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Integrated morbidity management for lymphatic filariasis and podoconiosis, Ethiopia

Kebede Deribe, Biruck Kebede, Mossie Tamiru, Belete Mengistu, Fikreab Kebede, Sarah Martindale, Heven Sime, Abate Mulugeta, Biruk Kebede, Mesfin Sileshi, Asrat Mengiste, Scott McPherson & Amha Fentaye

**Problem** Lymphatic filariasis and podoconiosis are the major causes of tropical lymphoedema in Ethiopia. The diseases require a similar provision of care, but until recently the Ethiopian health system did not integrate the morbidity management.

**Approach** To establish health-care services for integrated lymphoedema morbidity management, the health ministry and partners used existing governmental structures. Integrated disease mapping was done in 659 out of the 817 districts, to identify endemic districts. To inform resource allocation, trained health extension workers carried out integrated disease burden assessments in 56 districts with a high clinical burden. To ensure standard provision of care, the health ministry developed an integrated lymphatic filariasis and podoconiosis morbidity management guideline, containing a treatment algorithm and a defined package of care. Experienced professionals on lymphoedema management trained government-employed health workers on integrated morbidity management. To monitor the integration, an indicator on the number of lymphoedema-treated patients was included in the national health management information system.

**Local setting** In 2014, only 24% (87) of the 363 health facilities surveyed provided lymphatic filariasis services, while 12% (44) provided podoconiosis services.

**Relevant changes** To date, 542 health workers from 53 health centres in 24 districts have been trained on integrated morbidity management. Between July 2013 and June 2016, the national health management information system has recorded 46487 treated patients from 189 districts.

**Lessons learnt** In Ethiopia, an integrated approach for lymphatic filariasis and podoconiosis morbidity management was feasible. The processes used could be applicable in other settings where these diseases are co-endemic.

**Introduction**

Lymphatic filariasis and podoconiosis are major causes of lymphoedema in tropical areas. Lymphatic filariasis is a mosquito-borne parasitic infection, while podoconiosis is an inflammatory disease caused by prolonged contact with irritant soil minerals. However, both diseases require a similar provision of health care.

People with lymphoedema caused by lymphatic filariasis need access to care throughout their lives and the World Health Organization (WHO) has suggested a minimum package of care for managing morbidity and preventing disability. The package includes: providing antifilarial medicine, either through mass drug administration or individual treatment; hydrocele surgery; preventing and treating episodes of adenolymphangitis; and managing the lymphoedema.

Podoconiosis causes lymphoedema of the lower limb and acute pain. Early stages of the disease are reversible, but more advanced stages need lifelong treatment. The main prevention methods are use of footwear, regular foot hygiene and floor coverings, whereas already affected people receive management of their lymphoedema-related morbidity. The management includes daily foot hygiene using soap, water and antiseptics, emollients to restore skin function, elevation of the legs, exercise, use of socks and shoes, and if needed bandaging and removal of nodules.

Following the Global Programme to Eliminate Lymphatic Filariasis – which aims to eliminate lymphatic filariasis as a public health problem by 2020 – the *Second edition of national neglected tropical diseases master plan of Ethiopia for 2016–2020* targets lymphatic filariasis and podoconiosis for elimination by 2020 and 2030, respectively. The health ministry has taken an integrated approach for care provision, because it was not feasible to differentiate between the two diseases at primary health-care facilities and because of the similarity in health-care services provided.

Here we describe the implementation of the integrated approach into the Ethiopian health system.

**Local setting**

In Ethiopia, lymphatic filariasis is endemic in 70 districts, with over 5.6 million people at risk of acquiring the disease; whereas podoconiosis is endemic in 345 districts, with 34.9 million people at risk. Twenty-nine of these districts are co-endemic.

In 2014, 24% (87) of the 363 health facilities surveyed provided lymphatic filariasis services, while 12% (44) provided podoconiosis services. In the endemic districts, 42 nongovernmental partner-supported centres provide treatment for lymphatic filariasis and podoconiosis. These treatment centres have experienced staff members and act as training centres for resource allocation, trained health extension workers carried out integrated disease burden assessments in 56 districts with a high clinical burden. To ensure standard provision of care, the health ministry developed an integrated lymphatic filariasis and podoconiosis morbidity management guideline, containing a treatment algorithm and a defined package of care. Experienced professionals on lymphoedema management trained government-employed health workers on integrated morbidity management. To monitor the integration, an indicator on the number of lymphoedema-treated patients was included in the national health management information system.

