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Innovating to improve primary care in less developed countries: towards a global model

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► Additional material is published online only. To view please visit the journal online (<http://dx.doi.org/10.1136/bmjinnov-2015-000045>)

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Received 25 February 2015

Accepted 16 May 2015

Published Online First

23 July 2015



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To cite: Fairall L, Bateman E, Cornick R, et al. *BMJ Innov* 2015;1:196–203.

ABSTRACT

One of the biggest problems in global health is the lack of well trained and supported health workers in less developed settings. In many rural areas there are no physicians, and it is important to find ways to support and empower nurses and other health workers. The Knowledge Translation Unit of the University of Cape Town Lung Institute has spent 14 years developing a series of innovative packages to support and empower nurses and other health workers. PACK (Practical Approach to Care Kit) Adult comprises policy-based and evidence-informed guidelines; onsite, team and case-based training; non-physician prescribing; and a cascade system of scaling up. A series of randomised trials has shown the effectiveness of the packages, and methods are now being developed to respond cost-effectively and sustainably to global demand for implementing PACK Adult. Global health would probably benefit from less time and money spent developing new innovations and more spent on finding ways to spread those we already have.

Primary healthcare is key to achieving the Millennium Development Goals and the broader goal of ‘health for all’ by providing accessible, affordable and effective healthcare. Yet in many less developed countries, primary healthcare is constrained by a lack of adequately skilled and supervised health workers—the WHO estimates a global shortage of 4.3 million health workers.¹ Through 14 years of innovation, the Knowledge Translation Unit (KTU) of the University Cape Town Lung Institute has found evidence-based ways to strengthen primary care in underserved areas. This article tells the story of that journey, and discusses how this innovation is being spread and might be spread further.

THE CHALLENGES

The caseload in primary care has increased because of the growing burden of non-communicable disease (NCD) together with programmes to shift the care of patients with HIV and tuberculosis (TB) out-of-hospital.² In addition, primary care in underserved areas has been dominated by vertical programmes that only treat patients with TB or HIV. This is no longer an adequate response. Primary care in less developed countries is ill prepared for the pandemic of NCD and mental illness now hitting it. And many patients have not one condition, but many—for example, TB and diabetes or HIV and hypertension, which means that treatments are complex and intricate.

The 2008 *Lancet* series celebrating the 30th anniversary of the Alma Ata Declaration, which called for primary care to be available to all, made clear the need for strengthening primary care, building on the success of vertical programmes for priority conditions.³ It also noted that good primary care depends on the successful implementation of high-quality evidence-informed guidelines.⁴ In reality, primary care health workers in less developed settings are provided with guidelines that are long, dense, contain conflicting recommendations, are out of date, and do not help the patients who have multiple conditions. Plus, we have long known that simply sending guidelines to healthcare workers does not on its own improve performance; more is needed.⁵

Two decades ago, the WHO revolutionised the care of young children with its Integrated Management of Childhood Illness (IMCI) strategy, which provided standardised treatment algorithms for



serious conditions based on symptoms.^{6 7} The strategy has been implemented in over 100 less-developed countries, and evaluations have shown that it improved the quality of care and reduced costs.^{8–11} In order to reduce deaths, the programme needed to be implemented at scale, but scale up was constrained by dependence on intensive 2 week offsite training that often led to only one health worker in each facility trained to manage young children; the health worker being away also puts strain on the service. Nevertheless, IMCI remains the standard approach to training health workers managing children in resource constrained settings.

The WHO embarked on the development of an equivalent strategy for adults, first as the Practical Approach to Lung Health (PAL)¹² and later as the Integrated Management of Adult and Adolescent Illness (IMAI).¹³ However, IMAI arrived just as major campaigns were being launched to scale up treatment of patients with HIV and so took on an HIV focus. Its implementation has been limited to a few districts in countries with high rates of HIV and has not been evaluated in the overarching way that IMCI has. The recently developed WHO Package of Essential NCD (PEN) interventions for primary healthcare in less-developed settings includes guidelines on diabetes, chronic respiratory disease, cancer, heart disease and stroke, and is currently being piloted in several countries, as yet without a published evaluation.¹⁴

Table 1 summarises the key features of currently available clinical management aids designed to standardise the approach to priority conditions.^{6 12 13–21}

So it remains the case that primary care health workers in less developed countries face a burgeoning caseload without the tools they need to manage adult patients.

