

Digital Exclusion in Healthcare



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Editorial

Prof Amit Sinha FRCS (Tr&Orth). Consultant Orthopaedic Surgeon. Editor, BIDA Journal.



GMC Work Experiences report of doctors - 2026

The Barometer survey has tracked doctors' perceptions of being able to provide sufficient patient care since its inception in 2019 when 34% of all doctors said they struggled to provide this at least weekly. This rose to 44% in 2022 and has remained at similar levels since then. In 2025, two in five doctors (41%) found it difficult to provide patients with sufficient care at least weekly, with difficulties being most acute among GPs (60%) and recently qualified doctors (51%). This is all because of pressures in their working environment. How can they provide good clinical care in the corridor or to a patient with a broken ankle or a wrist and who requires surgery but has been sent home because of lack of beds in the hospital.

For doctors, the challenge lies not only in the volume or complexity of need, but in the way everyday working conditions affect the care they can provide for patients. Doctors are clear about what good care looks like. They describe it as timely, patient-centred, and focused on the whole person. If doctors are unable to deliver the care their patients need then it affects their wellbeing, professional fulfilment, and sense of purpose.

Trainers, meanwhile, face increasing pressure in a role that is critical to developing and supporting the next generation of doctors. Clinical or education supervisors (specialist trainers) continue to report poorer experiences than those not undertaking training roles, and the position has worsened since 2024.

Doctors in foundation training are struggling with workload and report progression and development challenges and concerned about competition for training places and quite often considering leaving the UK profession. Locally employed doctors feel that they are less likely to progress in their career the way they want.

BIDA has been highlighting to improve workload issues and workplace conditions to prevent dissatisfaction and give equal autonomy to all doctors working in the NHS, respect competence and merit and improve the sense of belonging.

AI and the patient

My GP colleagues tell me that the doctor-patient relationship is changing. Quite often the patient comes in armed with the

knowledge and the diagnosis as directed by the AI tool. ChatGPT and Google AI have managed to change the conversation between the doctor and the patient, who quite often is better prepared with medical concepts. When interpreted in the right way, AI can become a tool of health education and encourage patients to have an intelligent conversation and participate in the decision making process. What they may not gauge is that two people with the same symptoms may suffer from completely different diseases, and similarly, the same disease can manifest in very different ways. The AI tool may point to a certain condition but medicine in many situations does not give absolute answers. Therefore, the doctor through his experience, knowledge and wisdom has to channel the patient's enthusiasm to discuss and agree responsibly for the right decision.

Articles

We have some interesting articles in this issue. One of the big issues the present day society is facing is digital poverty in spite of so much progress in digital technology. This has been well articulated by Saxena et al. It makes a profound thought provoking statement that whatever digital innovation is made there will be a section of the society who will miss out.

Prof Brigden with a group of medical students from Lancaster University have put together a well-defined article on the complexities of the process of audit. Its certainly worth reading. Drs Vijay Kumar and Shetty share their experience of the practical aspect of Joint injections in their primary care practice. Prof Gupta puts forward his arguments that Yoga, Ayurveda, Qigong, diet and lifestyle together with modern science provide a unique opportunity to redefine healthcare delivery. This article is packed with scientific evidence.

"It is much more important to know what sort of a patient has a disease than what sort of a disease a patient has." Sir William Osler

Prof Amit Sinha

Editor, BIDA Journal

bida JOURNAL

Instructions for Authors

BIDA Journal is a peer-reviewed journal. We welcome original articles from physicians, surgeons and medical students from any part of the world. These include review articles, scientific articles, case reports, audits and letters to the Editor. Please visit BIDA's website for instructions, or refer to the article on page 27 of this issue.

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Editorial Committee:

Editor: Prof Amit Sinha

Members:

Mr Pragnesh Bhatt
Prof David Brigden
Dr Ashish Dhawan
Dr Vinod Gadiyar
Dr Rashmi Gupta
Dr Negin Gholampoor
Prof Ravish Katira
Dr Marguerite O'Riordan
Dr Momna Raja
Prof Cheliah Selvasekar
Dr Alireza Sherafat
Dr Janaki Srinivasan

Secretary: Mrs Alison Sherratt
office@bidaonline.co.uk

Editorial Address:

The Editor
BIDA Journal
Unit 4,
Swallow Mill Business Centre,
Swallow Street,
Stockport,
Cheshire
SK1 3HJ.

Telephone:
0161-456 7828

E-mail:
amitani2000@yahoo.co.in
office@bida-online.co.uk

Website:
www.bida-online.com

BIDA National President's Report

Dear Colleagues,

This year is rapidly passing through and it has already proved to be a tumultuous one. While the world is still reeling with the effects of the Gulf war, we have been thrown to the ground with the prospect of now living with the UK Prioritisation Act, which will seriously affect the career progression of thousands of international medical graduates working in the UK. We have also been shocked by BMA's decision to adopt a new policy advocating a minimum of 5 years NHS experience for International Medical Graduates before they can apply for specialty training. The resulting policy risks a substantial barrier to career progression for many suitably qualified IMGs. We sincerely hope the government rejects this policy and accepts a more pragmatic and reasonable definition of what constitutes a suitable adequate experience of work in the NHS which qualifies the IMG applicant to be on par with all UK graduates applying for specialty training.

I have been representing BIDA in meetings with all sister organisations in formulating letters to the government, the GMC and the BMA regarding these vital issues. I'll urge you to read the letters and the news releases published on our website www.bida-online.com.

BIDA intends on strengthening the prospects of success through the Portfolio Pathways (CESR) by providing adequate training and guidance in building the portfolio of all aspirants, in particular the Locally Employed doctors who wish to apply through the CESR route. We have a break out session at our National Conference on 10th October. We hope to organise another seminar entirely focussed on this subject.

Preparations are in full swing for the National Conference/AGM - ARM on 9th – 11th October at the Delta Hotels by Marriott Worsley Park Country Club, Manchester. We have an interesting conference programme, being expertly prepared by the Chairperson, Dr Sai Pillariseti. I encourage you all to come and attend the conference. It is so encouraging to see that there is a lot of interest in the Golf tournament as well. Mr Muthu Jeyam, Consultant Orthopaedic Surgeon at Salford Royal has taken responsibility for this year's golf competition.

I will miss the opportunity to attend the International Conference being held at Cairo, Egypt this year on 16th November. Dr Suresh Chandran, Dr Vinod Gadiyar and Prof Ravish Katira have taken the responsibility to organise the programme. My best wishes to them and best of luck to the whole group for a thoroughly enjoyable trip.

I am pleased to say that our EC group has a lot of young members, who have brought in a fresh enthusiasm to the group. Thank you to all of them for devoting their valuable time in spite of their busy schedules.

Prof Amit Sinha FRCS (Tr&Orth)

National President, BIDA.

Consultant Orthopaedic Surgeon.

Honorary Clinical Professor, Chester University.



BIDA National Chairman's Report

Dear Friends,

I hope you and your loved ones have and continue to enjoy the warmth of Summer Sunshine.

We are once again coming closer to that time of year when the NHS is always under tremendous pressure, with ongoing work-force challenges and seasonal demands placing immense strain on services. It is purely down to the unwavering hard work and dedication of our healthcare professionals that the NHS continues to cope during these tough periods. While significant challenges undeniably remain, genuine change and fresh hope appear to be on the horizon. With recent shifts in national leadership – including Andy Burnham becoming Prime Minister and the new Health Secretary changing guard – there is strong optimism for a brighter future for the NHS, paved by constructive dialogue and renewed support for healthcare staff.

Looking ahead, the British International Doctors Association (BIDA) has some exciting events lined up. We are looking forward

to our up- coming National Conference (ARM/AGM) this October, which will be held in Worsley, Manchester. Following our National meeting, we are equally thrilled to anticipate our next International Congress, which will be taking place in Egypt.

Finally, the current edition of the BIDA Journal features a diverse mix of medical insights alongside compelling political articles, ensuring that everyone has something valuable and engaging to read.

Best wishes,

Dr Ashish Dhawan

National Chairman, BIDA.

Consultant Cardiologist & Electrophysiologist



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8 Fairways, Appleton, Warrington, Cheshire WA4 5HA T: 07950 332 645 E: njcsample1@me.com W: www.nicksample.co.uk

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King William House, 202 Manchester Road, Bolton, Lancashire BL3 2QS

Phone: 01204 397522 E-mail: info@minervaprint.com Website: www.minervaprint.com

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Let's have a full house to support a PM endorsed charity

Dr Anita Sharma

GPwSI Gynaecology. Chair of Women's Doctors Forum BIDA

Dear Colleagues,

Working as a full-time GP and seeing my patients suffering with endometriosis, waiting and waiting to see the consultant, I developed EAN in 2022.

I was so pleased that Andy Burnham, now the Prime Minister, attended our Endometriosis Awareness North session in 2022 and supported our mission of raising awareness, promoting education and raising funds for research.



Dr Anita Sharma (left) with now Prime Minister Andy Burnham (centre) at the 2022 Endometriosis Awareness North's session.

As a charity we have done and achieved a lot but still a lot needs to be done. Our mission is to develop One Stop Endometriosis Clinic, and we have been in touch with his office. I am sure BIDA team will be with me when we get an invite.

Lately I have been involved with the NICE committee to help develop two technologies in primary care for early diagnosis of endometriosis. This is very much needed to speed up the diagnosis of endometriosis.

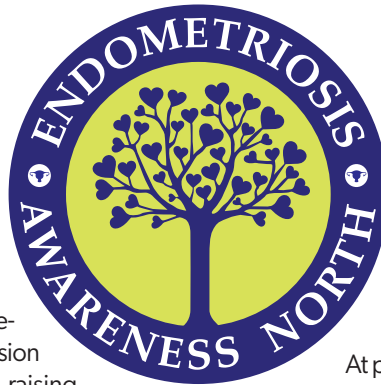
At present 1.5 million women in UK have endometriosis, and on average it takes 9 years 4 months from the first GP visit to get a diagnosis (11 years for people from ethnically diverse communities). The average age at diagnosis is 27. At present the only diagnostic test we have is laparoscopy and histology. Ultrasound (abdominal or transvaginal) has limitations in terms of sensitivity and specificity.

Two new tests, Endosure and Endotest, should be made available in primary care, with NHS funding, during a 3-year evidence generation period. EndoSure is a 45-minute test that measures electrical signals in the gut using sensor pads on the abdomen. Endotest analyses microRNA biomarkers from saliva and can indicate whether a patient has endometriosis.

Endosure or Endotest testing is an additional option, to be used if endometriosis is suspected and scans are reported normal or declined by the patient. Lots of patients, especially those from ethnic minority backgrounds, decline transvaginal scans⁽¹⁾.

Delay in diagnosis results in spread of the disease. I am seeing patients with spread to the bladder, bowel and even the lungs. The new approved technologies will provide earlier diagnosis and reduce the need for laparoscopy.

A third technology, a blood test called DotEndo, requires more research before it can be recommended on the NHS.



The All-Party Parliamentary Group on Endometriosis found more than half of women visited their GP more than ten times before receiving a diagnosis. An NCEPOD report in 2024 said: 'Many doctors, including gynaecologists still believe a painful period is normal'.

At present primary care has a skill mix of clinicians including GPs, practice nurses, advanced nurse practitioners, physician associates, pharmacists and medical students. It is important for everyone to be aware of the symptoms of endometriosis, take a proper history, and ensure that all patients with suspected endometriosis are referred for transabdominal and transvaginal scans.

With the help of Shipley College Bradford media students, we have produced a movie on endometriosis. The movie features heart-rendering interviews with those battling endometriosis. "NoLonger#Unheard." It is a powerful polemic on the importance of endometriosis awareness.

You can watch the movie at

<https://www.youtube.com/watch?v=2kP8fjHSBWM&t=12s>

The work done by the creative media students from Shipley College is superb.



A fund raising event has been organised on Friday 18th Sept 2026 at Rochdale Gold Club to raise funds to support Endo warriors and the families, and also to fund ongoing research at the University of Manchester.⁽²⁾ Endometriosis is costing the UK economy £12.6 billion per year because of late diagnosis, poor management and women not being able to work.

Dr Anita Sharma

Chair, Endometriosis Awareness North Charity.

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- 2) <https://endometriosisawarenessnorth.com/>



Digital Exclusion in Healthcare

Dr Leena Saxena General Practitioner, Wigan. Vice Chairperson ARM, BIDA

Prof Amit Sinha FRCS (T&O) Consultant Orthopaedic Surgeon. National President, BIDA

Prof Romesh Gupta OBE MD FRCP MBA Chairman, National Forum for Health & Well-being.
Honorary Professor of Medicine University of Lancashire & University of Greater Manchester



This subject was recently the theme for discussion and debate at the National Forum for Health & Well-being at the 'Breakfast meeting' of its Health Mela organised at the Victoria Mill-Burney Campus of the University of Lancashire. The discussion raised wide concerns amongst a number of the healthcare personnel and a huge number of people from the community attending the meeting. This was extremely appreciated by the general audience.

Introduction

The rapid growth of digital innovation in healthcare has transformed the way services are delivered, offering benefits such as quicker communication, easier appointment booking, remote consultations, online prescriptions, and faster access to medical records. The smart watches and other monitoring devices have capabilities which have become integral to the delivery of healthcare services. The digital tools offer to enhance healthcare accessibility, and efficiency and reach out easily to the vast population but we need to be acutely aware that it runs the risk of excluding the group of marginalised population and end up exacerbating existing health inequalities.

Is Digital Exclusion real?

1.7 million households have no mobile or broadband internet at home and around 2.4 million people are unable to complete a single basic task to get online, such as opening an internet browser.⁽¹⁾ We know certain groups in the population are more likely to be digitally excluded.

Limited users' of online technology are

- around 4 times more likely to be from low income households
- 8 times more likely to be over 65 years old
- 1.5 times more likely to be from ethnic minority backgrounds.

Disabled people may also be digitally excluded:

92% of non-disabled adults use the Internet compared with 67% of disabled people.

