



Centre for
Perioperative Care

Multidisciplinary working in perioperative care

Rapid research review

June 2020

Foreword

Perioperative care is the integrated multidisciplinary care of patients from the moment surgery is contemplated through to full recovery. There is evidence that a perioperative approach can increase how prepared people feel before and after surgery, while reducing both the amount of time that people stay in hospital and complications after surgery. This means that people may feel well sooner and be able to resume their day-to-day life more quickly.

This report explores the important role that multidisciplinary working plays in the perioperative care pathway. It teases out the 'ingredients' for successful team working and identifies the factors that can both help and hinder it – at system, organisational, team and individual level. And it shows that in some cases multidisciplinary working can speed access to surgery, improve people's clinical outcomes and reduce the cost of surgical care.

The most important resource in healthcare is our staff, and this review summarises evidence to guide the development of good multidisciplinary teams.

The UK's response to COVID-19 has shown how quickly and effectively we can adapt to meet the needs of patients. The [NHS People Plan for 2020/21](#) recognises that staff working and learning together in multiprofessional teams is "critical in meeting the new challenge."

As healthcare rebuilds after COVID-19, multidisciplinary perioperative teams can be at the front and centre of supporting staff to deliver the best possible care.

Please do let us know what you think about the findings by emailing advocacy@rcoa.ac.uk or tweeting us @CPOC_News.



Dr David Selwyn
Director of the Centre for Perioperative Care

Key messages

Perioperative care is the integrated multidisciplinary care of patients from the moment surgery is contemplated through to full recovery. This can improve people's wellbeing and reduce healthcare costs. Multidisciplinary working, whereby professionals from different specialities and sectors work together to support someone along their journey, is a foundation of perioperative care.

The Centre for Perioperative Care wanted to explore the benefits of multidisciplinary team working to support people having surgery and the factors that may help and hinder the development and sustainability of multidisciplinary working.

Our rapid review summarises learning from 236 UK and international studies about this. About 13% of the studies were from the UK. To identify relevant research, we searched 14 bibliographic databases and screened more than 18,000 articles available as of June 2020.

Impact of multidisciplinary working

Our review found that multidisciplinary working is worth prioritising. There is evidence that in some cases multidisciplinary working can:

- speed **access** to surgery, if that is an appropriate treatment option
- improve people's **clinical outcomes**, such as reducing complications after surgery
- **reduce the cost** of surgical care by helping people leave hospital earlier

However, these benefits are not always apparent. More work is needed to explore which types of multidisciplinary working are most effective and what infrastructure and resources are needed to strengthen and sustain multidisciplinary care around the time of surgery.

Various types of multidisciplinary working have been studied, including 1) multidisciplinary team meetings where professionals review and plan a patient's care together; 2) clinics where patients visit different professionals on the same day to gain more holistic care; 3) integrated perioperative care pathways implemented by multidisciplinary teams; 4) adding specific support from disciplines such as nursing, geriatric medicine, allied health professions or primary care before or after surgery, and 5) formal integration of the management and funding of services across sectors. We did not find research evidence that one model of multidisciplinary working was more effective than another.

Multidisciplinary team meetings are often used to review patients during the surgical pathway. Such meetings may help to coordinate care planning and discharge, but can be costly in terms of staff time. Research suggests that such meetings need to be appropriately planned, coordinated and attended and focus on the cases that may benefit most from multidisciplinary input.

We also explored evidence about more 'formal' cross-sector working through the integration of primary, secondary and social care services and budgets. We did not find research about the impact of Integrated Care Systems on surgical outcomes in the UK. There was mixed evidence about the impact of Accountable Care Organisations on surgery outcomes in the US, with some studies finding no improvement in complication rates, length of hospital stay or costs.

Helpful and hindering factors

Our rapid review found that commonly mentioned factors to facilitate effective multidisciplinary working along the surgical pathway include:

Culture and leadership

- **leadership** that recognises the value of multidisciplinary care
- **buy-in** and support from professionals and management
- **patient acceptance** of new ways of working (such as not always needing to see a surgeon or doctor for every issue)

Resourcing

- funding mechanisms and **resources** across a system to support multidisciplinary care
- **ringfenced staff time** to prepare for and attend multidisciplinary team activities
- a **coordinator** to organise multidisciplinary working and liaise between partners
- access to **technology** to support team working (such as online forums, virtual meeting spaces and record sharing platforms)
- **tools and templates** to structure multidisciplinary working, such as meeting agendas, case presentation templates and discharge summaries

Capability

- **training** for professionals in communication, use of virtual meeting technology and teamwork
- team member understanding of and **trust** in the roles of other professionals
- structures to support **communication** and follow through of multidisciplinary decisions

Team membership

- inclusion of a wide **range of sectors** in multidisciplinary care, including primary care
- inclusion of a wide range of professional **roles** in multidisciplinary teams
- **inclusion of patients** and informal carers as part of the multidisciplinary team approach

Professionals from different sectors and settings commonly worked as an informal 'virtual team' rather than setting up a ringfenced perioperative care team. Both approaches were feasible to implement if adequate time, resources and motivation were available.

There was evidence that anaesthetists and surgeons play an important role in the delivery and coordination of multidisciplinary care, but we did not find research about the pros and cons of involving surgeons and anaesthetists in setting up integrated care pathways and being part of the decision-making process at a very early stage.

There appears to be a lot to gain from supporting effective multidisciplinary working as part of perioperative care. Learning about the effective 'ingredients' may help to develop a blueprint to support health and care systems to further strengthen multidisciplinary working in the UK.

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The Centre for Perioperative Care (CPOC) is a cross-specialty centre dedicated to the promotion, advancement and development of perioperative care for the benefit of both patients and the healthcare community. We are led by the Royal College of Anaesthetists and work in partnership with patients and the public, the Royal Colleges of Child and Paediatric Health, Physicians, Surgeons, General Practitioners, and Nursing, the Association of Anaesthetists and health and social care practitioners and organisations across the UK.

This rapid review was undertaken for us by an independent organisation, The Evidence Centre. The review describes published research and does not necessarily reflect our views or those of The Evidence Centre.

Scope

Multidisciplinary working

This rapid review examines the impact of multidisciplinary working on surgical outcomes and the factors that help and hinder effective multidisciplinary working.

In the UK, about 10 million people have surgery each year and this number is rising.¹ Perioperative care focuses on providing integrated, multidisciplinary, patient-centred care from the moment surgery is contemplated through to full recovery. Multidisciplinary working is a cornerstone of perioperative care.

