Development and evaluation of the Supportive and Palliative Care Indicators Tool (SPICT): a mixed-methods study

Gill Highet,1 Debbie Crawford,1 Scott A Murray,2 Kirsty Boyd1

ABSTRACT
Objective To refine and evaluate a practical, clinical tool to help multidisciplinary teams in the UK and internationally, to identify patients at risk of deteriorating and dying in all care settings.

Methods We used a participatory research approach to refine the 2010 Supportive and Palliative Care Indicators Tool (SPICT) and evaluate its use in clinical practice. We conducted an ongoing peer review process for 18 months via an open access webpage, and engaged over 30 clinicians from the UK and internationally in developing an effective tool. Secondly, we carried out a prospective case-finding study in an acute hospital in SE Scotland. Four multidisciplinary teams identified 130 patients with advanced kidney, liver, cardiac or lung disease following an unplanned hospital admission.

Results The SPICT was refined and updated to consist of readily identifiable, general indicators relevant to patients with any advanced illness, and disease-specific indicators for common advanced conditions. Hospital clinicians used the SPICT to identify patients at risk of deteriorating and dying. Patients who died had significantly more unplanned admissions, persistent symptoms and increased care needs. By 12 months, 62 (48%) of the identified patients had died. 69% of them died in hospital, having spent 22% of their last 6 months there.

Conclusions The SPICT can support clinical judgment by multidisciplinary teams when identifying patients at risk of deteriorating and dying. It helped identify patients with multiple unmet needs who would benefit from earlier, holistic needs assessment, a review of care goals, and anticipatory care planning.

INTRODUCTION
Timely identification of people who are at risk of deteriorating and dying is a prerequisite for effective end-of-life care and a key element of health policies in the UK and internationally.1–7 Identification prompts clinicians to initiate proactive holistic needs assessment, shared decision making about goals of care and anticipatory care planning. However, patients are often identified too late in their illness. General practitioners and hospital specialists both report difficulties with earlier recognition.8–10 Effective triggers for patient identification are underdeveloped in contrast with other more established tools for end-of-life care planning and service delivery.1 2 5 The emphasis has been on predicting prognosis more accurately in order to introduce palliative care at an appropriate time. The widely used ‘surprise question’ (Would you be surprised if this patient died within the next 12 months?) is combined with clinical indicators of advanced conditions in referral criteria for hospice and palliative care in the USA and in the UK Gold Standards Framework Prognostic Indicator Guidance.4 11 If used alone, the surprise question may identify too many patients for palliative care; a third of all inpatients in a recent UK hospital prevalence study.12 Mortality risk assessment models for single diagnoses are often used by hospital specialists but are of limited value because multimorbidity is now the norm in those with advanced, long-term conditions.13 14 Even in patients with cancer, scores based on biomarkers gave similar prognostic estimates to a multidisciplinary team assessment and were less accurate with longer survival times.15

Linking identification of patients for supportive and palliative care with estimates of prognosis means that clinicians
tend to focus on when to start ‘planning for dying’ and may delay a review of care goals and unmet needs until the last weeks of life.16 Earlier identification requires a change from estimating when a patient may die to identifying those who are at sufficient risk of deteriorating and dying for proactive assessment and care planning to be appropriate. This includes people with advanced, progressive, incurable conditions, general frailty and coexisting conditions, and those at risk of dying from a sudden acute crisis in their condition or from life-threatening acute conditions caused by sudden catastrophic events.31 17

The Supportive and Palliative Care Indicators Tool (SPICT 2010) was designed to provide practical, evidence-informed guidance to help clinicians working in primary and secondary care recognise when their patients might be at risk of dying and likely to benefit from supportive and palliative care in parallel with appropriate ongoing management of their advanced conditions.18 The SPICT supports multidisciplinary assessments of individual patients based on clinical observations, performance status, symptoms, multimorbidity, illness trajectories and the patient’s views and goals.5 This paper reports the development and evaluation of the tool.

METHODS
Since April 2011, we have developed and evaluated the SPICT using a mixed-methods, participatory approach.19 The research team included palliative care specialists, primary care clinicians, hospital clinicians, and a senior social scientist as the project researcher. Peer review and consensus building contribute to the development of tools with good face validity and utility in routine clinical practice, so we offered open access, via a designated webpage, to each of the 15 major revisions of the SPICT that were developed over an 18-month period. This is now the SPICT project website (http://www.spict.org.uk). An international, electronic mailing list was built from a wide spectrum of interested clinicians and policy makers who contacted us from the UK, Europe, USA, Canada, New Zealand, Australia and Africa. We also invited primary and secondary care leads for palliative care in Scotland, England and Ireland to participate. After each amendment had been agreed by the project steering group and integrated into the next version of SPICT, email alerts were sent to all our peer reviewers seeking comments and suggestions until no further changes were proposed.