6% of all adults do not have Internet access at home. This offline group is disproportionately older: 17% are aged 65 – 74 and 66% are aged 75+.⁽²⁾

Minimum Digital Living Standards

Academics at the Universities of Liverpool and Loughborough in 2025 have looked at the benchmark of what is the minimum basket of digital goods, services, and skills that households need to live and participate in the digital world.⁽³⁾

A minimum digital standard of living (MDLS) includes, but is more than having accessible internet, adequate equipment, and the skills, knowledge and support people's need. It is about being able to communicate, connect and engage with opportunities safely and with confidence. This standard actually reflects everyday life and society today.

The MDLS reports that hard practical barriers, such as lack of infrastructure such as broadband availability are diminishing as more people are using smart phones to access digital services. However, there are still issues of access and inequalities in use and lack of skills in a large number of individuals in the UK.⁽⁴⁾ The study also found that in households with children, 45% of households fell below the

standard. Key issues, including poverty, household composition (e.g., being a single parent), and location significantly influence the ability to meet the standard.

The Northern Council of Further Education (NCFE) reports that one in five people in the UK lack the essential digital skills needed to navigate modern life. We assume that those under 18 are all tech-savvy. However, over 50% of these youngsters and almost one in four over 61 struggle with basic digital tasks.⁽⁵⁾

What are the barriers?

Digital exclusion in healthcare is a multidimensional, complex phenomenon with significant negative impacts on health. The barrier to digital inclusion is typically driven by three intertwined barriers.⁽⁶⁾

- access (lack of physical hardware or broadband)
- affordability (high costs) and
- ability (lack of digital skills and confidence)

A portion of the population faces the above barriers in accessing digital technologies that leads to a digital divide highlighting the gap between those who have access to digital technologies and those with no access. This contributes to a new form of social inequality that reinforces the already existing disparities affecting the several groups in our communities.

1. Older Adults

We have huge ever-growing elderly population and while these advancements improve efficiency for many patients, elderly people often face significant challenges in accessing and using digital healthcare services effectively. One of the main difficulties is limited digital literacy. Many older adults did not grow up using modern technology and may struggle to understand smartphones, mobile applications, patient portals, video consultations, QR codes, and online registration systems. Tasks that younger generations may consider simple, such as downloading an app, resetting a password, or joining a video appointment can become stressful and a confusing experience for elderly patients.

2. Rural and Remote Communities

In addition to digital skills, access to technology itself remains a major issue for those living in rural areas. Some elderly patients do not own smartphones, tablets, or computers, while others may not have reliable broadband due to trouble with poor connectivity. This may have a range of implications as unreliable and slow internet connection inhibits a household's ability to carry out the online activities.

3. People with Disabilities and Health Conditions

Even when devices are available, physical health conditions can make



technology difficult to use. Visual impairments may prevent patients from reading small text or identifying buttons on a screen. Hearing difficulties can affect communication during telephone or video consultations. Conditions such as arthritis or reduced hand mobility can make typing, scrolling, or using touchscreens uncomfortable and frustrating. Cognitive conditions, including memory loss, dementia, or confusion, may also create barriers when patients are required to remember passwords, follow multiple steps, or understand digital instructions.

4. Complexity of the online digital service

Another major challenge is the complexity of many healthcare systems. Security measures such as passwords, verification codes, and two-factor authentication are designed to protect patient information, but for many elderly users these processes can feel overwhelming and discouraging. As a result, some patients avoid using digital healthcare services altogether because they fear making mistakes, losing important information, or becoming victims of online scams and fraud. This lack of confidence often leads to anxiety and dependence on family members, carers, or healthcare staff for support with booking appointments, accessing test results, ordering prescriptions, or communicating with healthcare professionals.

Furthermore, many elderly patients highly value personal, face-to-face interaction with healthcare providers. Human communication provides reassurance, trust, emotional support, and clearer understanding, especially when discussing sensitive health concerns. The increasing shift toward digital-first healthcare can sometimes make older adults feel isolated, ignored, or disconnected from services. Some patients may hesitate to ask questions during virtual consultations or may struggle to explain symptoms clearly through digital platforms. This can affect the quality of care they receive and may result in misunderstandings, delayed diagnoses, missed appointments, medication errors, and poorer health outcomes overall.

There are also concerns about the design of digital healthcare platforms. Many systems are not developed with elderly users in mind. Complicated layouts, medical jargon, unclear instructions, small fonts, and inaccessible interfaces can create unnecessary barriers. Without proper training, support, or alternative methods of access, healthcare inequalities may continue to widen, particularly among vulnerable older populations.

5. Lower-Income Households and People in Poverty

It is well established that individuals of higher socioeconomic backgrounds have improved health outcomes as their lifestyle and higher levels of education lead to better healthcare access. They have greater capacity to afford digital devices and Internet access and

possess higher levels of digital skills and therefore benefit from the digital innovations. In contrast people who come from lower socioeconomic class often are least likely to access digital health services not only because of lack of affordability of the digital devices but also because of inadequate digital skills and lack of trust in the technology. It is worth noting that it is the population from the lower socioeconomic class in most need of the health services. This clearly exemplifies a paradoxical phenomenon known as the digital inverse care law: those who are most in need of adequate healthcare services are least likely to access and benefit from the digital innovations designed to improve their quality of health.⁽⁷⁾

6. Marginalized backgrounds

Research by Ofcom shows that people in insecure housing, individuals with limited English proficiency, and some minority ethnic groups also face higher rates of digital disadvantage.

Younger people may have the knowledge and skills in digital navigation but if they are in unstable financial situations or leaving the care system or are homeless, they often face exclusion due to a lack of a permanent address, devices, or reliable mobile data.

Conclusion

Although digital innovation has enormous potential to improve healthcare delivery, it is essential that healthcare organisations adopt a more inclusive and patient-centred approach. This includes designing simpler and more accessible digital systems, providing education and digital support for elderly patients, involving carers and families where appropriate, and ensuring that non-digital options remain available for those who need them. By balancing technological advancement with compassion, accessibility, and inclusion, healthcare services can ensure that elderly and other vulnerable patients are not left behind in an increasingly digital world. It is also important to note that the extent and type of engagement can vary according to individual needs, situations and preferences.

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Using Audit to measure performance, make and sustain Improvements – a guide for trainee doctors

David Mkwizu, Venya Gaddam, Abhishekdev Ramesh, Nida Khalil, Hannah Nixon, Luken Cheung Medical Students MBChB - Year 2
Prof. David Brigden Lancaster University and University of Greater Manchester)

Our paper explores how clinical audits impact medical practice and patient care, both their strengths and limitations. We are aiming for a balanced, reflective tone: explaining how audits improve outcomes and accountability, while recognising barriers and ethical considerations that limit their effectiveness.

Clinical audit is a continuous cycle rather than a series of isolated steps, with each stage influencing the success of those that follow. Certain principles, including effective leadership, staff engagement, organisational support and appropriate resources, therefore underpin multiple stages of the cycle. Although their importance may recur throughout the audit process, their role evolves as the audit progresses, from enabling effective preparation and measurement to facilitating implementation and sustaining improvement. Recognising these interdependencies is essential to understanding how audit findings can translate into meaningful and lasting improvements in patient care.

Audit according to the National Institute for Clinical Excellence (2002) is divided into five stages:

- Preparing for an audit
- Selecting criteria
- Measuring performance
- Making improvements
- Sustaining improvement



- | | |
|---------------------------------|---------------------------------|
| 1 Preparing for an Audit | 4 Making Improvements |
| 2 Selecting Criteria | 5 Sustaining Improvement |

- 3** Measuring Performance

Data Protection, Data Collection
Data Abstraction, Data Analysis

Preparing for an audit

Preparing for a clinical audit begins with selecting a clearly defined, high-impact topic where there is known variation in practice or a measurable gap between current performance and established standards, ensuring the audit aim is specific and clinically meaningful.⁽¹⁾ Once the focus is agreed, explicit audit criteria and standards must be derived from authoritative guidelines so that they are measurable, evidence-based, and directly linked to quality or safety outcomes.⁽²⁾

A structured methodology should then be planned, including defining the sample population, identifying data sources, designing standardised data-collection tools, and ensuring compliance with information-governance requirements. Securing organisational support, such as managerial approval, protected time, and reliable access to clinical systems is paramount to enable efficient data collection.

Early engagement with relevant stakeholders helps build understanding, promote active participation, and support the implementation of changes after results are analysed, while a realistic project timeline ensures the audit contributes meaningfully to the full audit cycle.⁽³⁾

Selecting criteria

Criteria selection is a central component of clinical audit, as it defines the scope of data collected and ensures conclusions about current practice are accurate and unbiased. Audit criteria are commonly grouped into three categories: structure (resources and policies), process (how care is delivered), and outcome (effects on patients).^(2,4) Using a combination of these helps identify achievable improvements and provides a balanced evaluation of care quality.

The Health and Safety Executive National Centre for Clinical Audits recommends that criteria follow the SMART framework, specific, measurable, achievable, relevant, and theoretically sound, to support meaningful and practical improvements.⁽⁴⁾ Similarly, NICE highlights the value of structured methods to ensure criteria generate relevant data on quality of care and areas for improvement.⁽²⁾ Guidance from the Healthcare Quality Improvement Partnership and NICE further stress that criteria should align with current best practice and be measurable against established standards,⁽⁵⁾ while also ensuring data collection complies with legal and ethical requirements, including the General Data Protection Regulation.⁽⁶⁾

Inclusion and exclusion criteria are essential for defining the audit population and maintaining focus. They help ensure relevant aspects of care are captured while excluding factors outside the organisation's control, improving the validity of findings.^(2,5) Clear

boundaries also make audits more practical by accounting for time and resource constraints.

Well-defined, measurable criteria improve efficiency and reliability by reducing unnecessary data collection and ambiguity. Certain principles can and should be utilised where possible in order to maximise audit efficiency. For example, use of Pareto analysis following the Pareto principle, that 80% of consequences result from 20% of causes, allows audits to be conducted under stricter time and resource constraints by focusing on the minority of causes which when addressed would result in the largest amount of quality improvement.⁽⁷⁾ Indeed, identifying causes is a crucial part of root cause analysis and cause and effect diagrams put forward by the Healthcare Quality Improvement Partnership to improve clinical audit effectiveness.^(5, 7)

Barriers to effective criteria selection include variation in local guidelines, lack of clarity, and subjectivity, all of which can introduce bias.⁽⁸⁾ Overall, robust criteria selection requires a careful balance, being specific enough to produce meaningful, actionable results while remaining inclusive enough to reflect real-world clinical practice.

Measuring performance

Data Protection and Data Collection

There are moral, ethical and legal provisions that should be considered in the third stage specifically and in all stages of an audit. This is highlighted in Measuring Performance and its 4 further divisions: Data Protection, Collection, Abstraction and Analysis.

The first step in protecting data is determining whether there is a lawful rationale to acquire the data, which is based on valid public interest or legal justification.^(6, 9, 10) When such a basis exists, the second step is to clearly define your target goals for the selecting criteria stage, which decides the exact type, quality, and quantity of the data to be collected.^(4, 5) Protection occurs by inaction as data without lawful basis or irrelevant to the selecting criteria isn't gathered, guaranteeing it's safety. In addition, this increases the efficiency of the audit.

Next, existing data structures within the trust should be understood, including how they are protected and governed, and whether they are sufficient for the data about to be acquired.^(6, 9, 10) The Caldicott Guardian within the organisation can be consulted, as it is their duty to provide leadership and informed guidance on these matters.^(10, 11)

Once the audit has begun, only necessary data should be collected.^(6, 9, 10) Data must be gathered only from individuals whose consent is freely given, specific, informed, and unambiguous.^(6, 9, 10, 12) Secure physical and digital measures should also be implemented to ensure that only legitimate requests can access the data. When inputting data, anonymisation or pseudonymisation should occur as early as possible. During the audit, participants should retain the ability to access, amend, or erase their data.^(6, 9, 10)

The destruction of unnecessary data should begin once the initial audit cycle is complete. At this stage, staff should be evaluated on their adherence to safety protocols, and Data Protection Impact Assessments should be conducted to safeguard data in future activities. Any breaches or non-compliance should be identified and reported for corrective action.^(6, 9, 10)

These regulations are vital for the legality of an audit; failure to comply means that even a successful audit cannot be implemented. The moral dimension underpinning data protection; is the need to uphold trust and reciprocate the confidence participants place in the audit when they share personal and sensitive information.

Data Abstraction

Data for an audit is usually collected retrospectively from records and entered either on a form or directly onto the computer database which should clearly specify the data abstracted.

Data abstraction for clinical audit typically involves systematically extracting relevant information from clinical records according to predefined audit criteria. To ensure accuracy and reproducibility, a standardised data-collection tool or proforma should be developed, specifying exactly which variables are to be captured, how they are defined, and the acceptable data formats. Consistency in abstraction is critical; therefore, data collectors should receive training and calibration to minimise inter-observer variability. Retrospective data collection is most common, allowing large sample sizes without interfering with ongoing patient care, but it requires meticulous verification to ensure completeness and resolve missing or ambiguous entries. All data should be entered into a secure, well-designed audit database that enables validation checks, transparency of audit trails, and compliance with information-governance standards.^(2, 13)

Data Analysis

It is important to decide on the type of data analysis that is to be used before data collection starts. Sophisticated statistical packages are available that might help in calculating the statistical significance or making analytical charts. Help from a statistician is always very useful.⁽¹⁴⁾

Deciding on the analytical approach before data collection begins is essential to ensure that the audit methodology is appropriate, statistically valid, and aligned with the audit's objectives. The analysis plan should outline whether descriptive statistics or comparative tests will be required to evaluate performance against standards. A range of statistical software packages such as SPSS, R, or Stata can facilitate more sophisticated analysis. This includes the calculation of confidence intervals, identification of significant variance, and generation of analytical graphics such as run charts or control charts. Early consultation with a statistician is strongly recommended to ensure correct test selection, adequate sample size, and appropriate interpretation of results, minimising the risk of statistical error or over-interpretation. Clear visualisations and summary tables should then be produced to support transparent reporting and facilitate stakeholder engagement.^(14, 15)

Taken together, these stages establish not only how data are collected and interpreted, but also how meaningful conclusions are generated from clinical practice. However, the true value of an audit lies not in measurement alone, but in how these findings are translated into practice and sustained over time, a process that introduces a new set of challenges beyond data collection and analysis.