The Centre for Perioperative Care is developing resources to help UK health systems strengthen multidisciplinary working as a component of good perioperative care. We undertook this review to learn more about the potential benefits of multidisciplinary working and the factors that may support it.

For this review, we use the term 'multidisciplinary working' to mean professionals from different disciplines and/or sectors supporting a patient along their surgical journey. This does not necessarily mean that all the professionals are part of one organisation or team. We were interested in multidisciplinary working related to any part of the surgical pathway, not solely services that defined themselves as 'perioperative care'.

Our review approach

Our review examined the questions:

1. What impact does multidisciplinary working or integration across sectors have on surgery outcomes?
2. What helps and hinders such multidisciplinary working?

We were interested in impacts related to **health outcomes** (postoperative complications and mortality); **resource use** (surgical admission / readmission rates, postoperative length of stay) and **capacity** to cope with current and predicted demand.

We worked with an independent team to search 14 bibliographic databases for research published between January 2000 and June 2020.[≈] Studies from any country were eligible if they were systematic reviews, randomised trials or comparative studies containing empirical data about impacts. Observational studies looking at helpful and hindering factors were also eligible.

We screened 18,209 potential articles. We included **236 studies** from the UK and abroad that met our criteria. About 13% were from the UK. We summarised themes from the studies narratively.

Although we searched extensively for research, we did not seek to include and quality assess every relevant study ever published about these topics, but rather to showcase examples to illustrate recurring themes.

[≈] The databases were CABI (multiple databases) Cochrane Library, CHBD, Dimensions, EBSCO (multiple databases), Embase, Google Scholar, Ingenta Connect, Jurn, Medline, Mendeley, Scopus, UpToDate, Web of Knowledge (multiple databases).

Multidisciplinary impacts

Surgery is a treatment option for a wide range of acute and chronic conditions and there is rising demand for surgery in the UK. The surgical procedures and the conditions and characteristics of patients being treated are increasingly complex. Drawing on multidisciplinary teams to support people along their surgical journey has the potential to help health systems best meet these new challenges.

This section summarises evidence about the impact of multidisciplinary working on surgical outcomes.

We focused on the impact of multidisciplinary working on postoperative complications, length of hospital stay, readmission rates after surgery, costs and service capacity.

Multidisciplinary working may have many other impacts on factors such as team communication, patient satisfaction, quality of life and staff wellbeing, but those outcomes were not the focus of our review.

The main types of multidisciplinary approaches described in the literature were:

1. multidisciplinary team **meetings** to review patient treatment options collaboratively
2. **clinics** implemented by multidisciplinary teams (such as preoperative clinics)
3. perioperative care **pathways** implemented by multidisciplinary teams
4. nurses, allied health professionals, geriatricians or others taking on **new roles** to support care before and after surgery
5. **formal integration** of the management and funding of services across sectors

We provide examples from each of these approaches, but we did not seek to compare the relative advantages and disadvantages of different types of multidisciplinary working.

We found 75 systematic reviews and additional studies about the impact of multidisciplinary working on complication rates, length of hospital stay, readmissions, costs and service capacity.

Overall, the empirical evidence was mixed and covered various types of multidisciplinary interventions and study designs.^{2,3,4,5,6,7,8,9}

There were some positive trends, but also some less positive findings. Multidisciplinary working had the potential to reduce postoperative complications and length of stay in hospital, but did not always achieve this.

Health impacts

Perioperative complications

There are many examples of service delivery or coordination across disciplines to support people having surgery. Many have been associated with reduced rates of postoperative complications but some have not.

For instance, a systematic review with 22 studies examined multidisciplinary strategies for reducing the complication rate in complex spine surgery. Important multidisciplinary elements included pre-operative workup and **interdisciplinary meetings**, intra-operative communication and monitoring, and postoperative ward management and discharge planning. The reviewers reported that these strategies produced decreases in surgical duration and complication rates.¹⁰

A hospital in the UK implemented a daily board round, weekly multidisciplinary meeting and targeted **geriatrician-led ward rounds** for older people undergoing elective and emergency urology surgery. Total postoperative complications were lower compared to usual care (risk ratio 0.2, 95% confidence interval [CI] 0.1 to 0.5, $p < 0.05$).[≈] Length of stay in hospital reduced by an average of 19% (average 4 vs 5 days, $p < 0.05$).¹¹

In the Netherlands a cohort study tested a multidisciplinary team approach for people older than 70 with colorectal cancer. Complex and frail cases were referred to a multidisciplinary team who weighed the risk of surgery versus the expected gain in survival. Prehabilitation was initiated where appropriate to help people prepare for surgery. Those referred to the multidisciplinary team were more often judged to be too frail for surgery (10% vs 2%, $p < 0.05$) and were more likely to take part in prehabilitation than others (75% vs 23%, $p < 0.05$). Despite being at increased risk of complications, those supported by the multidisciplinary team had the same rate of postoperative complications as others (Clavien-Dindo grade III-V 15% vs 12%, $p > 0.05$). The researchers concluded that **preoperative multidisciplinary evaluation** for frail people with colorectal cancer improves risk stratification and prehabilitation, resulting in comparable postoperative outcomes to people who are not frail. Frail patients continued to have worse overall survival.¹²

In Spain, a before-and-after study compared people with a hip fracture receiving **multidisciplinary care** versus usual care before and after surgery. Multidisciplinary care was associated with reduced postoperative complications (67% vs 76% usual care, $p < 0.05$), hospital stay and mortality. It took longer for those receiving multidisciplinary care to have surgery because the team was optimising people's health prior to surgery. The delay did not increase complications or mortality.¹³

A systematic review of interventions to improve **surgical culture** included 47 studies focused on teamwork, communication or safety climate. There were some trends towards improved patient outcomes such as reduced postoperative complications and mortality, though the number of studies reporting such trends was low. A small number of studies reported healthcare efficiency improvements such as fewer operating room delays.¹⁴

Not all findings have been positive. For instance, a systematic review of 22 studies of interventions designed to improve care **coordination between primary care and cancer care providers** found that most studies showed no statistically significant changes in any patient, provider or system outcomes, although there were conceptual and methodological differences between the studies.¹⁵

[≈] We rounded figures from published studies to the nearest whole number or decimal place. A p-value ≤ 0.05 was used to indicate strong evidence against the hypothesis that there was no difference between multidisciplinary care and the comparator. In other words, $p < 0.05$ indicates multidisciplinary working likely made a difference.