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Between 2015 and 2016 the burden assessment identified 44039 lymphoedema and 1574 hydrocele cases in 56 districts. Twenty five of these districts had cases of both lymphoedema and hydrocele.

Implementation

In the districts or nearby towns in adjacent districts, experienced professionals on lymphoedema management provide a three-day guideline course for government-employed health workers. The first two days contain lectures on neglected tropical diseases in general, details on the two diseases and morbidity management. On day three, the participants receive practical training on morbidity management. So far, 542 workers from 53 health centres in 24 districts have been trained. Based on supportive supervision reports performed by partners and health ministry staff, health workers are providing services according to the national guideline.

The health ministry, supported by partners, also developed and rolled out a teaching video for health workers on integrated morbidity management.

The implementation also requires some additional resources, such as pamphlets on the self-care routine, treatment supplies and custom-made shoes. Hence, the morbidity management services and training on self-care are being scaled up in a phased approach at health centres in the endemic districts.

Lessons from the field

Since July 2013, the national health management information system has contained an indicator for the number of lymphoedema-treated patients, segregated by cause (if available), which enables monitoring and evaluation of the integrated approach. The indicator definition of lymphoedema is a chronic progressive swelling of one or more parts of the body due to accumulation of lymphatic fluid and the fluid is gradually replaced by fibrous tissue. Treated patients are those who have received training on self-care routines and returned for the three-month follow-up. Health workers record demographic information, including name, contact address, sex, age, age of onset of condition, clinical stage and presence of wounds/entry lesions for new patients. An information system focal person collects reports on the number of lymphoedema cases treated from the registers in each health centre and manually enters the information into the registers in each health centre and district.
Lessons learnt

The implementation of integrated morbidity management for lymphatic filariasis and podoconiosis has worked well. However, some organizations and budgets focused only on one of the diseases, which limited the full implementation at regional, zonal and districts levels.

Several factors contributed to the successful implementation. First, the health ministry leadership helped to convert the vertical programmes to an integrated programme. Second, the presence of health professionals experienced in lymphoedema management supported the implementation through training of health workers, though these experts were not available in all endemic districts. Third, the existing treatment centres served as practical demonstration sites. Finally, committed partners supported the implementation of the integrated approach technically and financially (Box 1).

The integrated approach during the mapping and burden assessments reduced cost in comparison to the disease-specific approach. According to the planning budgets covering 659 districts, the estimated cost of lymphatic filariasis mapping was 1,212,209 United States dollars (US$), while the budget for podoconiosis mapping was estimated at US$1,121,664, compared to the actual cost of the dual mapping of US$1,291,400. Team training, one diagnostic test for both diseases, supplies and travel contributed to most of the savings. By integrating the two diseases in the burden assessment, the need for a diagnostic disease-specific test was unnecessary, which reduced staff time and cost. Furthermore, having a single indicator has eased advocacy for the inclusion of the indicator into the information system, leading to regular and sustainable data collection. Finally, the development of a guideline brought partners and experts together to discuss experiences and resolve implementation differences, such as the use of bandaging and surgical removal of nodules for podoconiosis cases. The experts agreed that most aspects of lymphoedema management can be integrated, while maintaining disease specific parts. This process helped to capitalize on national experience while also learning from global experiences.

The lessons learnt in Ethiopia could be used by other co-endemic countries, such as Brazil, India and the United Republic of Tanzania, wishing to implement an integrated morbidity management approach. In the future, the approach could include other neglected tropical diseases causing similar morbidities, such as leprosy and Buruli ulcer.

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Competing interests: None declared.

Box 1. Summary of main lessons learnt

- An effective health ministry leadership helped the implementation efforts through the development of the national guideline for the integrated morbidity management and disability prevention.
- The presence of treatment centres and experienced health workers on lymphoedema morbidity management within the country was important for training of health workers.
- The involvement of committed partners from planning stage to implementation contributed to the successful integration.