DEVELOPING A PACKAGE TO IMPROVE PRIMARY CARE IN SOUTH AFRICA

Over the past 14 years KTU has developed, tested, expanded, refined and implemented an integrated approach to common priority conditions in primary care throughout South Africa. PACK (Practical Approach to Care Kit) Adult, the latest iteration of this work, covers all significant and common presentations of adults in primary care in South Africa, and has four components: policy compliant and evidence-informed guidelines; onsite, team and case-based training; non-physician prescribing and a cascade system for jurisdiction-wide scaling up.

The first iteration of the package (PALSA; PAL in South Africa) was developed to address adults presenting to first-line facilities with cough or difficulty breathing, among whom the index of suspicion for a diagnosis of TB or another acute or chronic respiratory disease should be high. It was developed to address the already high incidence rate of adult TB in South Africa and the delay in diagnosis. A cluster

randomised trial of 40 clinics with over 200 nurses showed modest improvements in quality of care, and substantial improvements in detection of cases of TB, confirming the WHO's reasoning that improved management of the symptomatic patient was necessary to augment passive case detection of TB.²¹

The next iteration of the programme, known as PALSA PLUS, was developed in response to South Africa's decision to implement a public sector anti-retroviral treatment (ART) programme. It extended the training of clinic nurses to include HIV/AIDS screening, and referral to physicians for diagnosis and initial prescribing of ART, with patients returning to nurses for monitoring. A second cluster randomised trial of this wider programme again confirmed modest improvements in the quality of care, and a substantial additive positive impact on case detection of TB.²² There was also a surprising improvement in successful treatment outcomes for retreatment patients with TB, suggesting that the training might have had a positive impact on nurse–patient relationships.²²

As the South African HIV/AIDS treatment programme scaled up, it became clear that the physician initiation of ART (mostly in hospital or during once a week facility visits) was a severe bottleneck preventing access to early treatment.²³ So the KTU expanded the scope of the PALSA PLUS package to support Nurse Initiated and Managed ART (NIMART). A third cluster randomised trial found that the intervention supporting nurse-led care of HIV/AIDS resulted in patients being managed as effectively as in physician-led programmes, and again showed modest improvements in quality of care and outcomes for patients,²⁴ a rare finding in real world evaluations of health system innovations.⁵ Qualitative evaluations alongside these trials repeatedly showed that front line clinic staff felt empowered^{25 26} by their training, setting to rest a fear that responsibility for clinical diagnosis and treatment would be overpowering and result in burnout. PALSA PLUS has now been scaled up across South Africa as part of a 2010 push to provide ART in each of the country's 3500 primary care clinics. For the first time, mortality has begun to fall, and life expectancy rose from 54 years in 2005 to 60 years in 2012.²⁷ Today, South Africa has the world's largest ART programme with an estimated 2 million people on treatment, many initiated by nurses.²⁸

PACK ADULT

The PACK Adult guideline covers 40 common symptoms and 20 chronic conditions seen among adults attending primary care clinics in South Africa²⁹ (see online supplementary appendix 1), and is an expansion of PALSA PLUS to include NCD (hypertension, diabetes, cardiovascular disease), mental health, end-of-life care and women's health (antenatal care, contraception). A concise tool, it uses symptom-based algorithms as its entry point and a standardised

Table 1 Key features of currently available clinical management aids designed to standardise an approach to priority conditions