A confidence interval is the range of values we are fairly sure the true value from the population lies within. Throughout this review we report 95% confidence intervals, meaning that we have a high level of statistical confidence that the true value lies between the range presented.

For the purposes of our review risk ratios and odds ratios provide a sense of how likely an outcome is with multidisciplinary working versus another approach. The odds ratio is a ratio of two odds whereas the risk ratio or relative risk is a ratio of two probabilities. A ratio of 1 means that there is no difference in the odds / probability between groups. A ratio of more than 1 means that there is higher odds or risk of something happening and a ratio lower than 1 means there is lower odds or risk of that outcome.

Mortality

Relatively few studies examine differences in survival linked to multidisciplinary working, though there are some positive examples, particularly about care shared between different specialties.

For instance, a systematic review with 17 studies compared a multidisciplinary hip fracture service including **geriatricians/internists and orthopaedic surgeons** versus surgeon-led care.

Multidisciplinary care was associated with a significant reduction in the time to surgery, length of hospital stay and postoperative mortality (all $p < 0.05$). There was a trend towards lower cost.¹⁶

Another systematic review of 18 studies compared different models of care for people after hip fracture. **Combined orthogeriatric care** was associated with reduced mortality compared to usual care (odds ratio 0.9, 95% CI 0.7 to 0.97, $p < 0.05$). Having an orthogeriatric ward was more effective than other multidisciplinary approaches such as shared care by orthopaedists and geriatricians or geriatric advice on orthopaedic wards.¹⁷

Another systematic review of 18 studies found that **orthogeriatric collaboration** was associated with improved outcomes in people with a hip fracture. Orthogeriatric collaboration was associated with a significant reduction of in-hospital mortality (relative risk 0.6, 95% CI 0.4 to 0.8) and long-term mortality (relative risk 0.8, 95% CI 0.7 to 0.9). Length of stay was lower (standardised mean difference 0.3 day reduction, 95% CI 0.4 to 0.1 reduction), particularly in shared care models (standardised mean difference 0.6 day reduction, 95% CI 0.9 to 0.3 reduction).¹⁸

An example from the UK had similar findings. A multidisciplinary team for people with oesophageal cancer was compared with a group who received care by a general surgeon. Patients **managed by a multidisciplinary team** had lower operative mortality (6% vs 26%, $p < 0.05$) and were more likely to survive for five years (52% vs 10%, $p < 0.05$).¹⁹

Multidisciplinary rehabilitation programmes

have also been found to reduce morbidity and mortality in people with a hip fracture.^{20,21}

On the other hand, a systematic review of four studies of **postoperative shared care** for people having non-cardiac surgery found no improvement in in-hospital mortality (odds ratio 1.8, 95% CI 0.7 to 4.8) or hospital length of stay (average difference 1.4 day reduction, 95% CI 3.2 increase to 0.4 reduction).²²

And a systematic review of 27 studies of regular **multidisciplinary team meetings** in cancer care found that meetings impacted on patient assessment and management practices but there was limited evidence of improved survival.²³

It appears that the impact on mortality may differ depending on the type of multidisciplinary working implemented, the type of patients and surgery and the extent to which multidisciplinary care is effectively implemented.

Further evidence of this comes from a large study in China which looked at the records of people with breast cancer. Researchers compared people who had well-organised multidisciplinary team care, less well-organised multidisciplinary team care and those who did not have multidisciplinary care. 'Well-organised' multidisciplinary team care was defined based on professional attendance at meetings, the style of data and information delivery, the length of discussion time for each patient and other indicators of good practice. After matching for patient characteristics, people receiving well-organised multidisciplinary care had a 16% higher survival rate at five years compared to the conventional care group (hazard ratio 0.4) and 36% higher survival than the less well-organised multidisciplinary care group. In other words, multidisciplinary care that was not well organised was associated with lower survival than conventional care (hazard ratio 2.8). The researchers concluded that multidisciplinary working improved survival, but only if well implemented.²⁴

Resource impacts

Length of hospital stay

There are some indications that multidisciplinary care can reduce people's length of stay in hospital after surgery,^{25,26,27} though it is often difficult to distinguish whether it was the multidisciplinary element of initiatives that made the difference.

A UK hospital evaluated the implementation of an **integrated care pathway** and discharge documentation for hip fracture. The evaluators found that integrated care pathways led to improved organisational outcomes for the health care trust such as more rapid discharge.²⁸

Another UK hospital introduced an 'enhanced surgical **medicines optimisation service**' whereby a pharmacist was added to the team to support medicines optimisation and perioperative drug management issues. There was a significant reduction in median length of stay in three out of the four specialities testing the approach.²⁹

Elsewhere in the UK older people admitted to hospital under the care of a general surgeon were assessed by a geriatrician using a care pathway approach. **Proactive geriatrician input** helped to identify medical diagnoses and geriatric syndromes not explored by the surgical teams. Managing these issues contributed to a reduced length of stay (0.6 day reduction).³⁰

A similar study in the US examined outcomes before and after implementing **co-management** of joint replacements between a general medicine and orthopaedic team. Co-management was associated with reduced average length of stay, complication rates and 30-day readmission rates.³¹

In Italy people with hip fractures were cared for using 1) orthogeriatric co-management, 2) an orthopaedic team with the support of a geriatric consultant service or 3) usual orthopaedic care. **Co-managed** people were more likely than others to have surgery within 48 hours, to have a shorter stay in hospital and to have higher survival at one year.³²

In Australia, a before-and-after study examined physician-led **co-management** plus a multidisciplinary improvement programme targeting delirium and functional decline for older people admitted to a vascular surgical ward. Multidisciplinary care was associated with reduced length of stay (mean 8 vs 9 days, $p < 0.05$) and a greater proportion of people discharged home rather than to another facility (72% vs 50%, $p < 0.05$).³³

There are also examples of less positive or unclear findings.³⁴

Comprehensive geriatric assessment is a multidisciplinary collaboration that assesses the medical, psychosocial and functional capabilities and limitations of an older person to help plan support. A systematic review with eight randomised trials found that the impact of comprehensive geriatric assessment on length of stay varied widely. The average difference from usual care ranged between a 13 day increase and a 8 day decrease in length of stay. On average, the reviewers concluded that comprehensive geriatric assessment probably slightly reduced length of stay, but made little or no difference to complication rates and readmission rates (relative risk 1. 95% CI 0.8 to 1.3).³⁵