ملخص

الإدارة المتكاملة ل معدلات الإصابة بداء الفيلاريات اللمفي وداء الفيل في إثيوبيا

وذلك في 659 منطقة من أصل 817 منطقة موبوءة. وللإطلاع على توزيع الموارد، قام العملники الذين في مجال الإرشاد الصحي بتقنيات متكميلة لعدد المرضى في 56 منطقة لديها عوامي مرتفع، وللضمان توجه رعاية معقولة. قامت وزارة الصحة بتطوير الإرشادات الإدارية ل معدلات الفيلاريات اللمفي وداء الفيل الباي، تشمل خوض الخرائط للعلاج وحزمة محددة للرعاية. وتم تصميم دورة خبرة في إدارة مرض الوذمة اللمفي وتعليم العملники الحكوميين في مجال الصحة، على الإدارة المتكملة ل معدلات الإصابة المرض. وفراقة التكامل فإنه تم وضع مؤشر من لائحة لإدارة المرض، وقد أثبت النتائج إعداد إستراتيجية يتخطى الرعاية، وevin إعداد إستراتيجية تم استخدامها للتكامل للأمراض، وفقًا للتقدم المتزامن.

المشترك

Kebede Deribe et al.

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The Integrated Approach to Filariasis and Podoconiosis Management in Ethiopia

Lessons from the field

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Lymphoedema management and prevention, Ethiopia

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Résumé

Gestion intégrée de la morbidité liée à la filariose lymphatique et à la podocooniose en Éthiopie

Problème La filariose lymphatique et la podocooniose sont les principales causes du lymphédème tropical en Éthiopie. Ces maladies requièrent une prestation de soins similaire, mais en 2012, le système de santé éthiopien n’a pas intégré la gestion de la morbidité.

Approche Le ministère de la Santé et ses partenaires ont utilisé les structures gouvernementales existantes pour mettre en place des services de santé en vue de la gestion intégrée de la morbidité liée au lymphédème. Une cartographie intégrée de la maladie a été réalisée dans 659 des 817 districts pour repérer ceux où elle était endémique. Afin d’orienter l’affectation des ressources, des agents de vulgarisation sanitaire qualifiés ont intégré des évaluations de la charge de morbidité dans 53 centres de santé répartis dans 24 districts pour formuler des recommandations de soins cliniques élevées. Pour assurer une prestation standard de soins, le ministère de la Santé a rédigé des directives sur la gestion intégrée de la morbidité liée à la filariose lymphatique et à la podocooniose. Ces directives comportent un algorithme de traitement et un programme de soins précis. Des professionnels possédant de l’expérience dans la gestion du lymphoédeème ont formé des agents de santé employés par le gouvernement à la gestion intégrée de la morbidité. Pour suivre l’intégration, un indicateur relatif au nombre de patients pris en charge pour un lymphoédeème a été inclus dans le système national d’information sanitaire.

Environnement local En 2014, seuls 24% (87) des 363 établissements de santé participant à l’enquête ont fourni des services liés à la filariose lymphatique et 12% (44) ont fourni des services liés à la podocooniose. Changements significatifs À ce jour, 542 agents de santé provenant de 53 centres de santé répartis dans 24 districts ont formé des agents de santé employés par le gouvernement à la gestion intégrée de la morbidité liée à la filariose lymphatique et à la podocooniose. Les processus utilisés pourraient être appliqués dans d’autres environnements où ces maladies sont co-endémiques.

Lesçons tirées La mise en place d’une approche intégrée pour la gestion de la morbidité liée à la filariose lymphatique et à la podocooniose a été possible en Éthiopie. Les processus utilisés pourraient être appliqués dans d’autres environnements où ces maladies sont co-endémiques.

Rезюме

Комплексное управление заболеваемостью лимфатическим филяриатозом и подокониозом, Эфиопия

Проблема. Лимфатический филяриатоз и подокониоз являются основными причинами тропической лимфедемы в Эфиопии. Заболевания требуют аналогичного лечения, но в 2012 году система здравоохранения Эфиопии не использовала комплексный подход к управлению заболеваемостью.

Подход. С целью создания медицинских услуг для комплексного регулирования заболеваемости лимфедемой Министерство здравоохранения и партнеры использовали существующие правительственные структуры. Для выявления эндемичных районов было проведено комплексное картографирование болезней в 659 из 817 районов. Чтобы информировать об распределении ресурсов, подготовленные работники здравоохранения провели комплексные оценки времени болезни в 56 районах с высокой клинической нагрузкой. Чтобы