Making and sustaining improvements

Constructing audit findings into meaningful and sustainable change, is a challenging yet vital stage of the clinical audit cycle. Such improvements are paramount to safeguarding patients, minimising harm and enhancing both equity and service provision.⁽²⁾ This is one of the most challenging parts of the audit cycle, as the early benefits gained from an intervention quickly fade away due to the development of "audit fatigue" once initial enthusiasm fades. To support this process, a structured framework is required, such as the Plan, Do, Study, Act (PDSA) cycle.⁽¹⁶⁾ Up to 70% of change initiatives never achieve sustainability, highlighting the importance of embedding sustainability principles from the beginning⁽²⁾.

The audit cycle begins with identifying areas to improve and

reviewing the relevant audit data. Clear criteria and standards are then established to guide measurable change. Following this, the improvement is implemented, with the data collected systematically, then analysed using charts or trends, to assess whether the improvement had the intended effect. Lastly, further adjustments are made based on results to sustain and refine improvement. Sustainability in this context is defined as the ability to continue and make an improved practice permanent over time, but what needs to be sustained can be varied (behaviours, processes, outcomes or organisational changes).⁽¹⁷⁾ NICE guidelines explore a similar approach to improving with a 5-step plan. However, it highlights the importance of identifying barriers and emphasises that implementation is a process and not a single action. It can be defined both as an outcome where benefits are maintained and a process requiring adaptations along the way.⁽¹⁸⁾

Ideal sustainability results in a new steady-state in which enhanced outcomes and behaviours become routine, and there is a shift in mindset, culture, and systems. The NHS explains this as not just an “added-on” change but one that becomes the mainstream way of working and fundamentally alters thinking, attitudes, and structures. It involves acknowledging that the work does not end with implementation.⁽¹⁹⁾ A successful improvement requires sound leadership, organisational support, and the integration of systems to facilitate improvement rather than merely reporting performance. Being able to sustain improvements depends on a complex interplay of organisational, cultural and behavioural factors. Many initiatives fail because these elements are not fully addressed. As a result, evidence suggests that organisations can accurately recognise gaps in care, however, translating these insights into sustained change often proves challenging. There should be plans in place to monitor and evaluate the change, as well as maintain and reinforce it.⁽²⁾

Audit and feedback interventions typically achieve modest gain: A Cochrane review of 292 randomised trials with 678 study arms found that audit and feedback led to a median absolute improvement of 2.7% with a pooled meta-analysis estimate of a 6.2% absolute increase but when feedback is repeated and clinicians are directly involved in setting improvement goals, studies show an increase in the impact.⁽²⁰⁾ Both top-down and bottom-up commitment are indispensable. Leaders who communicate progress and expectations and participate in the audit gain better understanding of their practices and help improve quality of care in everyday work, while frontline staff contribute vital insight, motivation, help and escalation when needed. For example, a RCT in Australia evaluating musculoskeletal imaging requests found that general practitioners receiving individualised audit and feedback reduced their imaging requests by 4.7 per 1000 consultations over 12 months, compared with a 1.4 reduction in the control group with $p < 0.001$ this represents a significant 10% greater reduction attributable to the feedback intervention.⁽²¹⁾

Behavioural factors as opposed to technical ones, appear to be the true drivers of sustained practice⁽¹⁹⁾. Long-lasting transformation is more likely to happen when healthcare professionals look at audits as learning opportunities rather than assessments of their work. This highlights that the success in making improvements is not just collecting data and identifying gaps in care but also about how findings should be translated into action through targeted feedback from others such as clinicians. Several models such as the NHS Sustainability Model, the Institute for Healthcare Improvement (IHI) framework grounded in Juran’s Trilogy, and broader implementation models like RE-AIM are used to design, supervise and maintain improvements over time.⁽¹⁹⁾ According to NICE guidelines, change is divided into three levels: individual, group and organisational.

There are barriers to change across these levels. Within individual barriers, factors such as fear of review or poor performance, lack of time and training and lack of a perceived benefit encompass the main reasons for unsuccessful improvement implementations.⁽²⁾

Healthcare systems can also use a range of tools to sustain improvements beyond the initial audit cycle, like digital infrastructure that plays a central role, for example, integrated IT systems and automated patient-record-linked audit tools.⁽²²⁾ Performance may initially improve due to the Hawthorne effect, but this improvement is often not sustained once observation ceases. Additionally prolonged observation, may lead to fatigue and reduced compliance, contributing to a decline in performance.^(2, 23)

Sometimes performance indicators can be used to compare performance after a change has been implemented or to compare it with other local organisations; this gives an opportunity to re-audit if needed.⁽²⁾ Care should be taken to make sure these tools are not an excessive burden on the staff and are easily incorporated in day-to-day practice.

Looking at the group level barriers, it often stems from poor communication and hierarchical relationships. This can prevent improvements from being implemented consistently across departments. In some cases, staff may not fully comprehend how to apply changes, to or may resist being directed by those higher up the hierarchy. As a result, collaboration is limited, and improvements are either not enacted or adopted inconsistently between departments.^(24, 25)

There are a few practical ways of incorporating improvements as part of routine practice some of which include:

- Making efficient systems for rapid review and approval of audits proposals.⁽¹⁷⁾
- Make audit training part of clinical teaching in undergraduate and postgraduate courses.⁽¹⁷⁾
- Encourage staff and students to undertake clinical audits.⁽¹⁷⁾
- Automate the processes to be able to repeat audits.⁽¹⁷⁾
- Make audits part of regular agendas for department meetings.⁽¹⁷⁾
- Incorporation of sustainability improvements early on.⁽²²⁾
- Teamwork and engagement of all staff members from the get go so they do not feel like an audit is “imposed” on them.⁽²²⁾
- Creating an “environment that fosters the reporting of errors and adverse incidents.”⁽²⁾

Moreover, at the organisational level, several barriers can impede improvement efforts. These include, lack of resources, poor structure and planning, an emphasis on data collection over implementation and inadequate governance or excessive regulation. Resource shortages such as inadequate staff, data collection tools or audit training, encumber the ability to implement changes broadly and demonstrate measurable outcomes. Coupled with poor structure and planning, including the presence of vague aims or unclear improvement pathways further reduce staff engagement and adherence. In addition, both over-regulation and limited regulation from governance, such as the absence of a clear ethical framework, can create uncertainty about requirements before initiating improvements. This is compounded by variation in ethical frameworks across different countries making it challenging for clinicians to understand the prerequisite requirements before initiating improvement projects.^(20, 24, 25)

Changes also need to be made at the organisation level to help sustain improvements they should have the ability to evolve in

response to internal or external factors (a learning organisation). Additional methods alongside formal monitoring can be used to detect early declines in care, such as critical incident review, adverse incident reporting, and significant event audit.⁽²⁾

Ultimately, to be able to sustain audit-driven improvements, we should have accurate data with supportive infrastructure, inter-professional collaboration with motivated individuals, and a continuous-learning culture that ensures audits remain a dynamic, cyclic process rather than a one-off exercise.

Cross-cutting Considerations: Successful Audits and Barriers

The following features are associated with successful audit:

- ◆ Clear, realistic and clinically meaningful aims and objectives
- ◆ A supportive environment with adequate protected time and resources
- ◆ Strong leadership, facilitation, communication and teamwork
- ◆ Meaningful staff participation, ownership and engagement
- ◆ Effective feedback, monitoring and continuous improvement
- ◆ Appropriate balance between local involvement and regional or national standardisation
- ◆ Findings that can inform practice, policy and wider quality improvement

What makes an audit successful?

Building on the principle that improvements must be sustained for an audit cycle to have real value, a successful audit is one in which the structures established during the improvement phase translate into measurable and ongoing change in practice. Success begins with clear and realistic aims that are defined at the outset and revisited throughout the process, ensuring that standards remain visible reference points at every stage of audit activity. As discussed in the 'Making and Sustaining Improvements' section, strong leadership and cohesive teamwork underpin continuity across the audit cycle, enabling clinicians to work collaboratively while maintaining clear ownership of roles and responsibilities. Staff engagement is equally crucial; when healthcare professionals understand the purpose of the audit and feel supported in contributing, compliance improves and data quality is strengthened. Protected time and adequate resources further determine whether an audit can be conducted rigorously rather than becoming an additional burden. Finally, effective communication and continuous feedback loops allow teams to monitor progress, address challenges early and remain aligned with both local priorities and national standards.^(2, 13)

Critical Appraisal and Wider Impact

The importance of these success factors becomes evident when examining real world examples. A clear illustration is the National Non Hodgkin Lymphoma Audit, a continuous national audit programme that has demonstrated measurable improvements in diagnostic timeliness across the UK.⁽²⁶⁾ Trusts used audit findings to standardise biopsy pathways, fast track diagnostic imaging and strengthen MDT processes, leading to reduced variation between NHS Trusts. This narrowing of differences in diagnostic timeliness across hospitals meant that patients were less dependent on where they lived for access to prompt and high quality care. Such a reduction in unwarranted geographic variation strengthened equity within the diagnostic pathway and contributed to earlier initiation of treatment, directly improving patient outcomes in conditions such as lymphoma. These findings align closely with Wilson and

Jungner's screening principles, particularly those concerning timely diagnosis, availability of treatment and the need for quality assured, continuous case finding.⁽²⁷⁾ The UK National Screening Committee later operationalised these principles into formal appraisal criteria grouped under the condition, the test, the intervention, the screening programme and implementation criteria, including evidence of screening effectiveness, cost effectiveness, acceptability, quality assurance and equity.⁽²⁸⁾ Beyond this specific case, successful audits foster empowerment and ownership among clinicians, encouraging them to champion practice change and engage meaningfully with quality improvement. When conducted well, audits influence policy, support organisational redesign, and generate benefits that extend beyond the individual patient, shaping population level strategies through evidence-based insight. Ultimately, the value of a successful audit lies not only in correcting deficiencies but in embedding long term, system wide improvements that uphold standards of care.^(13, 26) Additionally, when audit findings reveal no significant deviation from best practice, they can affirm the effectiveness of existing policies, providing robust evidence to support their continued use.

Barriers

The following features are barriers to successful audit:

- ◆ Low participation, disengagement and audit fatigue.
- ◆ Failure to continue or complete the audit cycle.
- ◆ Failure to provide a supportive environment for staff to undertake, contribute to and act upon the audit.
- ◆ Lack of protected time, training, resources or organisational support.
- ◆ Poorly defined objectives, inappropriate criteria or inadequate planning.
- ◆ Difficulties with data availability, quality, governance and analysis.
- ◆ Resistance to implementing or sustaining change.
- ◆ Underestimation of the financial, staffing and logistical costs of audit.
- ◆ Lack of visible improvement, leadership support or reinforcement of change

Barriers often emerge at the very outset of an audit, long before data are collected, and these early constraints can quietly shape the trajectory of the entire project. During the preparation phase, poorly defined objectives, overly ambitious scopes, or insufficient stakeholder engagement can result in audits that lack direction or fail to address clinically meaningful questions. Selecting criteria introduces its own challenges; national guidance may not translate neatly into local practice, and teams can struggle to agree on measurable, achievable standards, particularly where evidence is evolving or multidisciplinary ownership is diffuse. Even at this stage, organisational priorities and competing service pressures may limit enthusiasm, meaning audits begin without the momentum required for sustained engagement. These structural and conceptual barriers highlight that the success of an audit is often determined before the first data point is ever recorded.^(2, 13)

As the audit moves into measuring performance, practical and ethical complexities become more visible. Data availability may be inconsistent, electronic records incomplete, and definitions interpreted variably between teams, introducing noise that undermines reliability. Concerns surrounding confidentiality, consent, and data governance can slow progress, particularly

where local infrastructure for secure data handling is limited. Analytical expertise is another recurring obstacle; without early statistical planning, datasets risk being underpowered or incapable of answering the original question, leaving teams with descriptive findings but little actionable insight. These issues illustrate how technical limitations, rather than lack of clinical interest, frequently account for audits that fail to generate meaningful conclusions. (14, 29)

Even when findings are robust, translating them into improvement is rarely straightforward. Implementation phases may encounter resistance rooted in workload pressures, entrenched practice patterns, or uncertainty about resource implications. Sustaining improvement introduces further fragility; initial enthusiasm can wane once external scrutiny fades, and without continuous monitoring, gains may erode over time. Organisational change theory suggests that without visible leadership support and reinforcement, new practices struggle to become embedded norms. Thus, barriers at this stage are less about knowledge gaps and more about behavioural and cultural inertia, emphasising that improvement is as much a social process as it is a technical one. (13)

Low participation, audit fatigue, and limited institutional support remain pervasive cross cutting barriers that can affect any stage of the cycle. Competing clinical demands often mean staff lack protected time, while insufficient training in audit methodology can reduce confidence and engagement. Financial considerations also play a role; underestimating the cost of data collection, analysis, or service redesign may limit the feasibility of implementing recommendations. When findings fail to produce visible change, motivation can decline further, reinforcing a cycle in which audits are completed but not fully realised. Overcoming these challenges requires proactive planning, leadership endorsement, and a culture that recognises audit as integral to clinical practice rather than an additional administrative burden. (13)

Conclusion / Take-Home Messages

- Clinical audit is more than a measurement exercise; it is a structured method for laying out standards into safer, more effective care.
- Each stage of the audit cycle contributes uniquely, from initially defining meaningful questions to ensuring that improvements endure beyond a single cycle.
- Success depends as much on culture, leadership and engagement as it does on methodology, disregarding these factors can lead to confusion and misdirection during the audit which can hinder the longevity of an intervention.
- Barriers such as limited time, competing priorities and data challenges are predictable, and can be mitigated through early planning and organisational support.
- When implemented rigorously, audit not only identifies gaps but reduces unwarranted variation, strengthens equity and informs policy decisions.
- Equally, audits that demonstrate high performance provider assurance that existing practices are effective and should be maintained, hence why continuous auditing within the National Health Service should be promoted.