In the UK a **geriatric surgical liaison service** was set up to support people having abdominal surgery. There was a trend towards reduced average length of stay compared to before geriatrician involvement but this did not reach statistical significance (17 vs 22 days, $p > 0.05$). There was no improvement in 30-day mortality.³⁶

Another UK example comes from a hospital trust that implemented a multidisciplinary **enhanced recovery after surgery pathway** for people having hip replacements. The pathway included input from a wide range of professions, including a 'bone school' for patients prior to admission. This included talks and preoperative assessment by a nurse, physiotherapist and occupational therapist. The average length of stay was 2 nights. The authors stated that this length of stay is amongst the shortest in the UK and that involving all team members was a key success factor. However, the study did not provide comparative data or differentiate whether the multidisciplinary element of the pathway was more important than others.³⁷

Many other similar studies are available which suggest that multidisciplinary integrated pathways can reduce length of stay, but it is unclear whether it is the multidisciplinary element of these pathways that is beneficial.^{38,39}

In Australia, people having surgery for hip fracture were managed with one of three models: orthopaedic-led, geriatric-led or co-managed model. There was no difference between groups in length of stay, mortality or discharge destination, but the **co-managed** group with geriatrician involvement were more likely to receive preoperative medical assessments and have long-term osteoporosis management.⁴⁰

In another part of Australia, a randomised trial examined a hospital-coordinated **discharge care plan** involving a multidisciplinary team of primary health care providers (not solely surgery-related). The intervention comprised sending a discharge care plan to the general practitioner (GP) and other community service providers for review before discharge. There was no difference in length of stay compared to usual care. There were improvements in the extent and speed of communication between the hospital and GPs as well as improved patient quality of life and satisfaction.⁴¹

Readmission rates

We did not identify research about the impact of multidisciplinary working on the rate of admission to hospital for surgery (or rate of surgical uptake).

We found only a small number of studies that suggested that readmissions after surgery decreased with multidisciplinary care.

For instance, a US study examined co-management by a general medicine hospitalist and orthopaedic surgeon or neurosurgeon at one hospital. Before-and-after analysis found that **co-management** was associated with a reduction in the proportion of patients with medical complications (odds ratio 0.9, 95% CI 0.7 to 0.96, $p < 0.05$), the proportion with length of stay of 5 days or more (odds ratio 0.7, 95% CI 0.7 to 0.8, $p < 0.05$), and 30-day readmissions for medical causes (odds ratio 0.7, 95% CI 0.5 to 0.8, $p < 0.05$). There were average savings of US\$2,642 to \$4,303 per patient in the co-management group.⁴²

Other studies have found reduced 30-day readmission rates from co-management⁴³ but no difference from comprehensive geriatric assessment.⁴⁴

Costs

Evidence about the cost impact of multidisciplinary working is generally positive but much of the available evidence comes from outside the UK.

One UK study explored **multidisciplinary meetings in discharge planning** for vascular surgery patients. Dedicated weekly meetings were held on the vascular ward to discuss each patient and their expected discharge date was planned. People who were discharged after this date were considered 'delayed' and the reasons for delay were discussed at the next meeting. There was a net saving of 35 days in hospital over a three month period, equating to a net cost of £2,936 per month or £35,235 per year (2016 prices).⁴⁵

Another UK study of **multidisciplinary team meetings** in cancer at one hospital found that the cost per new patient discussed was £415 (2013 prices). However, the researchers did not indicate whether this was deemed cost-effective⁴⁶

A systematic review of 43 studies about the cost outcomes of **multidisciplinary surgical teams** focused on outcomes directly attributable to collaborative interventions. All the included studies recommended multidisciplinary surgical care and 91% of the studies found that such care was cost-effective. Multidisciplinary care was associated with average cost savings of US\$5,815 per patient compared to non-multidisciplinary care. Different types of multidisciplinary interventions had similar cost savings. The reviewers concluded that well-designed multidisciplinary teams can optimise perioperative care for patients, providers and systems.⁴⁷

A systematic review of 11 studies of **shared primary and secondary care** when following up people who survived cancer found that shared care is acceptable to cancer survivors and primary care practitioners and may be less costly than usual care.⁴⁸

A cost modelling study in the US examined the potential benefits of a multidisciplinary team including orthopaedic surgeons, internal medicine physicians, social workers, and specialised physical therapists, to co-manage people with osteoporotic hip fractures. This study drew on costings and outcomes from published literature and modelled the potential impact under different scenarios. Co-management of all patients was more cost-effective than conventional care (incremental cost-effectiveness ratio US\$41,100 per quality-adjusted life-year) and more cost-effective than co-management for only those at highest risk (US\$81,900 per quality-adjusted life-year).

Co-management was more cost-effective than conventional management as long as the case volume was more than 54 patients annually. Co-management resulted in cost savings when there were more than 318 patients annually. Where staff could be partially dedicated to a co-management service, universal co-management was more cost-effective than risk-stratified co-management. Both co-management approaches had lower costs and better outcomes compared with conventional management. The authors concluded that **multidisciplinary co-management using a dedicated team** to improve perioperative care and preoperative evaluation is cost-effective in hospitals with moderate volume and can result in cost savings at higher-volume facilities.⁴⁹

Some international studies examine the costs of having different types of surgeons or anaesthetists involved during operations, but these may not be applicable to the UK context due to the different payment systems involved.⁵⁰

Capacity impacts

UK and international research has suggested that multidisciplinary team meetings can result in changes to people's care plans or treatment, often positively, though that was not a key outcome that we focused on in this rapid review ^{51,52,53,54,55,56,57,58}

For instance, a UK study examined the outcomes for all cases of hyperparathyroidism at one hospital for a year. All cases were discussed at a multidisciplinary team meeting. 43% were recommended for surgery, 41% had a trial of conservative or medical management before being discussed again and 16% required further imaging. The researchers concluded that multidisciplinary team meetings were worthwhile as they improved the **efficiency of referral pathways**, leading to more appropriate patient management.⁵⁹ However, this study simply described the management details of cases discussed at meetings. It did not compare with cases that were not managed using this approach or look at other outcomes.