المكتملة لمعدلات الإصابة بالمرض. و في الفترة ما بين يوليو / حزيران 2016، تسجل نظام المعلومات الوطني 65,487 مريضًا تم علاجهم من 189 منطقة. للإجراءات المستخدمة في مواقع أخرى تستوطن فيها هذه المرض، ثبتت جدوى استخدام النهج المتكامل لمعدلات الدروس المستفادة، سجل نظام المعلومات الوطني 2016 المتكاملة لمعدلات الإصابة بالمرض. وفي الفترة ما بين يوليو / تموز 2013 ويناير / حزيران 2016، سجل نظام المعلومات الوطني 363 منطقة. يشير استخدام النهج المتكامل لمعدلات الإصابة بداء النقليات المفيدة، في حين كانت 12% من المرضى تقدم خدمات داء النقلي ذات الصلة حتى الآن تم تدريب 542 من العاملين في مجال الصحة من 53 مركزا صحيا في 24 منطقة، على الإدارة

요약

에세오파미아에서 림프조직증 병 환자 증후군 관리

문제. 림프조직증과 피도코노이즈는 에세오파미아에서 림프조직증 병 환자 증후군의 주요 원인이다. 이러한 질병은 유사한 유형의 치료를 필요로 하며, 2012년 에세오파미아의 보건당국은 질병 관리가 통합되지 않았다.

방법. 보건당국과 협력체가 현존하는 정부 관리체계를 사용하여 종관 관리 투명성을 제공할 목적으로 설계되었다. 817곳의 지역 중 659곳에서 정관 관리 지도를 그려내고(지역을 개별화시킨다) 질병 관리가 통합된 곳을 확인하였다. 24% (87)의 보건당국의 일원이 이질병 관리에 관한 지도를 제공하도록 훈련되었다. 53개의 건강 센터, 24개의 관리 지역에서 직원들이 질병 관리의 주요 지침을 수립하였다. 질병 관리 지침은 병인의 치료 및 치료를 위한 프로그램을 포함한다. 이 전문가들은 질병 관리 지침을 기반으로하는 통합된 치료 지속주의를 제공하였다. 2013년 7월부터 2016년 6월까지 보건당국의 정보 제어 시스템에 46,487명 의 치료를 받은 환자 수가 기록되었다. 의료 기관에서 24% (87)의 363 건강 기관에서 질병 관리 지침을 제공하였다. 통계적 변화. 2014년까지만 해도 53개의 건강 센터의 542명의 보건당국 직원들이 통합된 질병 관리 지침을 수립하였다.

경험教训. 에세오파미아, 피도코노이즈에 관한 질병 관리 방법은 적절하다. 이 방법은 이러한 질병의 보건의료를 활성화한다.

要

埃塞俄比亚淋巴丝虫病和象皮肿综合发病率管理

问题. 淋巴丝虫病和象皮肿是造成埃塞俄比亚热带淋巴水肿的主要原因。这些疾病需要提供类似的护理，但是在2012年，埃塞俄比亚卫生系统没有整合发病率管理。

方法. 为了建立用于综合发病率管理的医疗护理服务，卫生部和合作伙伴使用了现有的政府体系。为了为资源分配信息，经过培训的工作人员在病流行地区。为提供资源分配信息，经过培训的健康

習近平

为了管理综合发病率，国家卫生管理信息系统中纳入了一个显示接受淋巴水肿治疗的患者人数的指标。当地状况. 2014年，被调查的363个卫生机构中，仅24% (87)个提供淋巴丝虫病护理服务，12% (44)个提供象皮肿护理服务。

相关变化. 截至目前, 24个地区53家卫生中心的542名卫生工作人员接受了综合发病率管理培训。在2013年7月至2016年6月期间，国家卫生管理信息系统记录了来自189个地区的46,487名接受治疗的患者。

经验教训. 在埃塞俄比亚，对淋巴丝虫病和象皮肿进行综合发病率管理的方法是可行的。这些流程也可能适用于这类疾病并发流行的其他地区。
Gestión integrada de la morbilidad para la filariasis linfática y la podoconiosis, Etiopía

Resumen

La filariasis linfática y la podoconiosis son las mayores causas de la linfedema tropical en Etiopía. Las enfermedades requieren una atención sanitaria similar, pero en 2012 el sistema sanitario de Etiopía no integró la gestión de la morbilidad. Para establecer servicios sanitarios para la gestión integrada de la morbilidad por linfedema, el ministerio de salud y colaboradores utilizaron estructuras gubernamentales existentes. Se realizó un mapeo integrado de la enfermedad en 659 de 817 distritos para identificar los distintos endémicos. Para informar sobre la asignación de recursos, agentes formados de extensión sanitaria integraron evaluaciones sobre la carga de la enfermedad en 56 distritos con una carga clínica elevada. Para garantizar un suministro estándar de la atención, el ministerio de salud desarrolló un algoritmo para la gestión integrada de la morbilidad de la filariasis linfática y la podoconiosis, las cuales contenían un algoritmo de tratamiento y un paquete definido de cuidados. Profesionales con experiencia en la gestión del linfedema formaron a trabajadores de la salud empleados por el gobierno sobre la gestión integrada de la morbilidad. Para controlar la integración, se incluyó un indicador del número de pacientes tratados de linfedema en el sistema nacional de información para la gestión de la salud.

