Chronic kidney disease and advanced roles for the biomedical scientist: time to step up, time to collaborate

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Biomedical scientists receive requests from renal teams almost knowingly full well that a patient may have complications during/post initial Chronic Kidney Disease (CKD) screening so there needs to be a step/process whereby scientists are empowered to inform/ ask the requestor 'what have you tried already' (in some practices this does take place, but not all). Scientists should further link clinical and scientific basis to identify whether CKD screening processes have been fulfilled or not. Some patients would be more at risk of further renal insufficiency otherwise. This is important bearing in mind there are now more restraints in 'everyday' practice. Having a good knowledge base is also important with regards to good leadership, and embracing shared-decision processes more widely.

This article seeks to provide a general awareness of how the Biomedical scientist's role should be enhanced and more integrated in Primary Care to support CKD screening and the advancement of Biomedical Sciences. This article will highlight what advances should be made to provide smarter services through collaborative working and put into perspective why scientists should deliver more services, such as CKD screening to the general population.

Key Words: Technology, Biomedical science, Primary care, Collaborative working, Chronic kidney disease, Best practice

INTRODUCTION

Healthcare access and delivery faces significant global and local challenges [1]. Funding restraints in health care practices means that there is now ever more need to ensure technology is available to better integrate services, to allow swifter delivery of clinical and 'biomedical-centred care for patients in primary care [1]. To ensure better health of the general population through smarter working, there is a need to highlight the scientist's role in wider primary care and this can be achieved through collaborative working [2]. New technology is already playing an important role in improving patient care.

The present reality is that Biomedical Science 'practice culture' has not changed. Scientists have traditionally been perceived (if at all) as 'those who support diagnosis in secondary care', or those who 'run the tests behind the scenes'. The public (and sometimes peers/ colleagues) otherwise do not really understand 'who we are and/or what we do'.

To provide perspective; community pharmacists and general practitioners around the country, for example use technology to enhance practices from paper to digital records, offering online transactions including online registration [3], medicines use review (MURs), appointment booking, ordering of repeat prescriptions and viewing of medications etc. Whilst these are some practical examples, there is now more scope where the scientists could be more involved in primary care to offer more integrated care and service to support innovation and best practice [4].

Aims

This article seeks to provide a general awareness of how the Biomedical Scientist's role should be more involved in the diagnosis of Chronic Kidney Disease (CKD) in primary care to help the advancement of Biomedical Sciences. This article will highlight what advances should be made to provide smarter services through collaborative working and put into perspective how scientists can deliver more screening services to the general population.

Objective

Whilst the Institute of Biomedical Sciences (IBMS) Corporate (2020) strategy is still in consultation; all parts of the IBMS Corporate Strategy (2015-2018) inform that scientists need to work together effectively and smarter towards the delivery of vision and aspirations if success is to be achieved [4]. It is against this background that it is now more important to understand what needs to really be done to inform use of technology to improve and enhance biomedical practice and identify wider ways of collaborating/ working where Chronic Kidney Disease (CKD) is an increasing and basic laboratory diagnostics can be implemented at the primary care level. This work seeks to explore:

- To identify what strategy and mechanisms are required to enhance collaborative working in Primary Care
- To identify what a Biomedical Science out of hours service should look like where online consultations are concerned and how scientists should be more involved in the diagnosis of CKD
- To identify what challenges (if any) identifying routes to collaborative working to advance Biomedical Practice.
- To identify how technology can help improve Biomedical Science for Primary Care Practice where clinical diagnostics is concerned

CHRONIC KIDNEY DISEASE (CKD)

CKD is a Long-Term Condition (LTC)/ Chronic Illness (CI) that can be summated as the steady and consistent reduction in renal function over time. Primarily in the disease development, patients with CKD will have no identifiable symptoms and it is thus largely a silent disease and this has been the case for many years-CKD is an under-diagnosed CI [5,6]. Even in the absent of indicators, CKD adds significant burden on cardiovascular health and can cause death acutely or over time owing to its clinical manifestations [5,6].

