

Effectiveness of a Rapid Improvement Programme to Increase Day Case Laparoscopic Cholecystectomy Rates

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Laparoscopic cholecystectomy is increasingly seen as a day case procedure. Day surgery is appropriate for more than half of all patients requiring cholecystectomy, yet the average day case rate remains low despite the publication of an ideal pathway from the NHS Institute for Innovation and Improvement. A one-year rapid improvement programme was devised to see whether implementing a standard pathway could reliably increase day case rates.

The programme was run by two managers from the NHS Institute, supported by seconded clinical leads for anaesthesia and surgery. Ten pilot sites were selected, one from each English SHA. The team visited each site twice to map the patient pathway using a custom designed, colour-coded process map to easily identify areas for improvement. Specific solutions were discussed with the team. Multidisciplinary groups from all ten pilot sites were also brought together on four occasions for training in service improvement techniques and each site received regular support from the NHS Institute managers and clinical leads, as required.

Nine of the trusts had low day case rates; four did essentially no day cases, four did less than 10% and the ninth achieved only 13.6%. Most trusts were initially sceptical of day case laparoscopic cholecystectomy and several perceived unique local barriers to significant change. However by improving the care pathway, all of the poorly performing trusts increased their day case rates significantly, managing an additional 23–68% of all elective patients as day cases. Four trusts approached or exceeded the BADS Directory target of 60% within the first year of the programme.

Using the process map and applying principles of best practice resulted in substantial increases in day case rates despite healthy scepticism and apparent barriers. The process map, principles and solutions have now been incorporated into a kit which all trusts will be soon able to use to improve and sustain their own service.

Introduction

Laparoscopic cholecystectomy was first described in the 1980s and within a decade gained widespread acceptance as the treatment of choice for gallbladder disease. Over the same period, the operation began to be performed on a day case basis, especially in North America. A few pioneering British units also embraced day case laparoscopic cholecystectomy, in some cases treating about half of their patients in this way, but the majority continued to regard it as an inpatient procedure, either exclusively, or in all but a few highly selected cases.

In an attempt to encourage the wider adoption of day case laparoscopic cholecystectomy and to reduce variation between NHS Trusts, the NHS Institute for Innovation and Improvement investigated a number of institutions with widely differing day case rates in order to try to identify best practice. This culminated in the production of the

“Focus on” document^{1,2} which set out an ideal patient pathway and encapsulated the key characteristics of those institutions achieving excellent quality care and high day case rates. Nevertheless, there remained considerable variation in practice across the United Kingdom. In England in 2008, the national average day case rate was only 16% while 13% were doing no day cases at all and over one third of trusts were achieving less than 5%³. At the same time, a small number of trusts were achieving day case rates of 60% or more, consistent with the target in the current BADS Directory⁴. It was therefore decided to run a year long rapid improvement programme to provide intensive support to a small number of trusts, to determine

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whether applying the previously determined best practice pathway could reliably increase day case rates.

Patients and methods

A team was established to support the rapid improvement programme (RIP). This was led by a full time Associate with the NHS Institute (SC), who had been involved with the development of the original Focus on document, and a Co-production Manager (HC) who was seconded full-time from a General Manager role in an acute Trust. Clinical support was provided by Surgical and Anaesthetic leads who were seconded for one day a week from their respective Consultant roles. Applications to join the programme were invited from all English NHS trusts, facilitated through the Strategic Health Authorities (SHAs). Applicants filled out a form listing their current day case rates, volume of work, reasons why they wished to join the programme as pilot sites and their previous experience of service improvement initiatives. Applications were shortlisted to prioritise those trusts with the greatest potential gains and potential for sustainability, but a decision was also taken to work with a single Trust from each of the ten SHAs.

During the course of the programme, each trust received two visits from the RIP team. Where possible, all four team members visited, but our minimum requirement was one manager and one clinical lead. During the first visit, the team walked the entire patient pathway from outpatient clinic to discharge and questioned the various staff groups along the way. At the second visit, the newly formed project team within the trust walked their own pathway, especially areas where they normally would not work. The patient pathway was then mapped, using a custom-designed process map (see below), and an action plan was developed. Further support was provided by regular contact with one of the NHS Institute managers by way of a telephone call every two weeks and a personal visit every six weeks with further input from the clinical leads, if needed. In addition, all ten pilot sites were brought together for four rapid improvement days where they received education in various service improvement techniques and had the opportunity to discuss key areas of the patient pathway in detail. This also facilitated the sharing of experience between the ten sites. In order to disseminate lessons learned from the programme, we also held two one-day events in each SHA where all local trusts were invited to attend. These trusts then participated in a condensed version of the RIP (without the ongoing intensive support) and had an opportunity to learn from the experiences of their local pilot site.

