Integrated community-based screening for cardiovascular diseases of childhood

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A screening programme in northern India, principally aimed at detecting and controlling rheumatic fever and rheumatic heart disease (RF/RHD) in children, also picks up individuals with congenital heart disease and other cardiovascular conditions, who are then referred for consultation and treatment. This strategy is clearly more ethical and cost-effective than screening programmes concerned exclusively with the control of RF/RHD.

Rheumatic fever/rheumatic heart disease (RF/RHD) and congenital heart disease cause considerable disability and mortality among children, particularly in developing countries. At present most programmes for the control of cardiovascular diseases of childhood are directed against RF/RHD, which is acquired at an early age following recurrent throat infection with group A beta-haemolytic streptococci.

A programme for the prevention and control of RF/RHD, launched in 16 developing countries in 1986 (1), involves case-finding in schools, hospitals and elsewhere, registration, secondary prophylaxis with penicillin or other antibiotics, regular follow-up, health education, and training of teachers, physicians, nurses and other health workers to recognize, detect and treat rheumatic fever.

Population-based first-level screening programmes for a particular disease usually include surveys of target populations by paramedical workers in order to discover whether indicator symptoms are present. If they are, the suspect cases are usually referred for second-level screening by a doctor and often for third-level screening by a specialist. Of course, the presence of various diseases in addition to that of principal concern may be revealed by first-level screening if the indicator symptoms are not specific. False-positive cases are likely to be excluded by second-level screening.

In RF/RHD control programmes, screening that involves looking for indicator symptoms such as fever, swollen joints, breathlessness, fatigue and involuntary movements can lead to the inclusion on the suspect list of many patients with other diseases, and considerable efforts are therefore made to rule out such cases when first-level screening is performed. It is important, however, to refer these patients to a hospital or health centre for consultation and treatment. There is a need to improve the system of referral and treatment for these cases.

In the Shimla Hills of northern India, integrated first-level symptom-based screening for cardiovascular diseases has been conducted in 15 080 schoolchildren aged 5–16 years, with advantageous results (2,3). A parallel can be drawn with the integrated approaches recently

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Prevalence of cardiovascular disease among schoolchildren, Shimla Hills, India

<table>
<thead>
<tr>
<th>Number screened</th>
<th>15 080</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number with history of rheumatic fever or presence of murmur</td>
<td>1 116</td>
</tr>
<tr>
<td>Number subjected to further examination/investigation</td>
<td>1 093</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of patients with confirmed diagnosis</th>
<th>Prevalence (per 1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rheumatic fever/rheumatic heart disease</td>
<td>45</td>
<td>2.98</td>
</tr>
<tr>
<td>Congenital heart disease</td>
<td>34</td>
<td>2.25</td>
</tr>
<tr>
<td>Functional systolic murmur</td>
<td>912</td>
<td>60.4</td>
</tr>
<tr>
<td>Non-rheumatic joint pains</td>
<td>Excluded</td>
<td></td>
</tr>
</tbody>
</table>

advocated for the control of sexually transmitted diseases and acute respiratory infections.

Histories of fever, sore throat, swollen or painful joints, breathlessness, fatigue and involuntary movements were noted. A physician then looked for objective evidence of RF/RHD, congenital heart disease or functional murmur in all the children. When any of these conditions was suspected the cases were referred to a cardiologist at a tertiary care centre, where detailed investigations were carried out (complete haemogram, antistreptolysin O titre, C-reactive protein, throat swab for betahaemolytic streptococci, 12-lead electrocardiogram, chest X-ray, echocardiography).

The results are shown in the table. There were 45 cases of RF/RHD and 912 of functional murmur, corresponding to prevalence rates of 2.98 and 60.4 per 1000 respectively. In addition there were 34 cases of congenital heart disease, for which the prevalence rate was therefore 2.25 per 1000. Integrated screening thus detected similar numbers of cases of RF/RHD and congenital heart disease. In traditional secondary prophylaxis programmes for RF/RHD, cases of congenital heart disease are usually excluded, yet they also need treatment. Indeed, many of the consequences of congenital heart disease are preventable. For instance, surgical intervention in cases of tetralogy of Fallot has proved highly beneficial (4).

Many patients with RHD presented with joint pains (84%), breathlessness (77%), recurrent fever (50%) and antecedent sore throat (27%). For congenital heart disease cases the corresponding figures were 20%, 79%, 41% and 23%. Thus breathlessness emerged as a major common denominator in both RHD and congenital heart disease. Moreover, RHD was significantly associated with congenital heart disease, suggesting that children with congenital heart disease were at elevated risk for the development of RF/RHD and therefore needed special care and regular follow-up so that early prophylactic measures could be taken.

About 23% of cases of RHD and 20% of those of congenital heart disease were detected only by auscultation, which revealed murmurs. Such cases are likely to be missed when first-level screening in routine RF/RHD control pro-

In RF/RHD control programmes, screening that involves looking for indicator symptoms can lead to the inclusion on the suspect list of many patients with other diseases. It is important to refer these patients to a hospital or health centre for consultation and treatment.

grammes is performed by paramedical workers who are not trained in auscultation. Physicians, therefore, when conducting school
Flow-chart for integrated control of rheumatic fever/rheumatic heart disease and congenital heart disease

Children aged 0–15 years

Checklist of signs and symptoms
- Breathlessness
- Joint pain or swelling
- Recurrent sore throat
- Involuntary movements
- Ashen or faintly cyanotic appearance
- Poor feeding and failure to thrive
- Recurrent chest infection
- Rapid heart rate (160–180 beats/min)
- Excessive perspiration

Yes

• Suspect RF/RHD\(^1\) or CHD\(^2\)
• Refer to doctor

Check for RF/RHD

No

Check for CHD

No

Exclude

Yes

Confirmed by
ASO, ESR, ECG

No

• Follow-up
• Refer to apex institute

Yes

Follow-up and secondary prophylaxis

Decompensated cases

Tertiary care centre
• Advanced investigations, e.g. echocardiography
• Further management, including surgery

\(^1\) Rheumatic fever/rheumatic heart disease
\(^2\) Congenital heart disease

health examinations or providing routine outpatient services, should auscultate all schoolchildren and preschool children so that cases of this kind can be screened out.

Because children aged under five years do not attend school, their screening presents a problem. Yet unless there is early recognition, accurate diagnosis, and treatment, about one in three infants with congenital heart disease can be expected to die in the first month of life. Heart failure and cyanosis are the two cardinal signs in high-risk infants with heart disease, who commonly present with poor feeding, failure to thrive, rapid heart rate, recurrent chest infection, respiratory distress, an ashen or faintly cyanotic appearance and excessive perspiration (5). It should be possible to train primary care workers to recognize these symptoms and refer affected children for medical examination.

The screening out of non-RF/RHD cases at the first level can be obviated if primary care workers identify children with a history of breathlessness and other symptoms. Second-level screening and further categorization can be done by cardiologists and other medically qualified personnel. Integrated surveillance of cardiovascular diseases of childhood should initially be carried out in communities where RF/RHD programmes are already running.
Combined registries can be set up to ensure proper follow-up of cases. In this way an RHD control programme can be carried out in primary care institutions in conjunction with screening for congenital heart disease. This can be expected not only to prevent premature deaths but also to reduce the cost of caring for patients with other cardiovascular diseases. Furthermore, under programmes for the control of acute respiratory infections, referred children who present with respiratory distress and poor feeding should also be screened specifically for cardiovascular diseases, particularly congenital heart disease.

References