Many similar studies are available describing multidisciplinary team meetings, clinics or the use of a wider range of staff roles within the perioperative care pathway. Some of these describe changes to care or communication as a result of such activities.^{60,61,62,63,64} However, these descriptive studies do not compare with other approaches and do not contain data about health, resource or capacity outcomes.

We did not identify studies empirically documenting the impact of multidisciplinary working on the capacity of health and care services to cope with current or future predicted demand. However, a number of studies suggested that multidisciplinary clinics and co-management may **reduce the time taken to provide people with appropriate care** or allow for more efficient referrals.^{65,66}

For example, in the US a single-day **multidisciplinary clinic** for people with complex breast cancer was setup with coordination between three specialties. This was compared with a clinic by specialists from varying disciplines on different days. The multidisciplinary clinic was associated with reduced median time from diagnosis to first neoadjuvant chemotherapy (13 vs 24 days, $p < 0.05$) but not time to surgery (31 vs 32 days, $p > 0.05$). Information was not provided about whether this affected health outcomes.⁶⁷

Elsewhere in the US, a lung cancer **multidisciplinary clinic** was set up at a community cancer clinic that met every week. Local medical and radiation oncologists and a pulmonologist collaborated with a thoracic surgeon from a tertiary care hospital. A cancer care coordinator ensured all necessary tests were available to clinicians at least one day prior to the clinic. Other sub-specialists were involved as needed. The team made final treatment recommendations for each patient at the clinic visit. This approach was associated with improved patient satisfaction and retention. Time from diagnosis to initiation of treatment was reduced from an average of 24 to 18 days.⁶⁸

In the UK, before-and-after analysis of a **multidisciplinary clinic** with combined pelvic floor specialists found that surgery was undertaken in one quarter of patients. The authors reported cost savings and a single recuperation period rather than multiple treatments and recovery periods. Patients were highly satisfied.⁶⁹

Another UK study examined '**surgical care practitioners**' drawn from nursing and allied health professions who provided a range of minor surgical procedures. One hospital found that such roles could contribute to reduced waiting times and were associated with high patient satisfaction.⁷⁰ Other studies found that such practitioners were acceptable to patients when providing pre-operative assessment.⁷¹

Formal integration

Some studies have examined the impacts of formalised integrated working through Accountable Care Organisations which combine the funding for primary and secondary care.^{72,73,74} Many of these studies are from the USA, which has very different healthcare structures to the UK. For surgery, the outcomes tend not to be more positive than the conventional organisation of care.

For instance, a US before-and-after study of the impact of Accountable Care Organisations for people with **spinal fracture** found no changes in the rate of surgery, mortality or readmission. Accountable Care Organisations were associated with a small but significant increase in complications.⁷⁵

A large comparison of people having **spinal surgery** in US Accountable Care Organisations versus non-integrated organisations found no benefits from integrated care. Accountable Care Organisations were associated with an 18% increase in the odds of 90-day complications and a 14% increase in the odds of 90-day readmissions. There was no difference in hospital mortality.⁷⁶

Another US study explored the impact of Accountable Care Organisations on outcomes for men with **prostate cancer**. There was no significant difference in the cost of care provided in Accountable Care Organisations versus other models.⁷⁷

Similar studies have reported that Accountable Care Organisations in the USA are not associated with improvements in efficiencies or clinical outcomes from various types of surgery.^{78,79,80,81} For instance, a review of all national insurance claims for those aged 65 to 99 years between 2010 and 2014 focused on six common **elective surgical procedures**. Hospitals that were part of Accountable Care Organisations had the same resource use and clinical outcomes as hospitals that were not part of integrated systems. The authors concluded that although Accountable Care Organisations have reported success at reducing spending for medical care, the same successes are not apparent with surgical spending.⁸²

There are some positive findings however.⁸³ For example, an analysis of a sample of US national data for **seven common surgical procedures** found that the 30-day risk-adjusted readmission rate was 0.5% lower in Accountable Care Organisations compared to other hospitals (95% CI 0.97 to 0.01%, $p < 0.05$). This may seem like a small reduction but it translates to 4,410 hospital readmissions avoided.⁸⁴

The difference in findings may reflect that formal structural integration and shared funding is not necessarily the same as multidisciplinary working and sharing care. There is wide variation in the extent to which surgeons participate in Accountable Care Organisations in the US.⁸⁵

A study examined whether the level of informal integration and shared working within US Accountable Care Organisations influenced their outcomes. Accountable Care Organisations with higher levels of informal integration in clinical teams had better survival rates after heart bypass surgery than other hospitals (97% vs 94%, $p < 0.05$). However, when there was limited informal joint working and integration, Accountable Care Organisations had no better outcomes than other organisations. The researchers concluded that formalised integration may not be sufficient to improve outcomes and that it is important to foster informal multidisciplinary working, regardless of the formal organisational structure.⁸⁶

Another study found that hospitals attempting to formally partner and integrate with primary care and community services encountered a range of challenges in becoming Accountable Care Organisations. These included a lack of provider engagement and difficulties due to disparate electronic medical record systems.⁸⁷