Management aid	Integrated acute and chronic conditions (NCDs, IDs, MH)	Symptom based	Evidence based	Less developed setting	Primary healthcare based	User friendly	Comment
IMCI ⁶		✓		✓	✓	✓	Limited to childhood illnesses
IMAI ¹³		✓	✓	✓	✓	✓	<ul style="list-style-type: none"> ▶ HIV focused ▶ Limited coverage of chronic conditions ▶ Modular
PEN Interventions for Primary Health Care in Low-Resource Settings ¹⁴			✓	✓	✓		<ul style="list-style-type: none"> ▶ Text format ▶ Limited to NCDs ▶ Focus on HIV
IMPAC ¹⁵		✓	✓	✓	✓	✓	<ul style="list-style-type: none"> ▶ Limited to obstetric and newborn care ▶ Modular
mhGAP Intervention Guide ¹⁶		✓	✓	✓	✓	✓	Limited to mental, neurological and substance use disorders
TEAMcare intervention manual ¹⁷			✓		✓	✓	<ul style="list-style-type: none"> ▶ Integrated to depression, diabetes and coronary heart disease ▶ Developed settings
FNIHB Clinical Practice Guidelines for Nurses in Primary Care ¹⁸			✓	✓	✓		<ul style="list-style-type: none"> ▶ Text format ▶ Modules
Queensland Government PCCM ¹⁹	✓		✓	✓	✓		Text format
New Zealand Primary Care Handbook 2012 ²⁰	✓		✓		✓		<ul style="list-style-type: none"> ▶ Developed setting ▶ Text format with some algorithms

FNIHB, first Nations and inuit health branch; IDs, infectious diseases; IMAI, Integrated Management of Adult and Adolescent Illness; IMCI, Integrated Management of Childhood Illness; MH, mental health; mhGAP, Mental Health Gap Action Programme; NCDs, Non-communicable diseases; PCCM, primary clinical care manual; PEN, package of essential Non-communicable disease.

checklist format to assist health workers to 'Assess, Advise and Treat' patients' chronic conditions. Usability has steadily improved by incorporating feedback from users and the qualitative evaluations. The guideline prompts users at appropriate opportunities to consider diagnosis of a priority condition, speeding initiation of routine care for that condition with criteria and paths for referral where appropriate.

PACK Adult is revised every year to remain current with new evidence and to stay aligned with fast changing national policies and programmes. Compliance with local medication lists and regulations on prescribing is critical, and experience gained from initial implementation has been used to lobby for greater access to essential medications. Updating of guidelines is a global problem, and KTU has worked hard to develop sustainable methods of updating. It has now formed a partnership with *BMJ* that provides access to the evidence updates that the *BMJ* produces every month. The guideline's relevance and being up-to-date now makes PACK Adult the predominant knowledge resource for local health workers, their managers and educators. PALS PLUS was used as the Department of Health training vehicle to pilot NIMART in South Africa,³⁰ and, more recently, successful PACK pilot implementation has led to nurses increasingly being allowed to initiate and titrate medication for hypertension, diabetes and other NCDs.

The PACK Adult training programme supporting the guideline is the culmination of repeated refinements, four large pragmatic trials of implementation, the scale up of PALS PLUS throughout South Africa and a pilot in three of South Africa's health districts.

The training programme is based on educational outreach, or repeated brief visits by clinicians trained as educators to the clinics where they facilitate information, encouragement and participatory education for health professional teams to embed the use of PACK Adult in daily practice.³¹

PACK Adult, as in the preceding programmes, is being scaled up in South Africa using a cascade system: master trainers based in provincial government training centres are selected by health department leaders and the KTU to be equipped as master trainers during a 4-day residential workshop. They are then supported to plan implementation at district level, identify suitable facility outreach trainers, conduct workshops for these outreach trainers, and then monitor and support them as they go out to provide training in clinics. Since 2007 the KTU has trained 74 master trainers who have equipped 1430 facility outreach trainers to train almost 20 000 health workers at more than 2000 South African primary care facilities. This has been the largest and most rapid scale up of health worker training in the country's history. Over 260 000 copies of the PALS PLUS and PACK guidelines have been distributed, signalling the enduring demand for the programme.

The curriculum for the educational outreach sessions comprises cases designed to create familiarity with the guideline and to highlight content where practice needs to change. The facility outreach trainers initially facilitate 8 to 12 60–90 min training sessions to the clinic team, thus avoiding information overload, and allowing health workers to test out the guideline and discuss their experience of it at the next session. Soon the nurses are bringing their own real-life cases to their training sessions.

The trainers do not instruct the nurses but, rather, help them to learn from the guidelines and each other. The length of this initial training is flexible, to ensure that required competence levels are reached by all nurses, with completion marked by a certificate. Follow-up training varies from monthly sessions to multiple visits and will provide updates, address local requests, align with national initiatives such as TB and HIV awareness days, or provide training for new staff. A hybrid training model to target new staff members combining subdistrict-based sessions with clinic-based outreach has also been developed.