CKD is thus now increasingly being recognized as a global public health problem and a key determinant of poor health outcomes. There is more compelling evidence that disadvantaged communities, (i.e., those from low-resource, racial and minority ethnic communities), and/or indigenous

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and socially disadvantaged backgrounds, suffer from marked increases in the burden of unrecognized and untreated CKD. Although the entire populations of some low- and middle-income countries could be considered disadvantaged, additional factors create a position of extreme disadvantage for certain population groups (those living in some rural areas, young, women, the elderly, etc.). The fact that even in developed countries, CKD has increased, and outcomes suggests that there is much to learn beyond the traditional risk factors contributing to this irreversible chronic disease and associated complications [7-9]. Renal function is established by degree of Glomerular Filtration Rate (GFR)/ estimated Glomerular Filtration Rate (eGFR). Table 1 below provides characterization of the five stages of CKD severity by GFR.

Table 1: Stages of Chronic Kidney Disease (CKD).

CKD Severity	CKD Classification
Stage 1	Kidney damage with normal or raised GFR (greater than 90 ml/min/ 1.73 m^2)
Stage 2	Kidney damage with normal or raised GFR (60-89 ml/min/ 1.73m^2)
Stage 3	Moderately impaired GFR (30-59 ml/min/1.73 m^2)
Stage 4	Severely impaired GFR (15-29 ml/min/1.73 m^2)
Stage 5	End Stage Renal Failure or GFR (less than 15 ml/min/1.73 m^2)

Table reproduced from [10]

Several authors have emphasized the importance of early renal screening in patients with diabetes mellitus [11-15]. Patients with an eGFR below 60 ml/min/1.73 m^2 (stages 3–5 CKD) are at increased risk of cardiovascular disease (CVD) and raised Serum Creatinine (SCr), in comparison to the general population [16-19]. Between 2009-2010, CKD accounted for 1.3% of the UK health care budget directly and indirectly up to 25% of the healthcare budget in the United States in patients aged over 65 [16-19]. In the past decade there have been continuous efforts to improve the identification, management and monitoring of CKD more effectively [20] and in this respect, Point of Care Testing (POCT) programmes are also being prompted [21]. POCT is also important to appreciate with respect to future care plans where more emphasis is being placed on patient reported outcome measures (PROMS) [22-24]. CKD can also be somewhat linked to race, as highlighted by the high prevalence of CKD related to hypertension, diabetes, or both among African and Native Americans in the USA, as well as Afro-Caribbean and Asian individuals in the UK [25-30].

Perceived challenges facing biomedical scientists

With the development and advancing status of technology, this should encourage scientists to also become more 'clinical', providing information, screening/diagnostic services (for example CKD health for general population), health promotion and online consultations relating to patient and ailment/ disease as part of a revamp of bridging gaps in care for the wider population; perhaps termed as enhanced services. Ironically, patients are being encouraged to use technology, web portals, social media and phone apps to help them assess and self-manage own health risks [31]. Even with websites such as Lab Tests Online [24], patients will still need to know what tests are for and why they are being requested from a healthcare provider. In this context, it scientists should be embracing technology and identifying novel ways of working/collaborating with other healthcare teams [32]. For example, in collaboration with community pharmacists, scientists should seek opportunities to implement their knowledge of tests and requests where community pharmacists have access to Patient Medicines Records (PMRs) [33]. Looking at medication history, scientists could offer more layman science understanding of tests based on requests in primary care setting or via online and telephone consultations [34].

Primary care is evolving; however, there is little (if any at all) collaboration and uptake of technology to support patients in managing their healthcare needs more innovatively. In collaboration with primary care, Biomedical Scientists have a great potential to improve screening and quality assurance of some of the services and provide health-related information/context of laboratory tests for different disease states for the public [34-37]. In this very context, the perceived challenges facing scientists are actually very similar to pharmacists [38,39].