Ultimately, audit remains one of the NHS's most practical tools for linking everyday clinical practice with continuous improvement, ensuring that measuring performance leads to meaningful and sustained better outcomes for patients.

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Finerenone: a review of its safety, efficacy and therapeutic targets

Dr U Ghorl MUDr Department of Cardiology, Whiston Hospital, Prescot, Merseyside, UK.

Dr M Abdimalik MRCP Department of Cardiology, Whiston Hospital, Prescot, Merseyside, UK.

Prof R Katira FRCP Department of Cardiology, Whiston Hospital, Prescot, Merseyside, UK.

1. Background

Heart failure (HF) is a clinical syndrome arising from structural and functional cardiac abnormalities, and it carries a substantial and rising burden: around 900,000 people are affected in the UK, prevalence increases steeply with age, and HF accounts for a disproportionate share of NHS emergency admissions and bed-days^(1–3). Long-term survival remains poor, with reported one-year survival of about 76% and ten-year survival below 25%, and admissions are projected to continue rising with the ageing population and improved post-infarct survival^(3–6).

HF frequently coexists with chronic kidney disease (CKD) and acute kidney injury (AKI), which impair the response to treatment and are strongly linked to increased morbidity and mortality; AKI is common during HF hospitalisation and independently worsens outcomes^(7–10). Mineralocorticoid receptor (MR) antagonism is a valuable therapeutic target in HF, but the first-generation agents spironolactone and eplerenone are limited in advanced CKD and type 2 diabetes mellitus (T2DM) by hyperkalaemia, renal-function decline, and hormonal adverse effects. Despite a Class I indication in HFrEF, they are frequently underused and discontinued – particularly when combined with ACE inhibitor or ARB therapy – leaving an important treatment gap that a safer, more selective MR antagonist could address^(11–15).

2. Mechanism of action

Mineralocorticoid receptors are widely distributed, including in the heart and kidney. Finerenone exerts its effect by inhibiting mineralocorticoid activation by aldosterone and cortisol, reducing MR overactivation and the downstream inflammation and fibrosis it drives in cardiac and renal tissue^(11, 12, 21). MR overactivation increases reactive oxygen species production, promoting fibrosis, hypertrophy and adverse ventricular remodelling, while aldosterone-driven sodium and water retention and enhanced vascular smooth-muscle proliferation increase vascular stiffness and injury^(21, 22).

Finerenone binds the MR with high selectivity, inducing conformational changes that alter cofactor recruitment and fully block receptor overactivation. It has a short elimination half-life (~2 hours) and, owing to low affinity for androgen and progesterone receptors, produces markedly fewer sex-hormone-associated adverse effects than spironolactone or eplerenone⁽²³⁾. It shows balanced distribution across cardiac and renal tissue and a lower risk of severe hyperkalaemia, with correspondingly lower hospitalisation and discontinuation rates and smaller reductions in eGFR than spironolactone. Finerenone is metabolised principally by CYP3A4 and is highly protein-bound^(19, 24, 26).

3. Chemical structure and key information

Finerenone has the molecular formula C₂₁H₂₂N₄O₃ (Figure 1). Key pharmacological information is summarised in Table 1^(17, 18).

4. Preclinical (animal) studies

Thirteen preclinical studies were reviewed, establishing finerenone's therapeutic targets across cardiac, renal and metabolic disease. Full study characteristics are provided in Appendix Table 2.

4.1 Cardiovascular targets

Finerenone demonstrated greater antifibrotic potency than eplerenone, more effectively blocking isoproterenol-induced fibrosis and macrophage invasion, improving global longitudinal strain, and inhibiting profibrotic cardiac gene expression – effects attributed to selective cofactor (GRK5) modulation^(27, 28, 33). It opposed metabolic-syndrome-related cardiorenal dysfunction by improving myocardial perfusion, diastolic function and LV structure⁽³⁰⁾, reduced DNA damage and hypertrophy in hypertensive models⁽²⁹⁾, attenuated vascular smooth-muscle proliferation while promoting re-endothelialisation after injury⁽³²⁾, and improved skeletal and cardiac parameters in a muscular-dystrophy model⁽³¹⁾.

4.2 Renal targets

Finerenone lowered blood pressure and produced marked reductions in albuminuria without affecting normoalbuminuria⁽³⁵⁾. Whole-body autoradiography showed balanced cardiac and renal distribution, with more efficient reduction of hypertrophy, BNP and proteinuria than eplerenone and little effect on electrolyte balance⁽³⁵⁾. MR antagonism protected against ischaemia-reperfusion AKI and its progression to chronic kidney disease and fibrosis^(36–38), and reduced myofibroblast accumulation and collagen deposition in a dose-dependent manner without altering systemic blood pressure⁽³⁹⁾.

4.3 Metabolic targets

In high-fat-diet mice, finerenone improved glucose tolerance and enhanced brown-adipose thermogenesis, mechanistically via

Table 1: Key Pharmacological information of Finerenone⁽¹⁸⁾

Class	Amides, naphthiridines, nitriles.
Alternative names	BAY 94-8862, Kerendia, MRA BR-4628 .
Chemical name	(4S)-4-(4-cyano-2-methoxyphenyl)-5-ethoxy-2,8-dimethyl-1,4-dihydro-1,6-naphthyridine-3-carboxamide.
Mechanism of action	Mineralocorticoid receptor antagonist (IC ₅₀ of 17.8 nmol/L
Route of administration	Oral
Pharmacodynamics	Benefits illustrated in preclinical studies in cardiorenal diseases (HF, CKD, DKD), can cause hyperkalaemia with a modest effect on SBP (2-3 mmHg), and no effects on QT on supratherapeutic doses.
Pharmacokinetics	Finerenone is rapidly absorbed (time to peak plasma concentration 30 mins to one hour) as well as rapidly terminated (terminal half-life≈2-3 hours). Finerenone is mainly metabolised by CYP3A4.
Identified Adverse events associated	Hyperkalaemia was observed but it was more significant when compared with placebo.

activation of AMP-activated protein kinase, reducing lipogenic flux and triglyceride synthesis ⁽⁴⁰⁾.

5. Human Studies

Fifteen human studies were identified; full per-trial characteristics are provided in Table 3.

5.1 Early-phase and dose-ranging trials (ARTS family)

The ARTS programme established finerenone’s early clinical profile. ARTS, the first randomised trial of the non-steroidal MR antagonist, showed reductions in natriuretic peptides and albuminuria comparable to spironolactone but with significantly smaller rises in serum potassium and lower hyperkalaemia incidence in HFrEF and CKD ⁽⁴¹⁾. ARTS-DN and ARTS-DN Japan demonstrated dose-dependent reductions in urinary albumin-to-creatinine ratio (UACR) in T2DM with diabetic nephropathy on renin-angiotensin system inhibitors, with low rates of hyperkalaemia-related discontinuation ^(42–44). ARTS-HF, in worsening HFrEF at high renal risk, showed a better safety profile than eplerenone while comparably reducing natriuretic peptides and albuminuria ⁽⁴³⁾.

5.2 Pivotal outcome trials

FIDELIO-DKD randomised 5,674 patients with T2DM and CKD (UACR 30–5000 mg/g, eGFR 25–<75) and showed a significant reduction in composite cardiovascular outcomes with finerenone (hazard ratio 0.86, 95% CI 0.75–0.99, P=0.034), with only a modest excess of hyperkalaemia-related discontinuation (2.3% vs 0.8%) ⁽⁴⁵⁾. FIGARO-DKD (7,437 patients) confirmed improved cardiovascular outcomes (hazard ratio 0.87, 95% CI 0.76–0.98, P=0.03), driven mainly by reduced heart-failure hospitalisation ⁽⁴⁶⁾. FINEARTS-HF extended benefit to patients with heart failure and ejection fraction ≥40%, with the greatest risk reduction in those recruited soon after a worsening-HF event (relative risk 0.74, 95% CI 0.57–0.95), supporting a unique role in HFmrEF and HFpEF ⁽⁴⁷⁾.

5.3 Observational Studies

Real-world data reinforced the trial safety signal. A multi-cohort FOUNTAIN-platform study in T2DM and CKD reported low hyperkalaemia incidence (2.16–2.70 per 100 patients) with no related hospitalisations despite concurrent ACE-inhibitor and SGLT2-inhibitor use ⁽⁵³⁾. Single-centre cohorts similarly showed low rates of significant hyperkalaemia and significant UACR reduction, with no gynaecomastia, breast pain or hypotension reported ^(54, 55).

6. Guideline recommendations (ESC / FDA / NICE)

ESC heart-failure guidance retains a Class I indication for MR antagonists in HFrEF; its 2023 focused update recognised finerenone’s role in HFmrEF and HFpEF following FINEARTS-HF, addressing a group with otherwise limited options ^(56–57). The FDA first approved finerenone (Kerendia) in July 2021 to reduce the risk of renal decline, kidney failure, cardiovascular death and heart-failure

Trial / Study	Study Medium	Therapeutic Targets	Findings
Selective Mineralocorticoid Receptor Cofactor modulation as molecular basis for Finerenone’s antifibrotic Activity ⁽²⁷⁾ .	Mouse model following infusion of isoproterenol.	Mineralocorticoid receptors H9C2 and MR transcriptional cofactors.	Finerenone prevents cardiac fibrosis and improves strain parameters on echocardiogram.
Mineralocorticoid receptor antagonism improves diastolic dysfunction in chronic kidney disease in mice ⁽²⁸⁾ .	Mouse model of chronic kidney disease.	Calcium binding proteins	Reduction in renal failure induced diastolic dysfunction.
Mineralocorticoid receptor-mediated DNA damage in kidneys of DOCA-salt hypertensive rats ⁽²⁹⁾ .	Mice treated with DOCA.	Spironolactone and the non-steroidal BR-4628 effects on DNA damage in hypertensive conditions.	Reduction in renal failure, cardiovascular damage and hypertrophy.
Short-term and long-term administration of the non-steroidal mineralocorticoid receptor antagonist finerenone opposes metabolic-syndrome-related cardio-renal dysfunction ⁽³⁰⁾ .	Zucker fa/fa rat model with metabolic syndrome.	LV function, haemodynamic and remodelling. Comparison made with long duration and short duration of finerenone therapy	Short-term therapy with associated with decreased LVEDP and increased LV fractional shortening. Longer duration of treatment is associated with improved BP, diastolic function, LV compliance and protection against metabolic cardiomyopathy.
Mineralocorticoid receptor antagonism by finerenone is sufficient to improve function in preclinical muscular dystrophy ⁽³¹⁾ .	Duchenne muscular dystrophy rats	Skeletal and cardiac myocytes.	Reduction in myocardial strain and improvement in grip strength.
The novel mineralocorticoid receptor antagonist finerenone attenuates neointima formation after vascular injury ⁽³²⁾ .	Human coronary artery smooth muscles (SMC) and umbilical vein endothelial cells (ES) are treated with aldosterone.	SMC and ES.	Finerenone reduces aldosterone-induced apoptosis. It inhibits intimal and medial cell proliferation after electric injury.
GRK5 is an essential co-repressor of the cardiac mineralocorticoid receptor and is selectively induced by finerenone ⁽³³⁾ .	H9c2 rat cardiomyoblast.	Co-factor regulation of GRK5	GRK5 phosphorylates MR leading to its inhibition in response to finerenone and not eplerenone.
Finerenone attenuates endothelial dysfunction and albuminuria in a chronic kidney disease model by a reduction in oxidative stress ⁽³⁴⁾ .	Munich Wister Fromter (MWF) rats	Renal and vascular structures	Significant reduction in albuminuria. Finerenone reduces arterial contractile response and improves the relaxation of arterial walls.
Finerenone, a novel selective nonsteroidal mineralocorticoid receptor antagonist protect from rat cardiorenal injury ⁽³⁵⁾ .	Rats	Cardio-renal distribution of therapeutic agent (finerenone vs eplerenone)	Finerenone provides protection from structural and functional cardiac and renal damage without affecting blood pressure. Additionally, finerenone diminished cardiac hypertrophy, BNP levels and proteinuria more efficiently when compared to eplerenone.
Benefit of mineralocorticoid receptor antagonism in AKI: role of vascular smooth muscle Rac1 ⁽³⁶⁾ .	Pigs undergo ischaemia and reperfusion of the kidneys.	MR receptors on AKI development following ischaemia-reperfusion (IR).	The pharmacological inhibition of MR by finerenone prevented AKI from IR in large white pigs.
Nonsteroidal mineralocorticoid receptor antagonist finerenone protects against acute kidney injury-mediated chronic kidney disease: role of oxidative stress ⁽³⁷⁾ .	Rats that were treated with finerenone then had renal ischaemia. They were divided into a treatment group and a none-treatment group.	MR receptors in the development of AKI.	Finerenone-treated rats showed normal renal function following re-perfusion and with greatly lesser tubular injury.
Direct blood pressure-independent anti-fibrotic effects by the selective nonsteroidal mineralocorticoid receptor antagonist finerenone in a progressive model of kidney fibrosis ⁽³⁸⁾ .	Two kidney fibrosis models in mice were used: unilateral ureter obstruction and chronic ischaemia/perfusion injury. Rats were treated with either finerenone or empagliflozin.	Effect on MR receptors.	Finerenone reduced the level of myofibroblast accumulation and collagen deposition with no effect on systemic blood pressure and inflammatory markers. It was observed that reduced kidney plasminogen activator inhibitor-1 and naked cuticle 2 (NKD2) expression was associated with reduced kidney fibrosis.
The novel nonsteroidal MR antagonist finerenone improves metabolic parameters in high-fat diet-fed mice and activates brown adipose tissue via AMPK-ATGL pathway ⁽³⁹⁾ .	High fat diet and normal diet mice models. Both were treated with finerenone for three months.	Adipose tissue morphology, metabolic parameters, gene and protein expressions. Brown adipose were used to investigate MR antagonism effect on lipid and mitochondrial metabolism.	Improvement in glucose intolerance, finerenone increased activation of AMP-activated protein kinase. Finerenone was observed to reduce lipogenic flux and triglyceride synthesis.