This training strategy is a significant departure from usual training programmes, which take individual health workers out of their facilities, away from their own setting and patients, and rarely provide follow-up support. The instructing of trainers also differs, paying equal importance to skills for their role as educator and to clinical content; this ensures that trainers facilitate the nurses' own learning and use of the guidelines rather than simply offering them didactic content. The strategy has influenced training across the public health sector in South Africa.

Once trained, nurses who previously were permitted only to prescribe a limited number of medications are granted prescribing permission for the larger number of medications necessary to control priority chronic diseases such as HIV, hypertension and diabetes. In the case of HIV, this is followed by a mentoring programme where an experienced prescriber, either a physician or nurse clinician, is partnered with a nurse who is starting to prescribe. This relationship means that the new prescriber has direct access to a named person for troubleshooting and queries, and allows for an assessment of competency necessary to meet local regulations. The KTU is working with provincial health departments in South Africa to expand this model to NCD. Ensuring all nurses are competent prescribers is important for making optimal use of the large state funded system of primary care clinics in South Africa, where nurses see 9 of 10 patients without physician input.³⁰

PACK Adult is being implemented in the 11 pilot districts identified for health system strengthening as part of plans to introduce National Health Insurance in South Africa over the next 15 years.³² This follows PACK Adult's successful pilot in four districts during 2012, and the political profile it received when

presented as one of 11 examples of innovation for NCD at the August 2012 Global Health Policy Summit in London.³³ The South African Deputy Minister of Health, who attended that meeting, has since championed the introduction of the programme in these pilot districts, even travelling out to clinics to see it in action.

PACK Adult is now being used to train medical and nursing students through the Medical Education Partnership Initiative (MEPI). The programme at Stellenbosch University prepares medical students for primary care using PACK Adult during their rural healthcare programme. Many physicians have little training in primary healthcare, and they need to be equipped for the special challenges of large patient numbers, wide scope of practice, limited options for investigation and treatment, working alongside nurse clinicians and difficulties referring patients to the next level of care.

EVIDENCE FOR THE EFFECTIVENESS OF THE PACK ADULT APPROACH

Four large randomised controlled trials, completed between 2003 and 2013, support the effectiveness of PACK Adult to improve health outcomes and strengthen health systems.^{21–23} The first trial tested the respiratory components of the package, the second, its expansion to cover HIV/AIDS, the third, nurse prescribing of ART, and the most recent, the expansion to NCD and mental health (still to be published). All of these trials have been pragmatic trials completed in real world circumstances, including frequent turnover of staff, medication stock outs and variable quality of implementation. Other studies using different designs, including qualitative research and economic evaluations, have complemented the trials.^{25 26 34 35}

The studies, between them, have shown:

- ▶ Modest but consistent and reproducible improvements across a range of outcomes and behaviours (prescribing, referral, screening).
- ▶ Simultaneous improvements in the care of patients with both communicable and NCD. This is important because strengthening one part of the health system is often accompanied by weakening another part.
- ▶ Improvements extend beyond quality of care indicators to patient health outcomes, which is unusual in trials of health systems.
- ▶ Shifts in healthcare utilisation with reductions in the length and duration of hospital admissions.
- ▶ Low-intensity delivery of educational outreach is effective, but there is a dose–response effect, suggesting that more training is more effective.
- ▶ The combination of algorithmic guidelines based on symptoms, educational outreach training, and non-physician prescribing is particularly empowering and effective.
- ▶ The approach is highly acceptable, and popular among nurses and trainers.

- ▶ No evidence of harm has been observed in any of the trials.

This evidence makes PACK Adult one of few programmes for training health workers to be based on robust evidence. A fifth trial of adding counselling for depression is underway, and there have also been studies of implementing an adaptation in Malawi.^{36 37}

EXPERIENCE BEYOND SOUTH AFRICA

PALSA PLUS has been adapted and implemented in pilot sites in Malawi, the Gambia, Brazil and Mexico, and PACK Adult in Botswana.

