full economic analysis was not conducted, such as benefits of reduced use of healthcare facilities and reduced emergency hospital admissions, as this was not the remit of our programme. Infants were discharged home at least a week earlier than infants cared in the traditional neonatal model and 2 weeks earlier in those born at <30 weeks' GA. Using the current Healthcare Resource Groups (HRG) recommended tariffs based on BAPM 2011 definition for care level days, the implementation of IFDC programme will reduce the cost by a median of £3850 per infant, and almost £9350 per infant if they were born before 30 weeks of GA.[22] Changes in culture and belief and developing an environment of mutual respect between the staff and parents has been one of the major challenges of implementing the programme.

Following implementation and the tangible benefits of the IFDC programme, there has been remodelling of the nursing staff structure such that IFDC has now become a standard of care in our neonatal unit. We suggest that FIC should become the standard of care in the UK neonatal units. We recommend a parent-focused, structured care bundle consisting of parent educational and competency-based training programme, lactation, psychosocial and discharge planning support, staff training and environmental changes to optimise parental facilities and access, to achieve similar outcome results and facilitate timely discharge.

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Contributors JB and AD: conceptualised and co-led the programme and developed the study design. JB: wrote the first draft and reviewed and revised the manuscript. KM, IS, AA, SVG and AD: reviewed and revised the manuscript. DR: performed statistical analysis and reviewed and revised the manuscript. All authors approved the final manuscript and agree to be accountable for all aspects of the work.

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