Table 2: Animal studies summary.

hospitalisation, echoed by the American College of Cardiology and American Heart Association ⁽⁵⁸⁾. NICE recommends finerenone for CKD stages 3–4 with albuminuria as add-on therapy to ACE inhibitors and SGLT2 inhibitors (eGFR >20), with heart-failure guidance pending ⁽⁵⁹⁾.

7. Side Effects and Interactions

Finerenone is a CYP3A4 substrate; concomitant use of potent CYP3A4 inhibitors or inducers should be avoided, as potent inhibitors can substantially raise finerenone levels with dose-dependent hyperkalaemia and hyponatraemia ^(60, 61). Potent CYP3A4 inhibitors contraindicated with finerenone are listed in Table 4.

8. Conclusion

Finerenone offers clear therapeutic benefit in patients with T2DM and CKD, and increasingly in heart failure. By selectively inhibiting over-activated MR and reducing inflammation and fibrosis, it improves renal and cardiovascular outcomes across randomised trials ^(41–47), while its high selectivity and balanced tissue distribution deliver these benefits with fewer hormonal adverse effects than earlier agents ^(58, 71). Preclinical work defined the molecular basis of these effects across cardiac, renal and metabolic targets.

Trial, Author, Year	Research Type	Phase	Country	Sample Size	Patients' Comorbidities	Intervention	Duration	Outcome	Safety Profile
Randomised controlled trials (RCTs).									
ARTS, Pitt et al, 2013. ⁽⁴¹⁾	RCT	Ila	Multicentre	Part A n=65, Part B n=392	HFrEF (NYHA II-III, LVEF ≤40%) with mild or moderate CKD (UACR ≥30mg/g and eGFR 60-90mL/min/1.73m ²)	Finerenone (2.5, 5 or 10mg QDS) in both parts or finerenone BID in part B. Open label spironolactone 25mg/50mg OD. Placebo in both parts.	28 days for both parts	Finerenone has an equivalent or greater reduction in albuminuria and N-BNP levels, with a smaller decrease in eGFR.	Lower incidence of hyperkalaemia and a smaller increase in serum K in finerenone groups.
ARTS-DN, Bakris et al, 2015. ⁽⁴²⁾	RCT	IIb	Multicentre	823	DKD receiving RAAS inhibitors (UACR ≥30mg/g and eGFR >30mL/min/1.73m ²)	Finerenone (1.25-20 mg/day, 7 doses assessed). Placebo.	90 days	Finerenone led to a reduction in UACR; dose-dependent with 20mg leading to best reduction (38% reduction vs placebo) Minimal effect on blood pressure seen in highest doses.	NI incidence of hyperkalaemia leading to discontinuation seen in finerenone 10mg. Incidence in patients on 7.5mg and 20mg were low (1.7-3.2%). No difference in eGFR decrease when compared to placebo.
ARTS-HF, Filippatos et al, 2016. ⁽⁴³⁾	RCT	IIb	Multicentre	1066	HFrEF and T2DM and/or CKD (eGFR >30 mL/min/1.73m ² in patients with diabetes. In non-diabetic patients with CKD with 30-60 mL/min/1.73m ²)	Finerenone vs eplerenone.	90 days	Finerenone led to a greater reduction of composite clinical outcomes of all-cause death CV hospitalisation and new worsening heart failure hospital admission.	Finerenone was associated with a smaller increase in serum K when compared to eplerenone. However, it has a similar incidence of hyperkalaemia events.
ARTS-DN Japan Katayama et al, 2017. ⁽⁴⁴⁾	RCT	IIb	Multicentre	96	Patients with DKD and receiving RAS blockers	Finerenone vs placebo	90 days	The UACR at day 90 was reduced following treatment with finerenone.	No incidence of hyperkalaemia. Small increase in serum K level. No adverse events require discontinuation of finerenone.
FIDELIO-DKD, Bakris et al, 2020. ⁽⁴⁵⁾	RCT	III	Multicentre	5734	DKD patients receiving RAS blockers. UACR of 30- <300mg/g, eGFR 25 - <60mL/min/1.73m ² . Patients also have diabetic retinopathy. The second set of patients: UACR 300-5000 mg/g, eGFR 15- <75 mL/min/1.73m ²	Finerenone Vs placebo. Finerenone dose of 10-20mg	Median follow-up of 2.6 years.	Finerenone led to a 31% reduction in the UACR from baseline. Primary and secondary composite outcomes were significantly less in the finerenone group.	K level >5.5 rate was higher in finerenone group at 21.7% vs placebo rate of 9.8%. Hyperkalaemia leading to hospitalisation rate of 1.4% in finerenone group.
FIGARO-DKD, Pitt et al, 2021. ⁽⁴⁶⁾	RCT	III	Multicentre	7437	DKD patients who are on RAS blockers. UACR 30-300mg/g, eGFR 25-90 mL/min/1.73m ² . UACR 300-5000 mg/g, eGFR ≥60 mL/min/1.73m ² .	Finerenone Vs placebo. Finerenone dose of 10-20mg/day.	Median follow-up of 3.4 years.	Finerenone significantly reduced key primary composite outcomes. No difference between secondary composite outcomes to placebo.	The rate of hyperkalaemia leading to discontinuation was higher in the finerenone group (1.2% vs 0.4%). The rate of AEs overall is similar to placebo.
FINEARTS-HF Vaduganathan et al, 2024. ⁽⁴⁷⁾	RCT	III	Multicentre	6001	Adults ≥40 with symptomatic HF and NYHF II-IV, with the diuretic requirement at least 30 days prior to randomisation. EF≥40%, enrolment of previous EF ≤40% was permitted.	FIN 10mg, 20mg and 40mg based on eGFR	Up to 42 months	Reduction in composite cardiovascular outcomes.	FIN is not associated with an increase in serum K.
RCT analyses, including FIDELITY:									
FIDELITY, Agarwal et al, 2022. ⁽⁴⁸⁾	Prespecified pooled analysis of FIDELIO-DKD and FIGARO-DKD	III	Multicentre	13,026	DKD	Finerenone vs placebo or standard therapy.	Interquartile range follow-up of 2.3-3.8 years.	Finerenone led to a significant reduction in CV endpoint outcomes (14% reduction), a 22% reduction in HF hospitalisation. Further 23% reduction in renal composite events, 20% reduction in dialysis initiation in ESRF	Finerenone was associated with a higher rate of AEs than placebo (18.5% vs 13.3%). Discontinuation rate higher with FIN vs placebo (6.4% vs 5.4%). Permanent discontinuation due to hyperkalaemia was higher with FIN (1.7 vs 0.6%). No increase in hormone-related AEs with FIN.
Effect of finerenone on ambulatory blood pressure in CKD and T2DM. Agarwal et al, 2023. ⁽⁴⁹⁾	Analysis of subset of ARTS-DN study (240/823 patients).	IIb	Multicentre	240	T2DM and DKD	Finerenone (1.25-20 mg/day, 7 doses assessed). Placebo.	90 days	Finerenone reduced daytime and nighttime BP despite short half-life. Changes were persistent for 24 hours with the morning dose.	Serious adverse events of 3.3%. One patient on 5mg and one patient on 15mg doses, had hyperkalaemia.
Effect of finerenone on the occurrence of vision-threatening complications in patients with non-proliferative diabetic retinopathy: Pooled analysis (ReFINE-DR/DFINE-DR). Rossing, et al, 2023. ⁽⁵⁰⁾	Pooled analysis from FIGARO-DKD and FIDELIO-DKD	III	Multicentre	244	Patients with non-proliferative diabetic retinopathy.	Finerenone vs placebo or standard therapy after two years of treatment.	2 years	VTC rates were reduced to 3.7% in the finerenone arm when compared to placebo (6.4%).	No safety data, hypothesis-generating study, no conclusions can be drawn.
Finerenone Reduces risk of incidence of heart failure in patients with CKD and T2DM. Analysis from FIGARO-DKD 2022. ⁽⁵¹⁾	Analysis from FIGARO-DKD.	III	Multicentre	7,352	Patients with CKD and T2DM with reduced EF and without symptomatic HF.	Finerenone vs placebo.	3.4 years	New onset heart failure was significantly reduced with finerenone as well as lower cardiovascular death and heart failure hospitalisation.	See FIDELIO-DKD safety.
Finerenone reduces new onset atrial fibrillation in patients with CKD and T2DM.	Analysis from FIDELIO-DKD	III	Multicentre	5,674	CKD and T2DM	Finerenone vs placebo.	2.6 years.	Finerenone reduces the risk of new-onset AF in patients with CKD and T2DM.	Safety profile not explored.
Observational studies:									
A multi-cohort from FOUNTAIN platform. Early clinical experience. Sato et al, 2024. ⁽⁵²⁾	A retrospective cohort study.	Observational Study	Two Japanese Nationwide Hospitals	1,029	CKD and T2DM	Observational study, no comparator	Median follow-up of 52 days in patients from the MDV database and 42 days in the RWD database.	The incidence of hyperkalaemia was 2.16 and 2.70 per 100 patients in the two databases. There was no hospitalisation from hyperkalaemia in either group.	Low incidence of hyperkalaemia (short follow-up period). The incidence of hyperkalaemia in the CHF subgroup was low. Results were consistent with stage III trials.
Effectiveness and safety of finerenone, observational study Zhou et al, 2024. ⁽⁵⁴⁾	A single centre retrospective cohort study.	Observational Study	Single centre in China	42	Adults over 18 years with DKD, CKD with UACR ≥30mg/g and eGFR ≥ mL/min/1.73m ² .	Observational study, no comparator.	Median follow-up of six months.	Significant reduction in UACR; 32% at one month and 73% at six months.	FIN was discontinued in one patient due to two twofold increase in serum creatinine. This was attributed to the initiation of SGLT-2 inhibitors and finerenone concurrently. The rate of hyperkalaemia (K>5.5 mmol/L) at 1, 3, and 6 months is 4.8%, 7.1% and 4.8% respectively.
Efficacy and Safety of finerenone in individuals with type 2 diabetes mellitus complicated by diabetic kidney disease: A retrospective observational study. Kawaguchi et al, 2024. ⁽⁵³⁾	The patient was treated with finerenone between April 2023 and April 2024 at Minami Hospital.	Observational Study	Single centre in Japan	30	T2DM and DKD.	Finerenone 10 and 20mg	12 months	FIN is associated with a significant decrease in UACR. Diastolic BP and body mass showed no changes in 3 months.	No Change in serum K level or reduction in eGFR was seen.

Table 3 - Summary of human studies.

A consistent finding across the ARTS programme and the pivotal FIDELIO-DKD, FIGARO-DKD and FINEARTS-HF trials is a favourable safety profile – particularly a lower risk of hyperkalaemia and renal decline – which should reduce discontinuation and enable more sustained MR antagonism. (See Table 5 for dose adjustment).

Observational studies confirm this profile in real-world practice^(53–55). Its enhanced safety and multi-organ benefit support earlier use in the heart-failure pathway.

Further work is needed to clarify finerenone’s role in diabetic retinopathy, atrial fibrillation and

HFpEF, and its potential in liver disease and portal hypertension – where spironolactone has an established role – remains unexplored and merits investigation^(48–51).

List of potent CYP 3A4 inhibitors
1. Itraconazole.
2. Ketoconazole.
3. Ritonovir.
4. Nelfinavir.
5. Cobicistat.
6. Clarithromycin.
7. Telithromycin.
8. Nefazodone.

Table 4 - List of CYP 3A4 potent inhibitors.

		Current finerenone dose (daily)	
		10mg	20mg
Potassium level (mmol/L)	≤4.8	Increase does to 20mg once daily.	Maintain the 20mg dose.
	>4.8-5.5	Maintain 10mg once daily.	Maintain 20mg once daily.
	>5.5	Initially withhold finerenone but consider restarting 10mg once daily once potassium is ≤5 mmol/L.	Finerenone should be withheld, consider restarting with reduced dose (10mg once daily) once potassium is ≤5 mmol/L.

Table 5 - Finerenone dose adjustment⁽⁷⁰⁾.

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Head Phones Risks

This is an equipment one regularly uses in modern life, at work, at play, and even to relax listening to music. But an investigation into headphones has found every single pair tested contained substances hazardous to human health, including chemicals that can cause cancer, neurodevelopmental problems and the feminisation of males. They contain harmful chemicals in the formulation of the plastics from which they are made. They contain whole classes of endocrine-disrupting chemicals in these consumer goods. This is the finding of Karolína Brabcová chemical expert Arnika, part of the ToxFree LIFE for All project. "Although there is no immediate health risk, the long-term exposures – especially for vulnerable groups like teenagers – is of great concern. There is no 'safe' level for endocrine disruptors that mimic our natural hormones." These chemicals are bisphenols, phthalates and poly- and per-fluoroalkyl substances (Pfas).

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Acupuncture for IBS

A meta-analysis from Jiangxi University, China reviewed 12 RCTs conducted in China, Germany, the UK and the US with 1105 participants has established that acupuncture for IBS significantly improved response rate and severity of symptoms at the end of treatment as compared with sham nonacupoint acupuncture. As to subtypes, acupuncture made a significant difference in response rates of IBS constipation and IBS diarrhoea. Experts say that many practitioners support complementary stress-reducing therapies to help manage patient's stress and anxiety. Acupuncture may be a helpful complementary option for relief of bowel pain and regulation and may be cost-effective for those with severe symptoms

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High protein intake & Kidney function

An article from UiT The Arctic University of Norway prospectively followed up 1324 participants for 10 years suggests that self reported high protein intake in those individuals above the age 40 without chronic kidney disease does not cause any significant decline in kidney function (mGFR). Baseline protein intake was estimated using a validated 262-item food frequency questionnaire.

The article does have limitation of being a questionnaire study and does not take into account total daily protein intake or any urinary estimation tests to measure the nitrogen levels but the strength is more than 1000 participants followed up for 10 years.

The question is whether this may be relevant for kidney disease sufferers in their very early stages

Clin Kidney J. 2026 Jul 11;19(8):sfag235. doi: 10.1093/ckj/sfag235

Fingernails mineral profiling

Hair, toenails and fingernails consist mainly of fibrous alpha-keratin proteins embedded in a matrix of lipids and other structural proteins. In addition minerals, trace elements and toxins can be deposited. Fingernails reflect long-term mineral exposure and can be used as a tool to assess dietary and lifestyle habits. A study from Fulda University of Applied Sciences in Germany looked at 184 participants (18-81 years).