The KTU led the guideline adaptation in Malawi in partnership with the non-governmental organization (NGO) Dignitas International, and in Botswana with the University of Botswana. In both cases, this required lengthy consultation with many local clinicians and managers taking around 6 months of the time of a guideline developer over a year. In Botswana, the Ministry of Health convened a steering group with representatives of relevant programmes ranging from NCD to maternal health. Working groups from these programmes gave input into the guideline pages, resulting in a high level of investment and sense of ownership by the ministry.

As in South Africa, existing national and provincial guidelines contained inconsistent recommendations, complicating their integration into a single coherent tool. For some conditions, local guidelines were either out of date or absent. Local clinicians assigned to the guideline adaptation struggled to commit the time and attention to detail to resolve discrepancies between policy and available resources.

KTU led the training workshops in Malawi and Botswana. All trainers went on to facilitate onsite training. This approach proved readily transferable, and initial resistance to an unconventional format without didactic presentation gave way to active participation and ownership. Clinic staff received the training with enthusiasm, but expressed frustration at the gap exposed by the guideline between policy and reality in the clinics. Further implementation was initially well supported in Malawi, especially by the NGO appointment of a programme coordinator, but later faltered because of political unrest, the global economic crisis and failure to position the programme within the Ministry.

Both the Gambia and Rwanda approached KTU to implement the programme, but with unrealistic timelines. In both cases, the health ministries underestimated the cost of guideline adaptation and viewed the intervention as one off training rather than a programme requiring the creation of in-country capacity to sustain it.

KTU was not involved in adapting or implementing PALSA PLUS in either Brazil or Mexico, rather the programmes were led by local clinicians. The instructing

of trainer model was not used. The Brazilian adaptation is being evaluated ahead of scale up.

MEETING GLOBAL DEMAND

Over the past 2 years KTU has received numerous expressions of interest from countries as diverse as Zanzibar, Brazil, Mali, Nigeria, Uganda, Kenya, Tanzania, Rwanda, Cambodia, Vietnam, Bangladesh, Nepal, Oman, Yemen, China, India, Germany and Canada. It is clear, however, that a way must be found to enable cost-effective and sustainable implementation of PACK Adult in other countries, and KTU, together with the *BMJ*, Open University and other partners, has worked to develop a model to do so.

RESPONDING TO THE CHALLENGES OF THE GLOBAL SCALING UP OF PACK

The challenges to scaling up something like PACK Adult are globally different from those of developing the components of PACK Adult and implementing it in South Africa, and meeting the challenges is giving KTU a rich opportunity to learn.

First, the guidelines must be adapted in response to local epidemiology and policies, and availability of health workers, medications and services. The aim is to establish local capacity to localise, revise and implement the guidelines to ensure satisfactory tailoring to the local setting, and ownership by those implementing it. This adaptation is a complex process that requires clinical, evidential and diplomatic skills. It can be difficult to find local people with the necessary skills. KTU is helping by preparing a generic version of PACK that provides the evidence for each of its 3500 recommendations along with guidance from *BMJ* Evidence, the WHO and other global bodies, and decision support tips with a limited resource focus. In addition, KTU can offer mentoring for those localising the guidelines and is producing a series of mentorship packages to guide local country teams to localise, pilot, evaluate, scale and revise PACK Adult.

Sometimes, the guidelines must be translated into languages other than English, which requires translation skills and, ideally, a means to quickly modify the translated version when the generic English version changes.

Second, ways must be found to make training more cost-effective. Training in South Africa has been mostly face-to-face, but it should be possible to produce onscreen support, and KTU is working on this with the Open University. Onscreen is more useful than online because many rural areas do not have easy access to the internet.

Third, the South African programme has mostly used paper, although an interactive e-book tablet version has been developed and piloted in four rural clinics, with success. A sophisticated e-reader should be developed, but this requires skills and investment in information technology, plus very careful design. A great deal of thought and learning has gone into the

production of the paper version, and this must now be repeated for electronic versions.

Fourth, if PACK is to be used by non-physicians (which is not always the case but usually is in rural areas and slums in low and middle income countries) then they must be able to prescribe. This usually proves to be a long drawn out political process with physician organisations often resistant. Considerable political skills are necessary to make this happen.