Mapping the process

Process mapping can be a valuable tool to uncover bottlenecks and inefficiencies in a patient pathway, especially where this is a complex journey, of which no individual has a clear overview. However, it is easy to

become sidetracked by minor details of the process, while overlooking more major sources of variation. In order to avoid this pitfall, we used a custom designed, pre-printed process map (Figure 1, see page 83). This comprised a total of 49 questions broken down into nine sections which followed the patient pathway from referral to initial outpatient appointment and preoperative assessment, through scheduling to admission, theatre and recovery and encompassing postoperative and after-care. The questions were intended to identify what was to improve day case rates, reduce waste and improve quality of care. Each question was accompanied by a series of pre-determined answers (Figure 2, see page 84), based on previous observations of common practice. Responses which represented previously-observed best practice, or which resulted in minimal variation or duplication were coloured green. Amber represented areas of practice where there was some variation or duplication and potential for some improvement. Red was used to denote major variations in practice or significant repetition or other areas of inefficiency.

Prior to the second team visit, paper copies of the questions and answers (but without the colour coding) were distributed among a wide range of multidisciplinary staff involved with all stages of the patient pathway. These staff were then brought together and allowed to walk the patient pathway before compiling a master copy of the process map, facilitated by the RIP team. Responses on the map were intended to reflect the experience of the vast majority ($\geq 80\%$) of patients, but multiple answers were permitted to capture common variations. Once the map was complete, areas with the greatest potential for improvement were immediately apparent from the pattern of colours. Individual action plans were then devised and a number of improvement projects undertaken with the support of the team. Pilot sites were encouraged to measure the impact of these changes and to constantly audit their results.

The rapid improvement days

These days were intended primarily to provide the necessary background information and skills to improve day case rates for laparoscopic cholecystectomy. However, there was also a desire to impart an ethos of continuous quality improvement and to ensure that much of the material was as generic as possible. In this way it was hoped that the improvements would be sustainable and would also serve as a starting point for other improvements in day case and short-stay surgery. Therefore, much of the first day was concerned with lean principles, appropriate measures and an introduction to the BADS Efficiency Assessment Tool. Subsequent days also focussed on some of the barriers highlighted by the mapping process and included the adoption of current patient selection criteria (with a particular focus on body mass index [BMI]), the development of guidelines for anaesthesia and analgesia, nurse-led discharge criteria and the provision of patient information and follow-up support.

On the final day, each pilot site reported back on their overall experience of the programme, their key

achievements and their current day case rates which were compared with rates reported when applying to join the programme. Because of the considerable delays in reporting nationally collected data, day case rates were taken from data supplied by the participating trusts. These data collection methods were the same at the start and end of the programme.

Results

As was our intention, ten trusts were recruited to the programme, one from each English SHA. With one exception, these trusts all had low rates for performing laparoscopic cholecystectomy as a day case (Table 1). Two trusts had done no day cases at all, while four others had done but a few cases. Two trusts had day case rates of less than 10% and another was below 15%. The exception was a high performer with a day case rate of 68%. This trust had joined the programme primarily to develop their emergency cholecystectomy pathway, which was a secondary objective of the RIP. Unfortunately, no other trust within this SHA with a low elective day case rate

Table 1 Self-reported day surgery rates for laparoscopic cholecystectomy in the ten pilot sites at the start and end of the rapid improvement programme.

Acute Trust	Start (October 2008)	End (November 2009)
Trust A	0	41%
Trust B	0	64%
Trust C	0.1%	29%
Trust D	0.37%	62.5%
Trust E	2%	70%
Trust F	2.6%	50%
Trust G	5.6%	29%
Trust H	9%	57%
Trust I	13.6%	37%
Trust J	68%	Data unavailable

applied to join the programme.

During the first team visit, it soon became apparent that many of these trusts were sceptical about their potential to substantially improve their day case rates. Some still doubted that the process was safe or that it was associated with clear benefits for patients. Others believed in the principle, but felt that “conventional solutions” would be ineffective in their specific trusts because of a variety of perceived differences in their circumstances. These differences included serving large geographical areas, inner city location, high levels of poverty and/or co-morbidities, high rates of tertiary referrals, teaching hospital status,

inadequate day surgery unit capacity and unfavourable layout of theatres and/or wards.