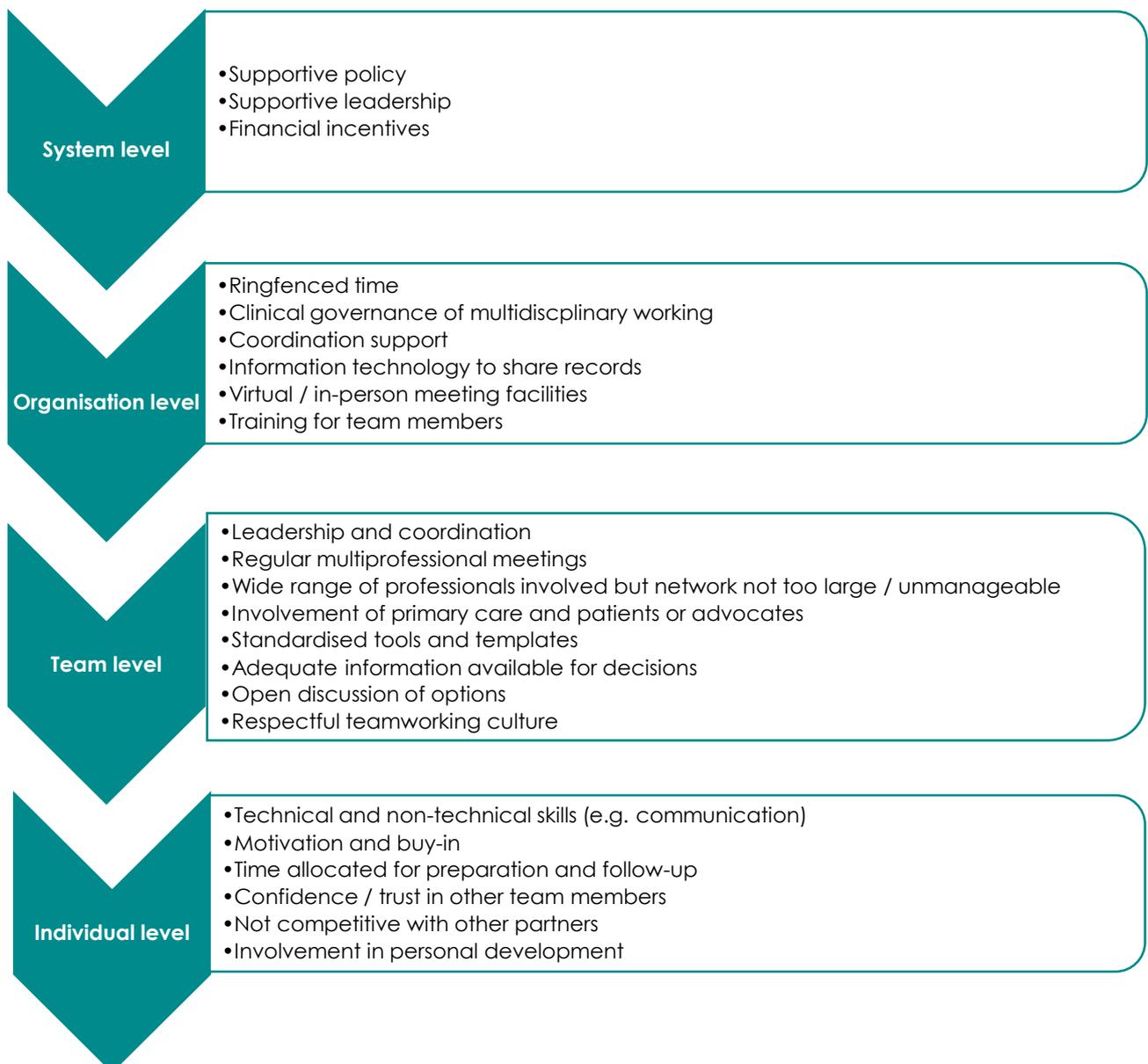
Other studies have also explored the factors that help and hinder multidisciplinary working more generally, and it is to an exploration of those factors that we now turn.

Helpful & hindering factors

This section summarises factors that have been found to help or hinder effective multidisciplinary working where surgery was a treatment option. We found 161 studies about this.

Several studies have examined the characteristics of effective multidisciplinary teams. There is broad agreement across the studies, whether including surgery or not.^{88,89,90,91,92}

There are factors at the macro, meso and micro-level of systems that can help gain the greatest benefit from multidisciplinary working.



Helpful factors

Research suggests that the following factors may facilitate effective multidisciplinary working for people having surgery:

Macro-level system factors

- Supportive **policy** context⁹³
- **Standard care pathways** so everyone is working with the same expectations⁹⁴
- Clear team **goals** and processes⁹⁵
- **Leadership** at system/board level and at operational level^{96,97}

Meso-level organisational factors

- **Clinical governance** around multidisciplinary working and meetings
- **Regular opportunities to meet** with team members across different services and sectors, whether in person or virtually^{98,99,100}
- Attendance at multidisciplinary meetings or other multidisciplinary activities by a **wide range of professionals**, including surgeons, anaesthetists, nurses, doctors, radiologists, dieticians, dentists, pharmacists, mental health professionals, other allied health professionals and primary care^{101,102,103,104,105,106,107,108,109,110}
- Drawing on **nurses and allied health professionals** to provide preoperative and follow-up care in perioperative pathways^{111,112,113,114,115,116}
- **Training** in teamwork and communication, including multidisciplinary education and simulation^{117,118,119,120,121,122,123,124,125,126,127,128,129,130}
- Access to **virtual meeting** technology and training in how to use it effectively^{131,132,133,134}
- **IT systems** that allow data sharing across teams, including patient follow-up^{135,136,137,138}
- Beginning **co-management** within 24 hours of hospital admission¹³⁹

Micro-level team/intervention factors

People

- **Shared leadership** of teams and meetings¹⁴⁰
- Good facilitation and **chairing**^{141,142}
- **Training of chairs** and coordinators¹⁴³
- Allocation of a **designated coordinator** for meetings^{144,145,146}
- Having pathway coordinators / **liaison people** for patients with clear role descriptions^{147,148,149}
- Good **relationships** between team members to facilitate communication¹⁵⁰
- Inclusion of **lay partners**^{151,152,153,154}

Processes

- **Adequate discussion time** at meetings for each patient¹⁵⁵
- Focusing discussions on **complex cases** rather than trying to cover all cases in depth^{156,157,158,159,160}
- **Adequate information** about each patient in multidisciplinary meetings^{161,162,163}
- Good **record keeping** of decisions in patient notes and communication of decisions to all stakeholders^{164,165,166}
- **Audit** of processes and outcomes¹⁶⁷
- **Open discussion of options** so professionals can see approaches other than their own preference¹⁶⁸
- **High number of cases** per meeting¹⁶⁹

Tools

- **Checklists** to assist with presenting cases and making decisions in a structured manner^{170,171,172,173,174}
- **Toolkits** and documentation designed for and with lay partners^{175,176}
- Structured **agendas** for team meetings¹⁷⁷

We provide examples of the types of studies conducted to give a flavour of the literature about factors that support multidisciplinary working.