At the same time, we carried out a prospective, case-finding study of patients with advanced kidney, liver, cardiac, or lung disease following an unplanned admission to a tertiary, acute hospital in SE Scotland. The research team worked alongside clinical staff in each of the four participating units in turn, supporting data collection, analysis and interpretation.20 Senior nursing staff and specialty registrars agreed to screen all their patients soon after an unplanned admission using a checklist of SPICT clinical indicators for an 8 week period. The checklist contained the SPICT general indicators, the surprise question and diseasespecific indicators relevant to the patients in each unit (see online supplementary appendix 1: Liver unit checklist). The staff recorded demographic and clinical details, admission outcome and service use data (unplanned admissions and hospital bed days) for all patients with the SPICT indicators of advanced conditions. The patients were then followed for 12 months by the research team using the hospital electronic patient record system. These data were analysed using a customised Excel database. χ² Tests for categorical variables were used to compare the SPICT indicators in patients who died and those still alive at 12 months. Scottish Patients at Risk of Readmission and Admission (SPARRA) scores were calculated by the Scottish Information Services Division.21 SPARRA scores are a proxy measure of deteriorating health because patients in the last year of life have increasingly frequent unplanned hospital admissions.22 We calculated the Charlson renal comorbidity index for patients with kidney disease and the UK end-stage liver disease (UKELD) score for liver unit patients.23 24

RESULTS
SPICT redesign
Six parameters underpinned the conceptual design of the SPICT, and our peer reviewers agreed they should be retained (box 1).

The 2010 SPICT indicators were reviewed and compared with similar tools identified from the literature to achieve consensus about the items for each section and their wording.6 7 11 25 General indicators of deteriorating health identified in several other

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**Box 1 Supportive and Palliative Care Indicators Tool (SPICT): key elements**

- Simple, one-page format.
- Readily identifiable general indicators of deteriorating health commonly present in advanced conditions.
- Evidence-based clinical indicators of all the major advanced, life-limiting conditions and multimorbidity.
- Good face validity for health and social care professionals working in hospital, community and care home settings in the UK and internationally.
- Promotes early supportive and palliative care in parallel with optimal management of any underlying conditions as part of routine clinical practice.
- Contains accessible language and concepts that can be used to initiate discussions with patients and families about goals of care and improve communication between professionals/teams.
palliative care assessment tools, or found in disease-specific mortality tools, are in the first section of the SPICT. We chose the Malnutrition Universal Screening Tool for the weight loss indicator as it is recommended for use throughout National Health Service (NHS) Scotland. Descriptions of symptoms were used instead of disease severity scores, for example, in advanced lung and heart disease, to make the tool more accessible (see online supplementary appendix 2: SPICT 2013). Many of the hospital clinicians in our case study and peer review group, and some primary care professionals, said the surprise question was of limited value if they did not know the patient well, or if the patient was at risk of dying but currently more stable. Our collaborative approach has led to continuing partnerships with projects using the SPICT to identify patients in primary and secondary care settings.

Implementation and evaluation of SPICT
Ward staff completed checklists containing demographic details and SPICT clinical indicators for 130 patients with advanced organ failure following an emergency hospital admission (table 1). The renal team identified 41% of their unplanned admissions (55, n=133) and the liver unit 83% (35, n=42). The cardiology unit screened 570 admissions but only identified 2.8% (16 patients) due to a change in the types of patients being admitted to the ward after the study was planned. Workload pressures meant the respiratory unit struggled to screen all admissions, but the participating ward staff identified 24 patients using the SPICT checklist by asking senior ward staff or the respiratory specialist nurses to direct to them newly admitted patients with advanced lung disease. The major diagnoses were vascular disease, alcoholic liver disease, ischaemic heart disease, and chronic obstructive pulmonary disease. Multimorbidity, defined as two or more active long-term conditions, was common (77%). Patients were usually admitted with acute medical problems relating to their underlying advanced conditions. Almost all the patients were discharged home but 35% (45) died within 6 months. By 12 months, 48% (62) had died; 69% (43) of these patients in hospital (table 2). Most patients had a short final admission (median 10 days, range 1–60 days) and half the deaths were within 88 days of patients first being identified. Five patients had a sudden terminal event. However, the majority followed an archetypical organ failure trajectory and died of multiple complications of their advanced conditions, usually after an acute deterioration on a background of progressive decline.