All of the process maps, including that in the high performing trust, indicated areas of inefficiency in the patient pathway, although these would not necessarily influence whether or not the procedure was completed on a day case basis. Seven trusts had the ultrasound scan arranged by the patient’s general practitioner (GP) prior to referral in the majority of cases so that the results were available to inform the decision to operate at the initial consultation. Only one trust, however, was able to have liver function test (LFT) results similarly available. Four trusts completed LFTs and three arranged ultrasound scans after the outpatient appointment. Nevertheless, all but one trust booked patients for a laparoscopic cholecystectomy at the outpatient appointment, although in many cases, this was provisional depending on the results of the pending investigations. Two trusts (including the high performer) defaulted some or all of their patients to day surgery, but in all other cases, the decision between day case and inpatient care was made by the surgeon in the outpatient department. Four trusts were able to provide a “one-stop” preoperative assessment service for at least a majority of their patients. Seven trusts operated centralised preoperative assessment, while three had a dedicated day case service. In all trusts, LFTs (and often many other blood tests too) were repeated as part of preoperative assessment, even if recent previous results were available. Preoperative assessment staff often changed the status of patients from intended day case to inpatient, but the decision to manage a patient as an inpatient was rarely, if ever, challenged.

Five trusts had standardised and agreed written day surgery criteria, while four others had written criteria which had not been agreed by all and one trust had no written criteria at all. Seven trusts had BMI restrictions, typically 35 to 40, while three had no restrictions. Day surgery patient pathways were used in seven trusts, but in only one was this specific to laparoscopic cholecystectomy. None of the pilot site trusts started this pathway before the preoperative assessment stage. Most of the trusts tried to prioritise their day case cholecystectomies on morning lists, but in practice, cholecystectomies were often used as list fillers and scheduled after major cases. Most cases were done on all day lists and in three trusts there was an attempt to schedule patients on dedicated day case lists. In four trusts, surgery was undertaken by upper GI surgeons (2) or a combination of upper and lower GI surgeons (2), in all others most, if not all, surgeons performed laparoscopic cholecystectomies.

Only two trusts gave patients preoperative oral analgesia, while a further three gave intravenous analgesia as part of induction of anaesthesia. No trust had written anaesthetic guidelines for day case cholecystectomies, although two had a written protocol for managing postoperative nausea and vomiting and another had a protocol for analgesia. Seven trusts permitted nurse-led discharge of cholecystectomy patients, although in two cases this applied only to some of the ward areas used. A surgical