Marco regional

En 2014, solo el 24% (87) de los 363 centros sanitarios encuestados ofrecían servicios para la filariasis linfática, mientras que el 12% (44) ofrecían servicios para la podoconiosis.

Cambios importantes

Hasta la fecha, 542 trabajadores sanitarios de 53 centros de salud en 24 distritos han sido formados acerca de la gestión integrada de la morbilidad. Entre julio de 2013 y junio de 2016, el sistema nacional de información para la gestión de la salud registró 46 487 pacientes tratados de 189 distritos.

Lecciones aprendidas

En Etiopía, fue viable un enfoque integrado de la gestión de la morbilidad para la filariasis linfática y la podoconiosis. Los procesos utilizados podrían ser aplicables en otros lugares donde estas enfermedades son coendémicas.

Referencias

1. Molyneux DH. Tropical lymphedemas – control and prevention. N Engl J Med. 2012 Mar 29;366(13):1169–71. doi: http://dx.doi.org/10.1056/NEJMmp1201181 PMID: 22455411

2. Lymphatic filariasis [Internet]. Geneva: World Health Organization; 2017– Available from: http://www.who.int/mediacentre/factsheets/fs102/en/ [cited 2017 Jun 9].

3. Lymphatic filariasis: managing morbidity and preventing disability: an aide-mémoire for national programme managers. Geneva: World Health Organization; 2013.

4. Deribe K, Wani J, Shafl O, M Tukahebwa E, Umulisa I, Molyneux DH, et al. The feasibility of eliminating podoconiosis. Bull World Health Organ. 2015 Oct 1;93(10):712–8. doi: http://dx.doi.org/10.2471/BLT.14.150276 PMID: 26600613

5. Accelerating work to overcome the global impact of neglected tropical diseases a roadmap for implementation. Geneva: World Health Organization; 2012.

6. Global Programme to Eliminate Lymphatic Filariasis. Geneva: World Health Organization, 2017. Available from: http://www.who.int/lymphatic_filariasis/elimination-programme/en/ [cited 2017 Jun 9].

7. Second edition of national neglected tropical diseases master plan. Addis Ababa: Ethiopian Ministry of Health; 2016.

8. Deribe K, Cano J, Newport MJ, Godling N, Pullan RL, Sime H, et al. Mapping and modelling the geographical distribution and environmental limits of podoconiosis in Etiopia. PLoS Negl Trop Dis. 2015 Jul 29;9(7):e0003946. doi: http://dx.doi.org/10.1371/journal.pntd.0003946 PMID: 26222887

9. Neglected tropical diseases (NTD) service availability at health facilities in Ethiopia. In: Special bulletin 18th annual review meeting. Addis Ababa: Ethiopian Ministry of Health; 2016. pp 73–80. Available from: http://www.moh.gov.et/documents/26765/0/SPECIAL+BULETIN+18th+ANNUAL+REVIEW+MEETING+2016/4da2368b-21f5-4149-be1c-3f0d8c569f0c.jsessionid=4A7FC53DE110925DBC859AA9E48AFDF7?version=1.0 [cited 2017 Jun 12].

10. Sime H, Deribe K, Assefa A, Newport MJ, Enquselassie F, Gebretsadik A, et al. Integrated mapping of lymphatic filariasis and podoconiosis: lessons learnt from Ethiopia. Parasit Vectors. 2014 08 27;7(1):397. doi: http://dx.doi.org/10.1186/1756-3305-7-397 PMID: 25166887

11. Lymphatic filariasis and podoconiosis morbidity management and disability prevention guidelines. Addis Ababa: Ethiopian Ministry of Health, 2016.

12. Ichimori K, King JD, Engels D, Yajima A, Mikhailov A, Lammie P, et al. Global programme to eliminate lymphatic filariasis: the processes underlying programme success. PLoS Negl Trop Dis. 2014 12 11;8(12):e3328. doi: http://dx.doi.org/10.1371/journal.pntd.0003328 PMID: 25502758