Strong diet/supplements: Selenium ↑ with supplements; vegans ↓ vs Omnivores; pescatarians ↑

Nail changes correlated with minerals: Brittle nails ↓ K – 30%; Ridging ↓ Na/K; Leukonychia ↓ Cr – 29%

Thyroid disorders associated with >10% higher selenium; clinical significance unclear.

<https://doi.org/10.1002/biof.70056>

Musculoskeletal Corticosteroid Injections: Part I

Evidence, Indications, and Practical Techniques for Soft Tissue and Joint Disorders.

Dr H R Vijayakumar MBBS, MS, FRCS (Edin), DFSRH (UK), MRCGP (UK), FRCGP(UK).
Associate Diplomat of the American board of regenerative medicine (USA) Senior GP in North Wales

Dr Vishwaraj GM Shetty MBBS, MS (Orthopaedic), D Ortho, FRCS, MRCGP (UK) Senior GP in North Wales

Abstract

Musculoskeletal (MSK) corticosteroid injections remain an important intervention for selected joint and soft tissue disorders. They can provide rapid pain relief, facilitate rehabilitation, and reduce disability when used appropriately. However, growing evidence suggests that the benefits of corticosteroid injections vary considerably according to pathology, anatomical location, and timing of intervention. While injections remain valuable for inflammatory joint disorders, adhesive capsulitis, trigger finger, and selected bursopathies, their role in tendinopathies has become increasingly controversial because of concerns regarding tendon degeneration, recurrence, and poorer long-term outcomes.

This review summarises the pharmacology of commonly used corticosteroids and local anaesthetics, indications and contraindications, adverse effects, and evidence-based injection techniques for commonly encountered MSK conditions in primary care, sports medicine, rheumatology, and musculoskeletal practice.

Introduction

Musculoskeletal disorders represent one of the leading causes of disability worldwide and account for substantial healthcare utilisation and socioeconomic burden. Corticosteroid injections are frequently used to manage pain arising from joints, bursae, tendon sheaths, and periarticular soft tissues.

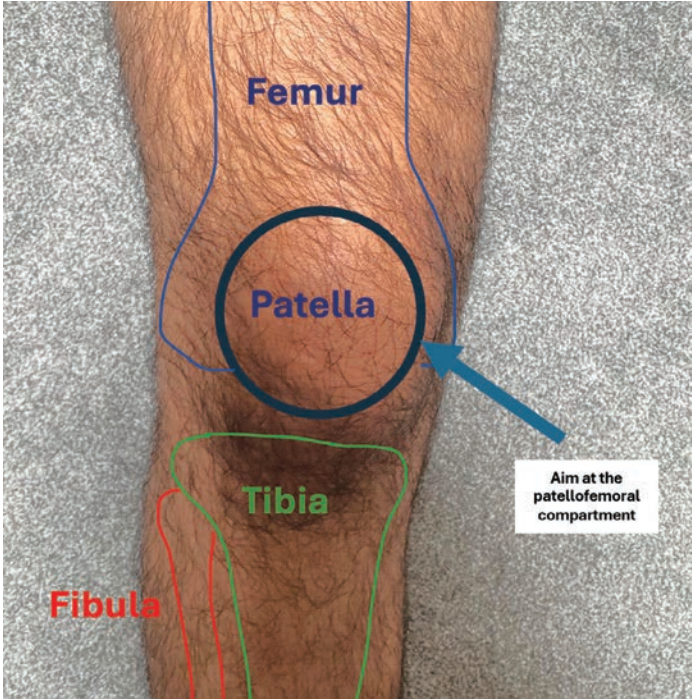
The effectiveness of corticosteroid injections depends on accurate diagnosis, appropriate patient selection, precise anatomical placement, and integration with rehabilitation strategies. Increasing evidence demonstrates that injections should not be viewed as stand-alone treatments but rather as adjuncts to exercise therapy, load modification, and patient education.

Pharmacology of Corticosteroids

The most used injectable corticosteroids include:

- Methylprednisolone acetate
- Triamcinolone acetonide
- Hydrocortisone acetate

Comparative studies suggest broadly similar clinical effectiveness



Above: Knee Joint Injection Guide

among corticosteroid preparations, although methylprednisolone may demonstrate a faster onset of action than triamcinolone.

Triamcinolone is the least soluble preparation and consequently remains within the joint space longer than other corticosteroids. This prolonged tissue residence may explain its longer clinical effect in some patients.

Triamcinolone acetonide (Kenalog) is a fluorinated corticosteroid. Experimental evidence suggests fluorinated corticosteroids may exert greater deleterious effects on collagen-containing soft tissues and tendons. Consequently, many clinicians avoid their use around vulnerable tendon structures such as the long head of biceps tendon.

Although extremely uncommon, anaphylactic reactions have been reported following intra-articular administration of both triamcinolone and methylprednisolone.

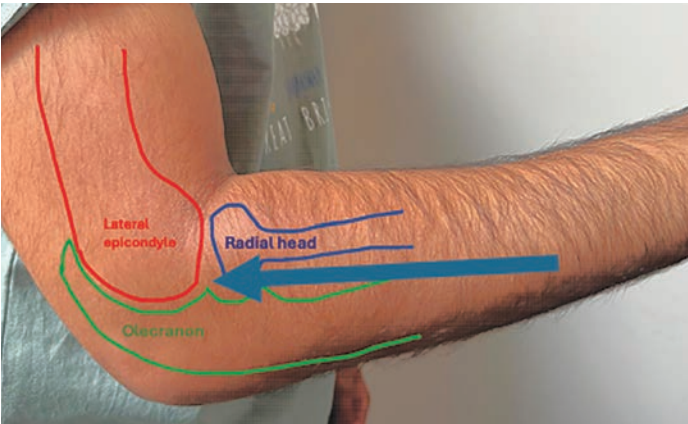
Local Anaesthetic Agents

Local anaesthetic is commonly mixed with corticosteroid to provide immediate analgesia and assist confirmation of correct placement.

The most frequently used agents are:

Agent	Concentration	Onset	Duration
Lignocaine	1%	Rapid	2 – 4 h
Bupivacaine	0.25–0.5%	Slower	4 – 8 h

Lignocaine provides rapid symptom relief whereas bupivacaine offers longer post-procedure analgesia. Effective early pain control may facilitate mobilisation and adherence to rehabilitation programmes.



Above: Lateral Epicondyle of Elbow Injection Guide

Indications for Corticosteroid Injection

Appropriate indications include:

- Osteoarthritis with inflammatory exacerbation
- Adhesive capsulitis
- Carpal tunnel syndrome
- Trochanteric pain syndrome
- Selected cases of rotator cuff related shoulder pain
- Inflammatory arthropathies
- Trigger finger
- De Quervain's tenosynovitis
- Pes anserine bursitis

In contrast, the role of corticosteroid injection in chronic tendinopathy remains controversial.

Contraindications

Absolute contraindications include:

- Local skin infection
- Systemic sepsis
- Haemarthrosis
- Injection through infected tissue
- Septic arthritis
- Known allergy to injectate

Relative contraindications include:

- Prosthetic joints
- Anticoagulation (requires individual assessment)
- Recent trauma
- Poorly controlled diabetes
- Skeletal immaturity

Adverse Effects and Complications

Common

The most frequent adverse event is post-injection flare, characterised by transient pain worsening for 24–48 hours.

Other common effects include:

- Local warmth
- Mild swelling
- Tenderness

Local Complications

Potential local complications include:

- Subcutaneous fat atrophy
- Bruising
- Periarticular calcification
- Skin depigmentation
- Bleeding

A systematic review reported an overall adverse event rate of approximately 5.8% following extra-articular corticosteroid injection, with most events being mild and self-limiting.

Serious Complications

Serious complications are rare but include:

- Septic arthritis
- Steroid arthropathy
- Anaphylaxis
- Tendon rupture
- Adrenal suppression

Septic arthritis occurs in approximately 1 in 10,000 injections.

Direct injection into tendon substance should be avoided because of the increased risk of tendon degeneration and rupture.

Corticosteroid Injections in Tendinopathy: Current Evidence

Historically, corticosteroid injections were frequently used for tendinopathies such as lateral epicondylalgia.

Contemporary evidence suggests a more cautious approach.

Randomised controlled trials have demonstrated:

- Superior short-term pain relief (up to 6 weeks)
- Increased recurrence rates
- Inferior medium- and long-term outcomes
- Worse outcomes compared with physiotherapy in some studies

A landmark trial comparing corticosteroid injection, physiotherapy, and wait-and-see management demonstrated that although injections provided superior short-term symptom relief, physiotherapy produced superior long-term outcomes and injection recipients experienced higher recurrence rates.



Above: Glenohumeral Injection Guide

Consequently, current best practice emphasises:

- Exercise-based rehabilitation
- Patient education
- Progressive tendon loading
- Judicious use of injections

Practical Injection Techniques

Shoulder

Glenohumeral Joint (Posterior Approach)

Indications

- Adhesive capsulitis
- Inflammatory arthropathy
- Glenohumeral osteoarthritis

Landmarks

- Posterior corner of acromion
- Injection point 2.5 cm inferior and medial to posterior acromion

Technique

The needle is advanced anteriorly towards the coracoid process. Free flow of injectate usually indicates successful intra-articular placement.

Subacromial Bursa

Indications

- Rotator cuff related shoulder pain
- Subacromial bursitis

Technique

The needle is introduced beneath the acromion and directed superiorly approximately 15–20 degrees to avoid contact with the rotator cuff tendons.

Acromioclavicular Joint

Indications

- Acromioclavicular osteoarthritis
- AC joint synovitis

Technique

The AC joint is identified approximately midway between the lateral acromion and distal clavicle. The needle follows the natural 15–20° medial inclination of the joint.

Only 0.5–2 mL is usually required.

Elbow

Lateral Epicondylalgia

The injection is targeted at the musculotendinous and tendoperiosteal junction rather than tendon substance.

A fanning technique is recommended to distribute medication throughout the symptomatic region while avoiding intratendinous placement.

Medial Epicondylalgia

The same principles apply. The goal is to bathe the pathological tissue while avoiding direct tendon injection.

Hand and Wrist

Trigger Finger

The target is the A1 pulley and surrounding tendon sheath.

Evidence suggests that precise intra-sheath placement may not be necessary, with subcutaneous deposition producing similar outcomes.

Carpal Tunnel Syndrome

Key anatomical landmarks include:

- Palmaris longus tendon
- Flexor carpi radialis tendon
- Distal wrist crease

The needle may be inserted either radial or ulnar to the palmaris longus tendon.

Any paraesthesia during needle advancement should prompt immediate repositioning because this may indicate median nerve contact.

Injection should never proceed if resistance is encountered.

De Quervain's Tenosynovitis

The injectate is deposited around the first dorsal compartment tendon sheath.

Because injections are often superficial, patients should be counselled regarding the risks of skin depigmentation and fat atrophy.

First Carpometacarpal Joint

The joint is accessed through the anatomical snuffbox with the thumb opposed to accentuate the joint line.

Gentle traction may facilitate entry into the joint space.

Hip

Greater Trochanteric Pain Syndrome

The patient lies on the unaffected side.

The needle is advanced perpendicular to the skin until bone contact is achieved. Following withdrawal by approximately 3 mm, the injectate is administered as a bolus.

Knee

Knee Joint Injection

A medial patellar approach is commonly used.

The knee is flexed approximately 20 degrees. The needle is introduced adjacent to the medial patella and directed towards the patellofemoral compartment.



Above: Trochanteric Bursa Injection Guide

Pes Anserine Bursitis

The needle is inserted into the tender region below the medial joint line until the tibia is contacted. Following slight withdrawal, the injectate is administered.

Foot

Plantar Fasciopathy

Current evidence does not support routine landmark-guided corticosteroid injection.

Potential complications include:

- Plantar fascia rupture
- Fat pad atrophy
- Chronic foot dysfunction

When corticosteroid injection is considered, ultrasound guidance is recommended to improve accuracy and minimise complications.

Exercise therapy, load management, podiatry input, and orthotic interventions remain first-line treatment options.

The role of Ultrasound Guidance

Growing evidence suggests ultrasound guidance improves injection accuracy, particularly in:

- Glenohumeral joint
- Subacromial bursa
- Carpal tunnel
- Small joints of the hand

Whether improved accuracy consistently translates into superior clinical outcomes remains less certain. Nevertheless, ultrasound guidance may improve confidence, reduce procedural discomfort, and enhance safety in anatomically complex regions.

Conclusions

Musculoskeletal corticosteroid injections remain an important component of contemporary MSK practice. Their greatest value lies in carefully selected inflammatory and periarticular conditions when integrated within a broader rehabilitation programme. Clinicians should recognise that short-term symptom relief does not necessarily translate into superior long-term outcomes, particularly in tendinopathy. Accurate diagnosis, meticulous injection technique, appropriate patient counselling, and adherence to evidence-based indications remain essential to maximise benefit and minimise harm.

Musculoskeletal Corticosteroid Injections: Evidence-Based Indications, Techniques, and Safety Considerations

What you need to know:

- Corticosteroid injections provide short-term pain relief for many musculoskeletal conditions but should usually be combined with rehabilitation and exercise therapy.
- Direct intratendinous injection should be avoided because of the risk of tendon degeneration and rupture.
- Corticosteroid injections for tendinopathies such as lateral epicondylalgia provide short-term benefit but may worsen long-term outcomes.
- Septic arthritis is rare (approximately 1 in 10,000 injections) but remains the most serious complication.
- Ultrasound guidance improves injection accuracy and may improve safety in anatomically challenging locations.
- Patients should be counselled regarding post-injection flare, skin depigmentation, fat atrophy, transient hyperglycaemia, and the possibility of symptom recurrence.