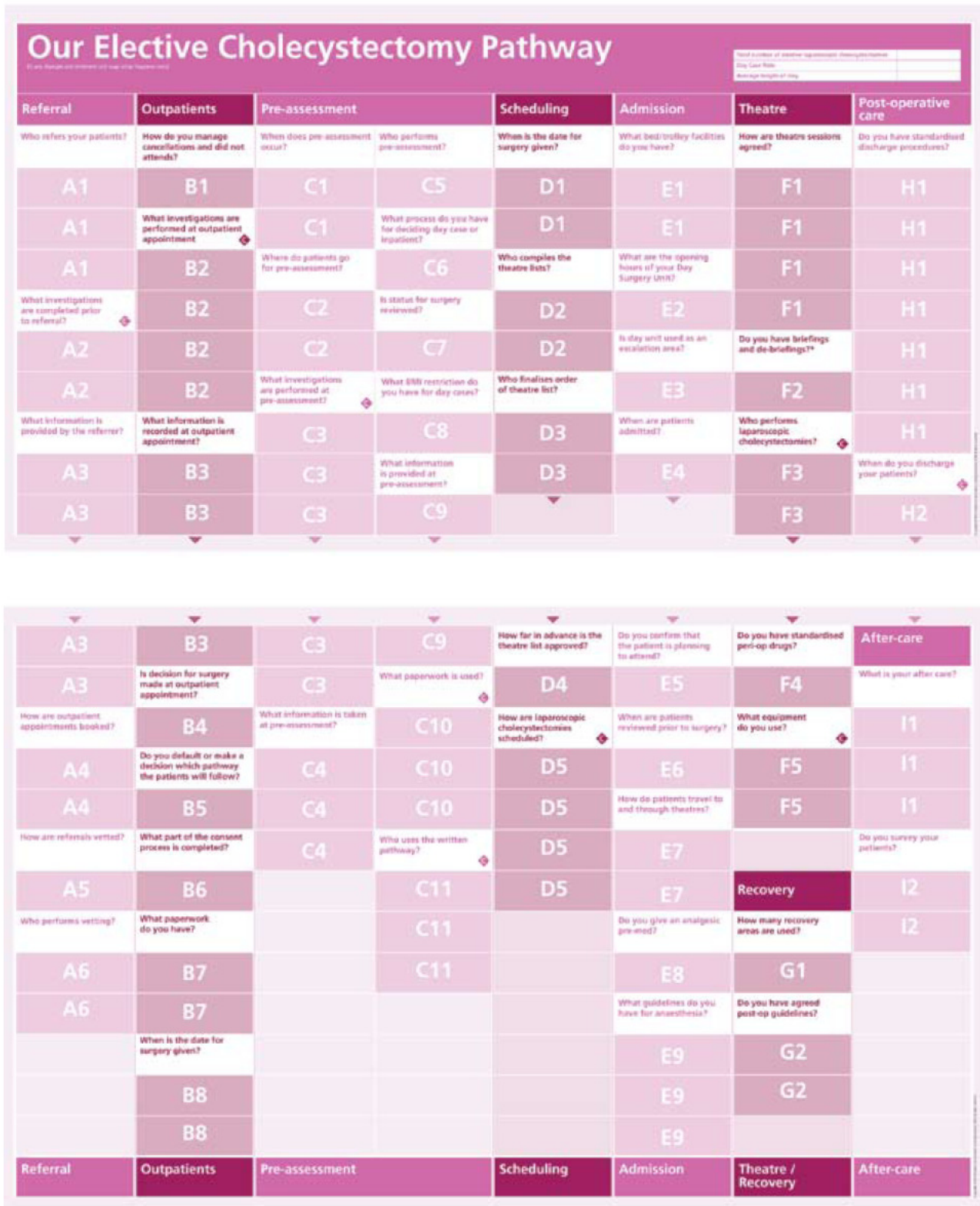


Figure 1: The elective cholecystectomy process map. This version of the map is similar to that used during the rapid improvement programme, but has been modified in light of the experienced gained and adapted for use as part of a service improvement kit.



Figure 2: A selection of the colour-coded pre-printed stickers used to populate the process map. Blank stickers allow for the inclusion of atypical practices. Green indicates best practice, amber indicates some repetition or variation and red signifies significant duplication, repetition or inefficiency.

review was required in all other cases. Five trusts required a minimum stay of six hours after surgery, two required four hours and two had no minimal time interval. One trust kept all patients overnight in a "23 hour" unit. Four day units closed at 8 pm, three opened to nine and two until ten at night, the remaining 23 hour unit remaining open at all times. Six trusts provided patients with a 24 hour contact number after discharge and four made a routine follow-up telephone call.

As a result of the RIP, the pilot sites made a number of changes to their pathways. These included arranging to have the majority of common investigations performed prior to the outpatient appointment, defaulting patients to day surgery, revising and updating day surgery criteria, including removing limits such as BMI, developing procedure-specific pathways and guidelines for anaesthesia and analgesia. Nurse-led discharge was expanded and minimal observation times were replaced with parameter-based discharge criteria. By the end of the RIP there were substantial increases in the rates of day case laparoscopic cholecystectomy in nine of the ten pilot sites (Table 1); the previously high-performing trust did not submit further data. The biggest increase was from 2% to 70% and the smallest was from 13.6% to 37%. On average, an additional 45% of laparoscopic cholecystectomy patients underwent day surgery and one trust was approaching, and three were exceeding, the BADS target of 60% by the end of the programme.

Discussion

Despite initial scepticism and the presence of multiple apparent reasons why high rates of day case surgery could not be achieved for laparoscopic cholecystectomy, the programme was successful in all cases and achieved an average 45% increase. Four trusts which had previously done few or no day case cholecystectomies approached or exceeded the BADS target of 60% and no trust had a day case rate much below 30% by the end of the programme. None of the solutions implemented were technically difficult and reflected the ideal pathway clearly set out in the NHS Institute Focus on document⁴, as well as established principles of day surgery⁵.

The ideal patient pathway, as illustrated by an all green process map, applies lean methodology in order to smooth the process of diagnosis and treatment of patients. By ensuring key information is available at the appropriate time and by avoiding duplication and excessive variation, all patients can be managed in a consistent way, allowing clear and unambiguous information to be given at all stages and allowing all patients to receive the highest quality of care, irrespective of which particular individuals are delivering that care. A good example of this approach occurs at the very start of the pathway. The majority of patients who require cholecystectomy will initially present and be investigated in a broadly similar way. It is therefore relatively easy to devise a referral proforma

for patients with suspected gallbladder disease which requests appropriate investigations (typically ultrasound scan and LFTs) to be completed so that the results are available at the initial outpatient appointment. Armed with this information, the surgeon is then able to definitively determine that the patient requires a cholecystectomy. While this may not directly influence the decision on day surgery or inpatient care, the surgeon will also have information about the state of the gall bladder wall and will be able to decide there and then whether further procedures, such as MRCP, cholangiogram or exploration of the common bile duct will be needed. This knowledge allows more accurate and reliable information to be given and minimises the need for a last minute change in management plan. Providing consistent information and an unchanging plan of action also improve the patient's confidence in the process.