The importance of point of care testing (POCT) or near-patient testing (NPT)

It has been highlighted that Point of Care Testing (POCT) or Near-Patient Testing (NPT) is becoming increasingly important [13]. In work by Muhammad (2015) [40] wherein a Chronic Kidney Disease (CKD) example is used to prompt early disease prevention, screening will become increasingly important where biomedical scientists and community pharmacists should play wider active roles. There are various costs to consider (e.g., human resource, POCT/NPT kits, clinical auditing, external quality assessment and quality control checks), but POCT/NPT and a collaborative referral service between would be more cost-effective than Renal Replacement Therapy (RRT). Further development of POCT/NPT programmes in primary care involving collaborations between biomedical scientists and community pharmacists would allow wider service availability in primary care and would be advantageous in suspect/ high-risk patients. What do Scientists have in common with pharmacists? Quite a lot-whilst community pharmacists have roles and skill-sets for delivery of medicines management to the public, they too have similar challenges relating to wider practice as biomedical scientists [41]. Where CKD is still a concern in wider primary care-various authors have prompted advantages for early screening [42-53]. Is it not time to collaborate?

Time to step up-time to collaborate

Biomedical Scientists have a wealth of insight and information wherein they are very much able to develop and be involved in wider areas of healthcare practice. This is also in-line with the IBMS Corporate Strategy (2015-2018) [4] and projections of the IBMS Corporate Strategy (2020) wherein the mission is to be dedicated to the promotion, development and delivery of excellence in all aspects of biomedical science and will provide the highest levels of service to patients and the public. Biomedical Scientists have a unique role to play to improve health outcomes. The use of technology is recommended as an enabler for scientists to play a greater role in healthcare. This has been evident regarding delivering Medicine Use Reviews (MURs) [28]. Whilst scientists have unique aptitudes and unique capabilities, their skill-set and talents have not been tested, piloted or well-defined in primary care, simply because traditionally 'scientists' have been viewed as laboratory support staff for the NHS and that's all they really do. It's now time to step up-time to collaborate, to identify smarter routes of working and better the health of general population. There should now be an action to advance roles for the Biomedical Scientist.

'Forward Thinking' and 'Forward-Doing'

Scientists should be encouraged to have more constructive dialogue with their multidisciplinary colleagues-one step further to this is for there to be 'across sector communication' so that scientists are more forward thinking and forward doing with regard to their roles. Understanding gaps in health practice across sectors is where more leadership is required; scientists can bring a unique contribution to the forefront.

Patient Reported Outcome Measures (PROMs) are used as tools for benchmarking and hospital performance assessment [30,31]. PROMs also have the potential to assist in the delivery of health care – primary care and otherwise. In the UK, [15,28-31] scientists and pharmacists could be more innovative and seek opportunities to ensure delivery of smarter services through technology ensuring best practices are truly being met [3,4,15].

Where technology is providing mores for biomedical practice

Technology and its ability to hold large amounts of information, to support decisions, and to repeatedly do the same act, give the potential to meet both service providers and users [3]. With the expanding utilization of digital and technological media by public health providers and service users, there is a need to evaluate the scientist's role in the wider primary care. Research has explored the effect of the availability of internet-based health information on patients' healthcare education and knowledge [3]. Studies have found that a significant proportion of the public rely on the internet to make critical health decisions and often bring information retrieved from the internet into healthcare consultations [15]. Whilst Long-Term Conditions (LTCs) can be somewhat controlled by medicines and ongoing care-plans, the life of a person with a LTC is forever altered – there is no return to 'normal' [15]. Scientists provide services from laboratory secondary care perspective; however, there is now more movement toward self-care and avenues where scientists could provide patient online consultation services. This could be achieved through Social Media or Desktop Apps. This is where the IBMS need to be involved to inform practice guidelines.