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Integrative Natural Approaches to Human Health – Biophysical, Biochemical and Systems Biology Foundation

Mechanisms of Yoga, Ayurveda, Qigong, Diet, and Lifestyle

Prof. Rajeev Gupta FRCPCH. Professor of Medicine, University of Greater Manchester
Consultant, Barnsley Hospital NHS Foundation Trust. Chairman of the Advisory Board, International Organisation of Integrated Health Practitioners.

Abstract

The global rise in chronic non-communicable diseases necessitates a paradigm shift from reactive disease management to proactive, preventive, and integrative health strategies. Traditional health systems such as yoga, Ayurveda, and qigong provide structured, multi-dimensional approaches that align closely with modern systems biology. These modalities influence key regulatory networks including neuroendocrine signalling, immune modulation, mitochondrial bio-energetics, and gut microbiome dynamics. Emerging scientific evidence demonstrates that integrative lifestyle interventions combining physical activity, breath regulation, dietary optimisation, and behavioural modification can significantly reduce disease burden, enhance resilience, and improve longevity. This article provides a comprehensive analysis of the mechanisms underlying these natural approaches, mapping traditional concepts such as prana and qi to measurable physiological processes, and proposes an integrative clinical framework for health maintenance and disease prevention.

The convergence of traditional wisdom and modern science provides a unique opportunity to redefine healthcare delivery models toward prevention rather than cure. These integrative approaches are not merely adjuncts but may represent foundational strategies for long-term health optimisation. The emphasis on self-regulation, behavioural adaptation, and environmental harmony aligns with contemporary public health priorities. Additionally, these systems empower individuals to take active responsibility for their health, reducing dependency on pharmacological interventions. The incorporation of such practices into mainstream healthcare could significantly reduce the burden on healthcare systems such as the NHS. There is also growing interest in personalised medicine, where Ayurvedic constitutional typing and lifestyle tailoring may play a significant role. Moreover, these practices contribute to psychological resilience, which is increasingly recognised as a determinant of overall health. The scalability of these interventions makes them suitable for both individual and population-level implementation. Finally, integrating these approaches into digital health platforms and AI-based systems may further enhance accessibility and effectiveness.

Introduction to the Need for Integrative Preventive Medicine

Modern healthcare systems are predominantly designed for acute care and disease treatment rather than prevention. However, chronic diseases such as diabetes, cardiovascular disease, cancer, and mental health disorders are largely driven by lifestyle and environmental factors. The concept of health must therefore evolve toward systems integration, where biological, psychological, and environmental domains are addressed simultaneously. Traditional systems such as yoga, Ayurveda, and qigong emphasize balance, adaptability, and

resilience. These principles align with modern concepts such as homeostasis, allostasis, and network physiology. Scientific advances now allow mapping of ancient concepts such as prana and qi to physiological processes including bioelectrical signalling, mitochondrial function, and autonomic regulation ⁽¹⁾.

In addition, the shift toward preventive medicine is supported by economic considerations, as healthcare costs associated with chronic diseases continue to rise globally. Integrative approaches provide cost-effective strategies by reducing disease incidence and improving quality of life. The concept of network physiology highlights the interconnectedness of organ systems, reinforcing the need for holistic interventions. Furthermore, environmental and social determinants of health play a crucial role, and integrative medicine addresses these factors more comprehensively than conventional approaches. The role of behavioural science is also critical, as sustained lifestyle changes require motivation, adherence, and psychological support. Integrative practices inherently incorporate mindfulness and self-awareness, facilitating long-term behavioural modification. There is also increasing evidence that early-life interventions can have lasting effects on health trajectories, supporting the adoption of integrative practices from a young age. The integration of traditional and modern systems requires interdisciplinary collaboration and robust scientific validation. Advances in omics technologies, including genomics and metabolomics, provide new opportunities to study the effects of these interventions at a molecular level. Ultimately, the future of healthcare lies in combining the strengths of both paradigms to create a more effective and sustainable system.

Modality	Primary Mechanism	Molecular Pathway	Clinical Effect
Yoga	Autonomic regulation	↓ Cortisol ↓ NF-κB	Stress reduction
Qigong	Energy flow, HRV ↑	↑ Parasympathetic tone	Cardiovascular health
Ayurveda	Metabolic balance	↓ Inflammation	Digestive health
Nutrition	Microbiome modulation	SCFA production	Immune support
Meditation	Neuroplasticity	↑ BDNF ↑ GABA	Mental health

Table 1: Integrative Modalities and Mechanisms

Neuroendocrine Regulation & Stress Modulation

Chronic stress is a major driver of disease, mediated through dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis. Increased cortisol leads to insulin resistance and central obesity, while sympathetic overactivity contributes to hypertension and systemic inflammation. Reduced vagal tone impairs immune regulation and increases susceptibility to disease. Yoga and pranayama reduce cortisol levels and enhance parasympathetic activity ⁽²⁾, while qigong improves heart rate variability, indicating better autonomic balance ⁽³⁾. Meditation modulates limbic system activity, reducing amygdala hyperactivation and promoting emotional stability. At the molecular level, these interventions reduce NF-κB activation, thereby decreasing pro-inflammatory cytokines such as IL-6 and TNF-α ⁽⁴⁾. Beyond these

mechanisms, chronic stress also affects telomere length and accelerates biological aging, which can be mitigated through integrative practices. Yoga and meditation have been shown to increase telomerase activity, suggesting a role in cellular longevity. Additionally, stress reduction improves sleep quality, which further enhances neuroendocrine regulation. The bidirectional relationship between the brain and endocrine system highlights the importance of mind-body interventions. Improved vagal tone also enhances digestion and gut function, linking stress management to metabolic health. Furthermore, these practices improve emotional regulation, reducing the risk of psychiatric disorders. The reduction in cortisol variability contributes to improved circadian rhythm alignment. Integrative practices also influence neurotransmitter balance, including serotonin and dopamine pathways. The cumulative effect of these changes leads to improved resilience against both physical and psychological stressors. These findings underscore the importance of incorporating stress management into routine healthcare.

Immune Modulation and Inflammation Control

Chronic low-grade inflammation is central to most non-communicable diseases, driven by activation of the NF-κB pathway, oxidative stress, and immune dysregulation. Yoga reduces inflammatory markers such as C-reactive protein and cytokines, while Ayurvedic compounds such as curcumin inhibit NF-κB and COX-2 pathways⁽⁵⁾. Qigong enhances natural killer cell activity, improving immune surveillance. These interventions collectively reduce inflammation and enhance immune resilience. In addition, the immune system is closely linked with metabolic and neuroendocrine pathways, forming an integrated network. Chronic inflammation contributes to insulin resistance, atherosclerosis, and neurodegenerative diseases. Integrative practices reduce oxidative stress by enhancing antioxidant enzyme activity, including superoxide dismutase and glutathione peroxidase. The modulation of cytokine profiles shifts the immune response toward an anti-inflammatory state. Furthermore, these interventions improve lymphatic circulation, facilitating immune cell transport and waste removal. The role of the microbiome in immune regulation further highlights the importance of diet and lifestyle. Integrative approaches also reduce autoimmune responses by restoring immune tolerance. Emerging research suggests that these practices may influence epigenetic regulation of immune-related genes. The long-term benefits include reduced disease risk and improved recovery from illness. These findings support the integration of natural therapies into immunological health strategies.

Disease	Pathophysiology	Integrative Mechanism	Outcome
Diabetes	Insulin resistance	AMPK activation	Improved glucose control
CVD	Inflammation	↓ NF-κB	Reduced risk
Depression	Neurotransmitter imbalance	↑ Serotonin, GABA	Mood improvement
Obesity	Metabolic dysfunction	↑ Mitochondrial function	Weight control
Autoimmune	Immune dysregulation	↓ Cytokines	Symptom reduction

Table 2: Disease Prevention via Integrative Pathways

Mitochondrial Function and Energy Metabolism

Mitochondrial dysfunction is a hallmark of aging and chronic disease, characterised by reduced ATP production, increased reactive oxygen species, and impaired metabolic flexibility. Yoga and breathwork improve oxygen delivery and mitochondrial efficiency, while dietary interventions such as intermittent fasting activate AMPK pathways, promoting mitochondrial biogenesis [6]. Qigong enhances microcirculation and may improve bioenergetic coherence at the cellular level. Moreover, mitochondrial health is closely linked with systemic energy levels, cognitive function, and overall vitality. Improved mitochondrial function enhances endurance and reduces fatigue. Integrative

practices also promote metabolic flexibility, allowing the body to efficiently switch between glucose and fat metabolism. This is particularly important in conditions such as diabetes and obesity. The reduction in oxidative stress protects cellular components, including DNA and proteins. Additionally, mitochondrial signalling plays a role in apoptosis and cellular repair mechanisms. Lifestyle interventions such as physical activity and dietary optimisation further enhance mitochondrial dynamics. The interplay between mitochondria and the microbiome adds another layer of complexity to metabolic regulation. Improved mitochondrial function is associated with increased lifespan and reduced disease burden. These findings highlight the central role of energy metabolism in health maintenance. Integrative approaches provide a practical means to optimise mitochondrial function in daily life.

Gut Microbiome and Metabolic Regulation

The gut microbiome plays a central role in health, influencing immunity, metabolism, and brain function through the gut-brain axis. Dietary fibre and polyphenols promote beneficial microbial diversity, while stress reduction through yoga supports microbiome stability⁽⁷⁾. Ayurvedic dietary principles emphasise digestive balance, aligning with modern concepts of gut health.

Furthermore, the microbiome produces metabolites such as short-chain fatty acids that regulate inflammation and energy metabolism. Dysbiosis has been linked to a wide range of diseases, including obesity, depression, and autoimmune conditions. Integrative practices improve gut motility and reduce stress-induced alterations in microbiota composition. The bidirectional communication between the gut and brain highlights the importance of holistic interventions. Additionally, dietary diversity enhances microbial richness and resilience. The role of probiotics and prebiotics further supports gut health. Integrative approaches also reduce intestinal permeability, preventing systemic inflammation. Emerging research suggests that microbiome modulation may influence gene expression and epigenetics. The integration of diet, lifestyle, and mind-body practices provides a comprehensive strategy for maintaining gut health. These findings reinforce the central role of the microbiome in overall health.

Molecular Pathways Underlying Integrative Health Interventions

At the molecular level, integrative health practices exert their effects through modulation of key intracellular signalling pathways, including NF-κB, AMPK, mTOR, and sirtuin pathways. NF-κB is a central regulator of inflammation, and its chronic activation is associated with a wide range of diseases including cardiovascular disease, cancer, and neurodegeneration. Yoga, meditation, and phytochemicals such as curcumin have been shown to inhibit NF-κB activation, thereby reducing the expression of pro-inflammatory cytokines

⁽⁵⁾. Similarly, AMPK acts as an energy sensor within cells, promoting mitochondrial biogenesis and enhancing metabolic efficiency. Practices such as intermittent fasting, physical activity, and caloric regulation activate AMPK pathways, leading to improved metabolic health⁽⁶⁾. The mTOR pathway, which regulates cell growth and protein synthesis, is modulated by dietary patterns and energy availability, and its downregulation has been associated with increased longevity. Sirtuins, particularly SIRT1, are involved in cellular stress resistance and metabolic regulation, and are activated by caloric restriction and certain plant-based compounds.

In addition to these pathways, integrative practices influence oxidative stress through modulation of reactive oxygen species and antioxidant

defence systems. The balance between ROS production and antioxidant capacity determines cellular health and longevity. Yoga and meditation have been shown to enhance endogenous antioxidant systems, including glutathione and catalase activity. Furthermore, mitochondrial signalling pathways interact with nuclear gene expression, influencing epigenetic regulation. DNA methylation and histone modification patterns are altered by lifestyle interventions, suggesting that integrative practices may have long-term genetic effects. The interaction between metabolic and inflammatory pathways further highlights the interconnected nature of these systems. These molecular changes collectively contribute to improved cellular resilience and reduced disease risk. The integration of these pathways provides a mechanistic basis for the observed clinical benefits of natural health interventions. Future research should focus on multi-omics approaches to fully elucidate these complex interactions. Understanding these mechanisms will enable more precise and personalised application of integrative therapies.

Neurobiology and Neurochemistry of Mind–Body Practices

Mind–body interventions such as yoga, meditation, and qigong exert profound effects on brain structure and function, influencing neuroplasticity, neurotransmitter balance, and neural connectivity. These practices increase levels of gamma-aminobutyric acid (GABA), serotonin, and dopamine, which are critical for mood regulation and emotional stability⁽⁸⁾. Functional imaging studies have demonstrated increased activity in the prefrontal cortex and decreased activity in the amygdala, indicating improved emotional regulation and reduced stress reactivity. Additionally, these practices enhance the production of brain-derived neurotrophic factor (BDNF), which supports neuronal growth and synaptic plasticity. The modulation of the default mode network (DMN) is another important mechanism, as excessive DMN activity is associated with rumination and mental health disorders.

Beyond neurotransmitter changes, integrative practices also influence structural brain changes, including increased cortical thickness in regions associated with attention and memory. These changes suggest long-term neuroprotective effects and potential benefits in neurodegenerative conditions. The regulation of neuroinflammation is another critical mechanism, as chronic inflammation contributes to cognitive decline and psychiatric disorders. Mind–body practices reduce microglial activation and inflammatory cytokine production in the brain. Furthermore, the interaction between the gut microbiome and the brain adds another layer of complexity, with microbial metabolites influencing neurotransmitter synthesis. These practices also improve sleep architecture, which is essential for cognitive function and memory consolidation. The cumulative effect of these neurobiological changes is enhanced cognitive performance, emotional resilience, and mental well-being. Integrative approaches therefore provide a comprehensive strategy for maintaining brain health across the lifespan. Future studies should explore the long-term impact of these interventions on neurodegenerative diseases such as Alzheimer’s and Parkinson’s disease.

Epigenetics and Gene Expression Modulation

Epigenetics provides a critical link between environmental factors and gene expression, and integrative health practices have been shown to influence epigenetic mechanisms. DNA methylation, histone modification, and non-coding RNA regulation are all affected by lifestyle interventions such as diet, physical activity, and stress management. Studies have demonstrated that meditation and yoga can alter the expression of genes involved in inflammation, stress response, and immune function⁽⁴⁾. These changes suggest that integrative practices may have long-term effects on health by modifying gene expression patterns.