In a survey with more than 1,600 members of multidisciplinary cancer teams in the UK the following features were perceived to be important **elements of effective multidisciplinary working**: building non-technical skills; organisational support; good relationships between team members; recording disagreements and potentially sharing them with patients; patient-centred information about team decision-making; and the central role of clinical nurse specialists as patient advocates.¹⁷⁸

Another UK study tested ways to improve **multidisciplinary team meetings** for cancer. The intervention comprised a half-day training session about the evidence for improved clinical decision-making followed by an interactive workshop and discussion, a decision-support tool, training session for surgical residents about how to use the tool to prepare and structure cases in advance of the team meeting, and emails about how team members could draw out optimal clinical information for decision-making. This approach was found to improve decision-making and the likelihood of the team formulating a clinical management plan.¹⁷⁹

A systematic review with seven studies about **teamwork education** in acute hospital settings found that:

- organisational culture and expectations impact on health professionals' participation and experience of teamwork education
- understanding how successful teams function is key to developing interventions to enhance teamwork
- multidisciplinary education is valued when it is implemented by facilitators who create practical authentic learning opportunities and foster reflection and debriefing. Simulation also provides useful learning opportunities to practise teamwork skills¹⁸⁰

Another systematic review of 8 studies explored staff views of implementing **multidisciplinary enhanced recovery** after surgery pathways. Professionals described the importance of effective multidisciplinary team collaboration and communication, education for staff and patients, and appointing a dedicated champion to successfully implement and integrate pathways. Evidence-based guidelines were useful for standardising practices and reducing treatment variations, but were thought to be too open to interpretation at local levels. Setting and managing 'realistic' expectations of staff was suggested as a priority.¹⁸¹

A systematic review of 31 articles examined factors that support safe **multidisciplinary handover** from the operating theatre to post-anaesthesia or intensive care units. Recommendations included standardising processes using checklists and protocols; requiring that all relevant team members be present; providing training in team skills and communication; and ensuring detailed information is available.¹⁸²

A US study interviewed surgeons and **GPs** about transitioning people who used opioid medications after surgery. Surgeons reported passively transitioning to GPs after ruling out surgical complications. Patients were often referred to the surgeon when GPs were uncertain about the cause of ongoing pain. Factors that fostered more effective multidisciplinary care pathways were setting clear preoperative expectations, engaging in active transition for postoperative prescribing, increasing knowledge of care transitions amongst surgeons and primary care providers; guidelines for coordination of care; using support staff for active transition and incentives for multidisciplinary collaboration.¹⁸³

Another US study explored the views of primary care teams about collaboration with hospitals to improve care transitions after discharge (not specific to surgery). Perceived facilitators included relationship building through interpersonal networking and improving information transfer through electronic health record systems. Major barriers included a lack of institutional financial incentives for collaboration, competing priorities and mismatched expectations about the role and capacity of primary care to improve care transitions.¹⁸⁴

There are differences of opinion about the **extent to which patients should be included** in multidisciplinary team meetings. For instance a survey of breast cancer surgeons, nurses, oncologists and patient advocates in Australia found that the majority of patient advocates (93%) and breast cancer nurses (73%) supported involving people with breast cancer in multidisciplinary treatment planning meetings compared to less than one third of surgeons (32%), medical (25%) and radiation oncologists (24%). Those who supported patient involvement said this would help patients feel more informed and empowered, provide them with an opportunity to ask questions, facilitate decision-making and improve communication between the patient and the medical team. Health professionals often said that attendance at meetings would make patients anxious and that teams would need to modify their medical language.¹⁸⁵

On the other hand, another study in Australia examined the feasibility of involving people diagnosed with cancer in multidisciplinary team meetings to plan care. Most patients valued participating and this was acceptable to and welcomed by most health professionals in the multidisciplinary team. There was no change in patient anxiety scores as a result of participation.¹⁸⁶

Other researchers in Australia explored ways to improve multidisciplinary working. Strategies included pathologists flagging high-risk patients, clinical leadership, education, and audit and feedback about individuals and organisational practices. The researchers concluded that **interventions focused on structures and processes** that enable health system-level change, rather than those focused on individual-level change, are likely to have the greatest effect.¹⁸⁷

Potential barriers

Research suggests that the following factors may be barriers to effective multidisciplinary working for people having surgery:

Macro-level system factors

- **Fragmentation** of health and care services and different sectors^{188,189}
- Policy makers, funders and managers not understanding the benefits and requirements of multidisciplinary working, and not allocating necessary **resources and infrastructure**^{190,191,192}
- Lack of knowledge about primary care, surgery and other disciplines at **strategic planning** level^{193,194}
- Lack of clear **guidelines** and processes to support integrated care¹⁹⁵
- Incompatible **IT systems**¹⁹⁶

Meso-level organisational factors

- Lack of **ringfenced time**^{197,198}
- Poor **communication** and blurred lines of responsibility between hospital and primary care, including around discharge^{199,200,201,202,203,204,205,206,207}
- Perception of multidisciplinary working as an 'add on' rather than **embedded** as part of routine care²⁰⁸
- Not fitting in with staff **routines**²⁰⁹
- The sector in which staff are employed or their physical location leading to **siloed working**

Micro-level team/initiative factors

People

- Lack of **designated coordinator** or administrative support²¹⁰
- Limited **attendance** at meetings by some staff groups^{211,212}
- Not including **patients** as part of the team²¹³
- Unclear / differing **expectations** about the roles of various team members²¹⁴
- Professionals feeling **isolated** from their own disciplines if working only with other disciplines²¹⁵

Processes

- Lack of formal function and **structure** for meetings, teams or activities^{216,217}
- Difficulty identifying a **time** when all members can meet²¹⁸
- Lack of consensus and clear guidelines over **which patients** to discuss or only discussing patients once or after they had surgery^{219,220}
- Clinicians simultaneously attempting to **chair** and take part in meetings^{221,222}
- Lack of robust **measurement** and reporting to track over time²²³

Knowledge

- Lack of knowledge amongst clinicians of their **legal responsibilities** at multidisciplinary meetings²²⁴
- Limited **knowledge** and comfort about multidisciplinary working²²⁵
- Lack of **training** in perioperative care²²⁶

Attitudes

- **Resistance** to change or lack of buy-in amongst team members, including adherence to discipline-specific roles and stereotypes^{227,228,229,230,231}
- **Patient reticence** towards multidisciplinary interventions²³²

Other

- Prioritisation of medical over **psychosocial** elements^{233,234,235}
- Differences of opinion between team members, leading to **inconsistent advice** to patients²³⁶
- Challenges in **communicating** for continuity of care including between sectors^{237,238,239,240n241}
- Lack of clear **patient-focused information** resources^{242,243}
- Lack of **follow through** with multidisciplinary decisions

We provide examples of the types of studies available about barriers to multidisciplinary working.