In contrast, some aspects of the ideal pathway can have a large impact on day case rates. Predicting the outcome after cholecystectomy is difficult and even technically difficult cases can often recover well enough to go home on the day of surgery⁶. Defaulting all cases to day surgery is therefore recommended as best practice⁷. It is notable that only the high-performing trust and one other which had already taken a conscious decision to increase day case cholecystectomy were defaulting to day surgery at the start of the programme. It is important to reassure surgeons that patients defaulted to day surgery will still undergo a thorough preoperative assessment and, if there are clear medical contraindications, they will be diverted to inpatient care. However, it is important that the most current day surgery selection criteria are used⁸ and we would expect the preoperative assessment staff to be best placed to keep up to date with these. Similarly, no day surgery unit will discharge a patient unless they have fulfilled all the appropriate criteria, so patients in whom a postoperative complication is possible, or even likely, will only be allowed home if this anticipated difficulty does not occur. In contrast, a patient booked for an overnight stay who does better than expected will feel unsupported and insecure if a last-minute attempt is made to discharge them on the day of surgery. When adopting a default to day surgery strategy, it is essential that all members of the team are aware of the change and the implications for them. For example, surgeons in one pilot site started listing most of their patients for day surgery only to find the booking staff were changing them back to inpatients, assuming a mistake had been made!

Successful day surgery requires careful surgery and anaesthesia. Good pain relief is fundamental, but it is also important to minimise the use of opioids with their inherent side effects. There is no single consistently best technique, but several basic principles which are important⁷. During the RIP, we encouraged the pilot sites to develop their own local guidelines for anaesthesia. It is important that the outcomes of these techniques are assessed by local audit and modified, if necessary, in light of the outcomes. An enthusiastic lead anaesthetist in one of the pilot sites undertook an anonymised audit of pain and nausea in recovery and was mortified that the patients with the least favourable outcomes were their own! Having an agreed set of local

guidelines also means that patients receive a similar high standard of care, even when the regular anaesthetist is away.

One limitation of our programme is that we assessed its effectiveness using locally-collected self-reported data rather than relying on nationally reported HES data. This was largely because of the considerable delay between the publication of HES data and its collection. We wanted to assess the day surgery rates immediately before the start of the programme (rather than a year or more previously) and also to assess its effectiveness as soon as possible. HES data is still collected by individual trusts, so the data collection process should have been similar. In addition, the changes over the timeframe of the programme were so dramatic that even modest errors in data collection would not have altered the outcomes by much.

It remains to be seen if the improvements in day surgery rates are sustained now that the support of the RIP has been withdrawn. However, despite the intensity of the programme, there was no financial support or additional material resource put into any of the trusts. The changes which were implemented were all relatively simple and should become embedded into routine practice within a short period of time. The intensity of the RIP was predominantly concerned with evaluating the pathway and educating staff to enable them to make the necessary changes themselves. Much of the education was directed towards changing attitudes and culture in the hope of achieving greater sustainability. The outcomes are most likely to be sustained if the changes in practice are adopted by all areas rather than by those individuals who were driving the changes.

That nine quite different trusts were all able to make substantial changes by reference to a single patient pathway offers hope that the underlying principles are applicable to all. Unfortunately, we currently have no data to determine whether those trusts which engaged with the programme through the SHA education days have increased their cholecystectomy day case rates to a greater extent than those which did not. Based on the experiences of this programme, we have developed the patient pathway into a kit which trusts can use independently to improve their own services. The kit includes a copy of the process map and stickers (Figures 1 & 2) and is accompanied by a comprehensive solutions section which describes how to improve the pathway. Although still focussed on cholecystectomy, 80% of the process map and kit are generic and can be used to improve the pathway for most other day surgery patients. The kit also includes resources to assess and modify the underlying culture of the organisation, since many service improvement initiatives fail because of cultural issues. The kit will be available from the NHS Institute for Innovation and Improvement and can be ordered by contacting institute@newaudience.co.uk quoting DQ017.

In summary, implementing the ideal cholecystectomy patient pathway did reliably increase day case rates. This was achieved by applying a series of simple measures, in a diverse range of NHS trusts, and despite the presence of many perceived barriers.

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