In addition, epigenetic modifications are reversible, making them an attractive target for preventive and therapeutic interventions. Nutritional factors such as polyphenols and vitamins play a key role in regulating epigenetic processes. For example, compounds such as resveratrol and curcumin influence histone acetylation and gene transcription. Physical activity and caloric restriction also modulate epigenetic pathways, contributing to improved metabolic health. The interaction between epigenetics and the microbiome further highlights the complexity of these mechanisms. Early-life exposures and lifestyle choices can have lasting epigenetic effects, influencing disease risk later in life. Integrative approaches that combine diet, lifestyle, and mind–body practices provide a comprehensive strategy for modulating gene expression. These findings support the concept of personalised medicine, where interventions are tailored based on individual genetic and epigenetic profiles. Future research should focus on identifying specific epigenetic markers associated with integrative health practices. This will enable more targeted and effective interventions for disease prevention and health optimisation.

Clinical Translation and Disease Prevention

The translation of integrative health practices into clinical settings requires a structured and evidence-based approach. These interventions have been shown to be effective in preventing and managing a wide range of chronic diseases, including cardiovascular disease, diabetes, obesity, and mental health disorders. Integrative approaches improve risk factors such as hypertension, dyslipidaemia, insulin resistance, and inflammation. They also enhance patient adherence and engagement, as they empower individuals to take an active role in their health. Furthermore, the incorporation of these practices into primary care can reduce the burden on healthcare systems by preventing disease progression and reducing hospital admissions. Clinical guidelines should include integrative approaches as part of standard care, particularly for lifestyle-related conditions. The use of digital health technologies and wearable devices can facilitate monitoring and adherence to these interventions. Personalised care plans based on individual risk profiles and preferences can enhance effectiveness. Interdisciplinary collaboration between healthcare professionals is essential for successful implementation. Education and training in integrative medicine should be incorporated into medical curricula. The cost-effectiveness of these interventions further supports their adoption in healthcare systems. Long-term studies are needed to evaluate their impact on morbidity and mortality. The integration of these approaches represents a shift toward a more holistic and patient-centred model of care.

Step	Action	Tools
Assessment	Lifestyle + biomarkers	Blood tests, history
Personalisation	Constitution + risk	Ayurveda + AI
Intervention	Yoga, diet, qigong	Structured plan
Monitoring	Biomarkers	HbA1c, CRP
Prevention	Long-term adherence	Behavioural coaching

Table 3 Clinical Integration Framework

Future Directions - AI, Precision Medicine, and Integrative Health

The future of integrative health lies in the convergence of traditional knowledge, modern science, and digital technologies. Artificial intelligence and machine learning can be used to analyse large datasets and identify patterns in health and disease. These technologies can facilitate personalised health recommendations based on genetic, metabolic, and lifestyle data. Integrative health apps can provide real-time feedback and guidance, enhancing adherence and outcomes. In addition, precision medicine approaches can be

combined with traditional systems such as Ayurveda to create highly personalised treatment plans. The integration of wearable devices and biosensors allows continuous monitoring of physiological parameters. This data can be used to optimise interventions and predict disease risk. The development of digital platforms for integrative health can improve accessibility and scalability. Collaboration between researchers, clinicians, and technologists is essential for advancing this field. Ethical considerations, including data privacy and equity, must also be addressed. The potential for these technologies to transform healthcare is significant, particularly in the context of preventive medicine. Integrative approaches supported by AI can lead to more efficient and effective healthcare delivery. Ultimately, the goal is to create a system that promotes health, prevents disease, and enhances quality of life.

Conclusion

Integrative natural approaches have the potential to offer a scientifically grounded and clinically effective strategy for maintaining health and preventing disease. Yoga, Ayurveda, qigong, and nutrition collectively influence neuroendocrine, immune, metabolic, and microbiome pathways. Their synergy provides a comprehensive framework for health optimisation. In addition, these approaches emphasise sustainability, accessibility, and patient empowerment, making them suitable for large-scale implementation. The integration of traditional knowledge with modern science enhances credibility and acceptance within the medical community. Future research should focus on high-

quality clinical trials and systems biology approaches to further validate these interventions. The incorporation of digital health technologies and AI may facilitate personalised and scalable solutions. Education and training of healthcare professionals in integrative medicine are essential for effective implementation. Policymakers should consider integrating these approaches into public health strategies. The long-term benefits include reduced healthcare costs and improved population health. Furthermore, these practices promote a holistic understanding of health, encompassing physical, mental, and social well-being.

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Medical Quiz

Mark out True / False statements.. Answers at the bottom of page 26.

Vitamin D

1. It is considered an appropriate strategy to recommend Vitamin D supplementation to high-risk pre-diabetes and who are already undertaking lifestyle modification.
2. Daily low dose administration of Vitamin D is recommended for older individuals above the age of 50 for Vit D supplementation rather than intermittent high doses.
3. The British Geriatrics Society does not recommend Vit D monotherapy for general older population to prevent fractures.
4. For most healthy, community dwelling adults routine use of Vit D and calcium does not meaningfully prevent fractures.
5. Empiric Vit D supplementation is suggested to adults aged 75 and above to potentially reduce mortality risk.
6. Vitamin D administration does not prevent the progression or deterioration of kidney function in Chronic Kidney disease.

TRUE FALSE
✓ ✗

☐ ☐
☐ ☐
☐ ☐
☐ ☐
☐ ☐
☐ ☐

Gout

1. Cushing syndrome is more commonly associated with a higher incidence of gout.
2. Gout is a subacute onset of symmetric polyarthritis involving small joints of the hands, often with morning stiffness.
3. Abrupt onset of acute monoarticular arthritis affecting a lower-extremity joint.
4. A normal serum uric acid level typically excludes gout.
5. Elevated serum uric acid levels alone are sufficient to diagnose gout in the absence of symptoms.
6. Serum uric acid levels might be normal during an acute gout attack.
7. Serum uric acid testing is the gold standard for diagnosis.
8. Humans cannot metabolise uric acid.
9. Both symptomatic and asymptomatic hyperuricemia always require xanthine oxidase inhibitor therapy.
10. Tophi should be surgically removed in most cases to prevent progression.
11. Urate-lowering therapy is generally not recommended for asymptomatic hyperuricemia.
12. Therapy for acute gout flares should be initiated 36 hours after symptom onset to avoid complications

TRUE FALSE
✓ ✗

☐ ☐
☐ ☐
☐ ☐
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Realise the Value of Your Practice. Reduce the Burden of Running It.

For many GP partners, the real challenge isn't deciding whether to retire or step back — it's how to unlock the value they've built in their practice and premises while ensuring continuity for patients and staff.

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Case study 1

Single-Handed GP — From Retirement Decision to Outstanding Practice. A six-week transition that protected the GP's investment and the practice's future.

A single-handed GP owned both his practice and its building. After many years of caring for his patients, he wanted to retire — but also wanted to protect the value he had built up.

SSP Health acquired the building and transferred the NHS contract in **less than six weeks**.

The impact

- **Less than 6 weeks** from agreement to transfer
- GP was able to **realise the value of his property investment**
- Patients experienced **continuity of services**
- Staff experienced a **smooth transition**
- No prolonged uncertainty around the future of the practice
- Practice continued to develop and thrive
- **Current CQC rating: Outstanding**

A retirement without the hassle — and a practice with an even stronger future.

Case study 1

Four-GP Partnership — From Succession Problems to Long-Term Freedom. Two partners retiring. Recruitment difficult. Management pressures mounting.

A four-GP partnership owned its practice building. Two partners wanted to retire, but replacing them was proving difficult. At the same time, the remaining partners were struggling with the increasing demands of practice management and meeting local targets.

SSP Health purchased the building and transferred the contract.

All four partners were able to **realise the value of their investment in the premises**.

The remaining partners then continued working as self-employed GPs, but without the burden of running the practice.

One partner continued for an extraordinary **20 years after joining SSP Health**, with guaranteed income and without management responsibilities.

The impact

- All partners realised the value of their property investment
- No need to find replacement partners before retirement
- Remaining GPs could continue clinical work without management stress
- One GP continued working for SSP for 20 years
- Guaranteed income provided long-term security
- Clinical targets are now regularly achieved
- Practice became a teaching practice
- **Current CQC rating: Good**

The partnership changed — but the GPs didn't have to give up the part of the job they loved.

Case study 3

Husband & Wife Partnership — From Requires Improvement to Good. A stress-free retirement — and a practice transformed.

A husband-and-wife GP partnership owned its building. The practice was rated **Requires Improvement by the CQC**, creating additional pressure. The wife wanted to retire, while her husband wanted to continue working.

SSP Health purchased the building and transferred the contract, allowing both partners to **recover the value of their premises investment**. SSP Health's **Clinical Governance and Quality Assurance teams** then worked swiftly with the practice, implementing the systems, processes and governance needed to address the CQC concerns. The practice was subsequently re-inspected and achieved an **overall CQC rating of Good**.

The wife retired stress-free. Her husband continued working for a further two years — **without the management burden of running the practice**. Today, the practice is thriving.

The impact

- Both partners **realised the value of their premises investment**
- Wife retired **stress-free**
- Husband continued working for **two further years**
- Management burden removed
- Immediate access to experienced **Clinical Governance and Quality Assurance teams**
- CQC rating improved from **Requires Improvement** → **Good**
- Practice is now **thriving**

A change in ownership that transformed both the partners' lives and the future of the practice.

What could your next chapter look like?

These practices were all very different. But each GP partnership had reached a point where **the traditional model of owning and managing a practice was becoming increasingly difficult and stressful**.

SSP Health provided another option. **You could:**

- **Realise the value of your practice premises**
- **Retire without the stress of finding a successor**
- Continue working as a GP for **as long as you choose**
- Remove the burden of **practice management**
- Benefit from experienced **clinical governance & quality teams**
- Give your staff greater organisational support
- Protect continuity for your patients
- Have the reassurance of a **larger organisation behind you**
- Focus on **being a GP — not running a business**

You built your practice. You deserve to benefit from it.

Don't wait until recruitment becomes impossible, management becomes overwhelming, or retirement becomes complicated.

Keep the value you've created. Keep doing the work you love. Lose the management burden.

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BIDA Sports Update

Dr Ravi Badge MSc, MRCS, DNB(Orth.), MS(Orth.), FRCS(Tr. and Orth.)

Consultant Upper Limb Surgeon, Warrington and Halton Hospitals NHS Foundation Trust (NHS). National Sports Co-Ordinator, BIDA.

The BIDA President's Cup 2026

The Final of BIDA's 2026 President's Cup Cricket Tournament was played at Monton Sports Club, Eccles, Manchester on 4th May, with Wigan Division taking on Stoke-on-Trent Division. In an entertaining contest, Wigan won by 5 wickets. Dr Ravi Badge was named "Man of the Match" and is shown, bottom right, receiving his trophy from BIDA President Prof. Amit Sinha. Below: The victorious Wigan Division team pictured with BIDA President Prof. Amit Sinha.



**British International
Doctors' Association Ltd**

President: Prof Amit Sinha
National Sports Secretary: Mr Ravi Badge



4th Annual BIDA Golf Tournament



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Division 1 (Handicap ≤ 18.0)
Division 2 (Handicap ≥ 18.1)



Dinner Sponsor: Adventum Wealth



Medical Quiz Answers: Vitamin D – All Statements 1 – 6 are True. **Gout:** 1. Cushing syndrome is more commonly associated with a higher incidence of gout. False. 2. Gout is a subacute onset of symmetric polyarthritis involving small joints of the hands, often with morning stiffness. False. 3. Abrupt onset of acute monoarticular arthritis affecting a lower-extremity joint. True. 4. A normal serum uric acid level typically excludes gout. False. 5. Elevated serum uric acid levels alone are sufficient to diagnose gout in the absence of symptoms. False. 6. Serum uric acid levels might be normal during an acute gout attack. True. 7. Serum uric acid testing is the gold standard for diagnosis. False. 8. Humans cannot metabolise uric acid. True. 9. Both symptomatic and asymptomatic hyperuricemia always require xanthine oxidase inhibitor therapy. False. 10. Tophi should be surgically removed in most cases to prevent progression. False. 11. Urate-lowering therapy is generally not recommended for asymptomatic hyperuricemia. True. 12. Therapy for acute gout flares should be initiated 36 hours after symptom onset to avoid complications. False.

Remembering... Dr Arun Bakshi

Emeritus Consultant Physician,
St Mary's Hospital, Isle of Wight

The entire membership of BIDA wishes to express its deepest sympathy to the family and loved ones of Dr Arun Kalyan Bakshi, who sadly passed away on 20 August, aged 87.

A much loved husband, father, grandfather, brother, uncle, dear friend, and a widely respected physician and campaigner for NHS reform, Dr. Bakshi was a highly distinguished clinician, a dedicated campaigner against racism and discrimination in the NHS and a long-standing advocate for patients' rights to be involved in their own care. After graduating from medical school in India, Dr. Bakshi moved to the UK in 1961, initially working in the Liverpool area and subsequently becoming a Consultant in Diabetes and Endocrinology on the Isle of Wight, helping to shape the treatment of diabetes on the Isle of Wight and at Portsmouth Hospitals NHS University Trust. Following his full-time retirement from the NHS in 2020, a centre for diabetes and endocrinology on the Isle of Wight was named in his honour.

Dr. Bakshi was the founder editor of the Medical Journal *Practical Diabetes*, and a member of the "Our NHS Our Concern" think tank. He was a campaigner against racism, and a valued member of both BAPIO – for whom he established the Division on the Isle of Wight over 15 years ago – and also of BIDA.

We mourn his departure to the heavenly abode and offer our prayers for him and pay our condolences to the family. We will always celebrate his life. He remained an active participant and member of BIDA and will be sorely missed.



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International commission on radiological protection.
<http://icrp.org> (date last accessed 20 September 2009).

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Once you have read the guidelines and are ready to submit your article please ensure all elements are included in the same document. They are to be sent to the BIDA office or the Editor. The email address is as follows:

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