In Canada, researchers examined the barriers and enablers to implementing a multidisciplinary **enhanced recovery after surgery pathway**. In interviews, general surgeons, anaesthesiologists and nurses were positive about multidisciplinary working but identified barriers including lack of time, poor communication and collaboration, resistance to change, and lack of patient education to support new ways of working. They suggested that standardised guidelines based on best evidence; communicating the evidence for multidisciplinary working and perioperative pathways; and education of staff, patients and families were essential.²⁴⁴

A similar UK study examined facilitators and barriers to implementing multidisciplinary **enhanced recovery after surgery pathways**. Helpful factors included alignment with evidence-based practice; standardising practice; drawing on the evidence base of other specialties; leadership; strategies to build teamwork; regular meetings; patient involvement and education; staff education, and data collection and feedback. Implementation challenges included resistance to change, standardisation affecting personalised patient care, buy-in of relevant stakeholders, limited information provision to patients; lack of resources; and aligning ward cultures.²⁴⁵

A UK study of **multidisciplinary cancer meetings** interviewed surgeons, oncologists, nurses and administrators. Participants were positive about multidisciplinary meetings but suggested areas for development, including having protected time to attend. Contributions to discussions were unequal amongst disciplines. Participants said that good leadership was necessary to foster inclusive case discussion, improved case selection and working in a more structured manner.²⁴⁶

Another UK study explored **multidisciplinary team meetings** in head and neck cancer. The researchers suggested that processes could be improved to properly represent patients at team meetings and to clearly disseminate information from team meetings to patients. Observation of meetings found that individual team members often had clear views about the treatment option they considered to be 'best' in any clinical situation. When disagreement occurred, the team had to manage how it presented differences of opinion to the patient. The clinician selected to discuss the treatment recommendation to the patient often framed their description of treatment options to fit their own view of what was best. Many team members felt that any differences of opinion should be concealed from the patient. This meant that decision-making in the multidisciplinary team meeting excluded the patient. Team members sometimes sought to counteract this by introducing increasing amounts of information about the patient into the meetings, however the information was highly selective and limited which could steer the discussion in a certain direction. The researchers concluded that there are barriers to effective patient involvement in multidisciplinary team meetings.²⁴⁷

Elsewhere in the UK, structured **daily multidisciplinary briefings on medical wards** were tested to hear staff concerns (some wards included patients considered for surgery). The initiative was implemented to varying extents. In those wards where the intervention was well implemented, excess length of stay reduced, but in wards that did not implement the intervention consistently, there was no difference in excess length of stay. This is an example of how ward-level multidisciplinary interventions may need to be consistently and robustly implemented to make a difference.²⁴⁸

Other UK researchers explored the roles of respiratory **nurse specialists** as part of a multidisciplinary team. They found that most of the nurses' work related to supporting self-management in people's homes, supporting patients on home oxygen, providing hospital-at-home services after or instead of surgery and facilitating early discharge from acute care. However most respiratory nursing teams were employed by secondary care trusts and located within acute environments. The employment and location of the teams was a barrier to multidisciplinary working.²⁴⁹

Another UK study, not specific to surgery, examined a large-scale transformational project to improve care for older people with long-term conditions. The initiative included **functional integration** through pooling health and social care budgets, multidisciplinary groups, an alliance agreement between organisations, a shared care record and an integrated contact centre. Integration was slow and it was challenging to engage with primary care. There was little improvement in patient satisfaction or clinical outcomes. Limited engagement with primary care was a barrier.²⁵⁰

Researchers in Australia examined the facilitators and barriers to providing multidisciplinary **smoking cessation support** prior to cardiothoracic surgery. In interviews with surgeons, anaesthetists, nurses and physiotherapists from six hospitals, commonly identified barriers included a lack of staff knowledge, training and institutional engagement; clinician attitudes; lack of time and limited hospital support and resources. Having a collaborative, multidisciplinary team and the ability to follow-up patients long-term were facilitators. The researchers suggested that hospitals should provide adequate resources and training to all clinicians so that everyone can support patients throughout the perioperative period.²⁵¹

Summary

Our rapid review suggests that having professionals from different specialities working together has the potential to benefit patients, the workforce and health and care systems, though this potential is not always realised.

For example, a systematic review of 191 studies of multidisciplinary approaches to breast cancer care found that most of the studies focused on describing multidisciplinary processes rather than exploring their outcomes or the factors that made them more or less effective. The studies differed in terms of design, clinical context, patient population and study outcome.²⁵²

Research from the UK and abroad suggests that multidisciplinary care can improve patient health outcomes and optimise resource use. However, there are opportunity costs and not all studies have found benefits. One of the reasons for the conflicting findings may be that novel treatments, technology and service changes have all developed alongside multidisciplinary working so it is **difficult to differentiate whether changes are a result of 'joint working'** or from other improvements implemented simultaneously.²⁵³

Furthermore, it can be difficult to design studies to assess the effectiveness of multidisciplinary working. For instance, in the UK multidisciplinary management is mandatory in cancer care so it is difficult to undertake studies that compare with no multidisciplinary care.²⁵⁴

Studies about factors that help and hinder multidisciplinary working also have methodological challenges. For instance, a systematic review of eight studies about the impact of improving teamwork on patient outcomes in surgery found some positive trends but the reviewers argued that the studies included were small, there was a lack of unified training and multidisciplinary training was of short duration.²⁵⁵

Many other reviews have also pointed out **deficiencies in the quality and quantity of evidence available**.^{256,257}

There are also many gaps in existing knowledge. We do not have clear evidence about whether a multidisciplinary team to support perioperative care should be centrally coordinated or whether more virtual or ad hoc collaboration is just as beneficial. A review of implementing perioperative care pathways in the UK found 17 papers, not all of which included empirical research. The reviewers highlighted that there were two main theories of change: one involved consulting with staff to implement pathways and the other involved appointing a change agent or coordinator to drive the implementation process. There was no evidence about whether one approach was better than another.²⁵⁸

We identified little research about the impact on surgical outcomes of Integrated Care Systems and equivalent in the UK. The evidence available about Accountable Care Organisations in the US has mixed outcomes for surgical care.

Despite these difficulties, there are many studies that point to the potential for reduced complications and shorter length of stay when multidisciplinary care is implemented well. Understanding the facilitators and barriers to implementation is thus important for driving up the quality of care for people having surgery.

At the Centre for Perioperative Care, we believe that collaborative and efficient perioperative care is the route to effective and sustainable surgery – and multidisciplinary working is a key part of this. Many components of the perioperative care pathway already exist within the NHS, including examples of multidisciplinary working. The time is right to strengthen multidisciplinary working even further.

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