Fifth, there should ideally be a quality assurance system for the guidelines, the training and the daily use of the guidelines. More work is needed on this in South Africa as well as globally, although opportunities exist to form partnerships with other organisations that lead this work, but lack the appropriate clinical decision support.

Finally, the biggest challenge may be obtaining funding and achieving a sustainable model. It seems to be much easier to find funding for research than for scaling up. Investment is needed to achieve the developments outlined above, and it is hard to find this investment. In terms of finding a sustainable model, there is probably only one long-term option—becoming a business of some sort, perhaps a social enterprise.

The business model has simplicity: you generate products and services, customers pay you for the value you provide, the surplus (profit) in what they pay you allows you to invest to produce still better products and services, the customers pay you for the added value—and a virtuous circle is established. If you cease to provide value you go out of business. In contrast, raising research grants or seeking donor funding requires spending a lot of time raising the funds, and once the research is over or a pilot is completed, funding usually ends and the search for funding must begin again.

In addition to the challenge of finding investment, the ‘business model’ requires a set of skills that is usually not available in academic units. The units either have to develop the skills themselves or partner with organisations that have them. KTU is doing both, but the challenges of scaling up something like PACK Adult to other countries are very different from those needed to develop products and services in the first place—probably explaining why so many innovations do not spread. Global health would probably benefit from less time and money spent developing new innovations, and more on finding ways to spread those we already have.

EXTENDING THE VISION

PACK Adult is growing in response to requests from the health workers, trainers and managers who use it. These requests include a package for community care workers (CCWs) and one for the management of child health.

Many low-income countries lack not only physicians but also nurses. The material developed for

CCWs so far covers referral recommendations for seven priority chronic conditions. A 22-page pocket guide, PACK CCW, complemented by patient information leaflets and a training programme, has been developed, and the package is being piloted with 380 CCWs before further expansion. Following a request by the South African Provincial Western Cape Health Department and others, funding is now available to develop PACK Child, which would extend beyond the scope of IMCI to include common non-life-threatening conditions, as well as conditions in children between 5 and 15 years.

The depression package currently being piloted will inform the development of PACK Counsellor, a generic tool for lay health workers providing counselling services across a range of conditions, behaviours and therapies.

The KTU vision is to integrate the management of common priority conditions both within primary care and across levels of care, targeting all health workers from community health workers to professional clinicians based in first-level facilities, as well as those receiving patient referrals to district hospitals. PACK Adult is the first component of this package, and working out how best to adapt it quickly and cost-effectively for other countries in a way that fosters local ownership and sustainability will be key learning for this broader vision.

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Acknowledgements The authors would like to acknowledge the more than 200 doctors and nurses, managers and academics who contribute regularly to the PACK Guidelines. They also acknowledge Sandy Picken and Camilla Watrus for compiling table 1.

Contributors LF and RS produced the first draft. All the authors commented critically and LF and RS brought together the comments. LF is the guarantor.

Funding The authors would like to acknowledge past funders of the KTU, including the International Development Research Centre, the Belgian Technical Cooperation, Development Cooperation Ireland, Discovery Health South Africa, the Canadian International Development Agency, Britain's Medical Research Council, South Africa's Medical Research Council, the National Heart, Lung and Blood Institute (NIH), and USAID, through PEPFAR. Current funders of the KTU include the Sowerby Foundation and National Institute of Mental Health (NIH), and the Health Resources and Services Administration, US Department of Health and Human Services, through the Medical Education Partnership Programme. They also acknowledge our partners in the Western Cape and Free State governments, the National Department of Health (South Africa), Dignitas International, the University of Botswana and the BMJ Publishing Group.

Competing interests LF, RC, NF and VT are employees of KTU. GF is an ex-employee and now a consultant to KTU. EB is director of the University of Cape Town Lung Institute, which includes KTU. MZ and MB have both worked on the trials of PACK Adult and its predecessors. RS directed the United Health Chronic Disease Initiative that provided some funding for the development and testing of PACK Adult.

Provenance and peer review Not commissioned; internally peer reviewed.

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BMJ Innov 2015 1: 196-203 originally published online July 23, 2015
doi: 10.1136/bmjinnov-2015-000045

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