PATIENT GROUP DIRECTIONS (PGDS)

In the Patient Group Directions NICE Guideline (2013) [50] the public have the right to be involved in discussions and make informed decisions about their care, as described in your care [51]. Patients who are more informed often find they are content with their services, and more likely to hold on to treatments and/or care-plans, when they make decisions jointly with their healthcare professionals [52]. The making decisions using NICE guideline explains how to use words to show the strength (or certainty) for recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards, laws (including on consent and mental capacity), and safeguarding. The PGDs allows healthcare professionals to supply and administer specified medicines to pre-defined groups of patients, without a prescription. This guideline aims to ensure that PGDs are used in line with legislation, so that patients have safe and speedy access to the medicines they require. Given the wider roles that scientists and pharmacists should be involved in; scientists too do have knowledge of issuing medicines and blood products, for example. The NICE Guideline (2013) [53] will help inform setting up integrated services and where technology in practice could be bridge services better.

Diagnostics and screening: what needs to be done?

Scientists and Pharmacists, here and internationally, should be playing an important role in supporting care for patients with complex needs [34], as well as in providing educational events in community based on health and care needs relating to ailment and disease [4,15,35-38]. A range of developments have been called for in support of the further expansion of medicines optimization activity. This includes referring patients to a community pharmacy for medication planning before starting any treatment [4,15,35-38], and strengthening the transfer of medicines information, for example, by providing all community pharmacists with NHS.net website addresses. In side with this, Biomedical Scientists should be involved with the same privileges, prompting more routes for collaborative working [53-55].

CONCLUSION

Understanding expansion of roles, economics, and technology will allow better care and prompt management of patients in primary care [4,15,34-37]. At present, however the evidence-base for collaborative working has been insubstantial. Biomedical Science practice has been quite traditional – it is still hidden, misunderstood or misinterpreted; collaborative working would be particularly appealing for delivering care, monitoring practice, auditing and managing care. To identify what strategy and mechanisms are required to encourage collaborative working. This also means research and an evidence-based approach is needed to inform both biomedical and pharmacy practices to strengthen ways of evaluating the delivery of CKD treatment and diagnosis [3,5,33].

RECOMMENDATIONS

1. In keeping with the IBMS (2015-2018) Corporate Strategy, future Biomedical Scientists (with appropriate further competencies) should be more involved in primary care POCT/NPT screening, especially for patients with LTCs like CKD.
2. The IBMS needs to begin working on a collaborative framework/ guideline with the Royal College of Pathology (RC Path) to broaden the services for scientists. This should be a focus on primary care practice.
3. Whilst the pharmacist can conduct Medicine Use Reviews (MURs) as part of their primary care practice, the scientist should be providing diagnostic understanding of CKD-related tests so that care primary care is robust, and patient has a more 'rounded' experience
4. Owing to time constraints, GP clinics should no longer be the only areas to get medicines advice or screening and information on ailments/ disease
5. Use of technology is needed to enhance multi-disciplinary working, efficiency, quality and management.

DECLARATIONS

Ethical approval and consent to participate

This is a review of Advancing the Role of the Biomedical Scientist in Primary Care/ Community. Ethical approval and consent was not required for this work. No participants were involved where ethics approval would be needed prior submitting this review for publication. This is a review of Advancing the Role of the Biomedical Scientist in Primary Care/ Community. Ethical approval and consent was not required for this work. No participants were involved where ethics approval would be needed prior submitting this review for publication

Consent for publication

The author has published on behalf of the Worcester University in collaboration with the Renal Patient Support Group (RPSG). The corresponding author is lead author.

Availability of supporting data

All information and context relating to this subject entity at large has been retrieved through citing the literature, respectively.

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SM is lead and corresponding author for this work

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Shahid has provided multidisciplinary team working perspectives from laboratory to community and wider through several key publications. Shahid co-founded the Renal Patient Support Group (RPSG) in (2009) which is an evidence-based support group for patients and carers in Chronic Kidney Disease (CKD); the group now has an international membership.

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