The SPICT indicators identified in patients who died and those still alive at 12 months are shown in figure 1. A significantly greater number of patients who died, compared with those who survived for over 12 months, had: two or more unplanned admissions in the 6 months before they were screened (69% vs 37%, p<0.001, 95% CI on the difference=33±16), persistent symptoms despite optimal treatment of their underlying conditions (60% vs 24%, p<0.001, 95% CI 36±16), and increased care needs (40% vs 13%, p<0.001; 95% CI 27±15). There was some variation between patient groups. A poor or deteriorating WHO performance status affected 60% in total, but only a quarter of the liver unit cases. Weight loss occurred in a third of renal unit patients but in less than 5% of the other groups. The SPICT performed as well as the standard mortality tools. The renal unit patients who died had a mean Charlson renal morbidity index of 7.9; a score of 6+ predicts a 1-year survival probability of about 0.6. In the liver unit, SPICT identified patients had a mean UKELD score of 57; a score of 60 predicts a 50% 1-year survival in advanced liver disease. The ward teams identified many of the patients who had died by 12 months (79%) with the surprise question. They thought that

Table 1 Demography of Supportive and Palliative Care Indicators Tool (SPICT)-identified patients (130)

<table>
<thead>
<tr>
<th>Unit</th>
<th>Mean age (range)</th>
<th>Main diagnosis</th>
<th>Main admission reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renal (55)</td>
<td>65 (34–88)</td>
<td>Vascular disease</td>
<td>Sepsis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Primary renal disease</td>
<td>Deteriorating renal function</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Myeloma</td>
<td>Symptom control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
<td>Fluid overload</td>
</tr>
<tr>
<td>Liver (35)</td>
<td>57 (32–88)</td>
<td>Alcoholic liver disease (ALD)</td>
<td>Pain/symptom control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-alcoholic fatty liver disease</td>
<td>Gastrointestinal bleeding</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Secondary liver cancer+ALD</td>
<td>Liver disease complications</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
<td>Other</td>
</tr>
<tr>
<td>Cardiac (16)</td>
<td>76 (55–89)</td>
<td>Ischaemic heart disease</td>
<td>Heart failure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cardiomyopathy</td>
<td>Myocardial infarction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
<td>Multimorbidity</td>
</tr>
<tr>
<td>Respiratory (24)</td>
<td>74 (49–87)</td>
<td>Chronic obstructive pulmonary disease (COPD)</td>
<td>Exacerbation of COPD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pulmonary fibrosis</td>
<td>Pneumonia+multimorbidity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lung cancer+COPD</td>
<td>Haemoptysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
<td>Pleural effusion</td>
</tr>
</tbody>
</table>

71% of the group as a whole was at risk of dying within 12 months. Despite this perception that many of the identified patients might die, relatively few had a ‘Not for cardiopulmonary resuscitation’ form in place at the time of their initial SPICT screening; 24% overall and 39% of those who died.

In addition to documenting how many of the patients had two or more admissions when screened with the SPICT, we recorded admissions and bed days during the last 6 months of life for the 62 patients who died. These patients had a mean of 2.4 unplanned admissions (range 1–7), a median number of hospital bed days of 34.5 (range 3–130 days), and spent 22% of their last 6 months of life in hospital. We also recorded these service use outcomes for the 68 patients who survived during the first 6 months after they were identified. They had a mean of 2.2 admissions (range 1–7), a median number of hospital bed days of 21.5 (range 3–167 days) and spent 17% of that 6 months in hospital. This high use of hospital services by all the patients identified was reflected in the SPARRA scores at discharge following the initial admission. These showed a 65% median readmission risk for those who died and a 60% risk in those who were still alive.

**DISCUSSION**

The SPICT is a simple tool consisting of easily recognised, clinical indicators of advanced illness. It can support the clinical judgment of multidisciplinary teams in primary and secondary care as they seek to identify patients who might benefit from supportive and palliative care assessment and care planning. The SPICT has been further developed and evaluated in this study using a mixed-methods approach that combined peer review with a detailed case study and web-based dissemination. The tool is now being used in clinical practice by SPICT partner projects caring for patients with a wide range of advanced illnesses in hospitals, the community and care homes in the UK and internationally. In our hospital-based, case study of patients with advanced non-malignant illnesses, those who died had a higher frequency of SPICT general indicators than those who survived for 12 months, particularly unplanned hospital admissions, persistent symptoms and increasing care needs.

More emphasis on identifying patients with advanced conditions who are at risk of deteriorating and dying will encourage clinicians to consider a review of care goals and interventions to improve quality of life earlier in the illness trajectory. Simple identification tools based on accepted clinical indicators, such as SPICT, are needed to support this change in practice. Better identification, holistic assessment and anticipatory care planning for future deterioration, could help to reduce the substantial risk of unplanned hospital admissions and prolonged inpatient stays experienced by all the patients we identified.

**Table 2** Outcomes for Supportive and Palliative Care Indicators Tool (SPICT)-identified patients

<table>
<thead>
<tr>
<th>Unit</th>
<th>First admission</th>
<th>Deaths at 6 months</th>
<th>Deaths by 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Died</td>
<td>Discharged</td>
<td>All deaths</td>
</tr>
<tr>
<td>Renal (55)</td>
<td>3</td>
<td>52</td>
<td>19</td>
</tr>
<tr>
<td>Liver (35)</td>
<td>–</td>
<td>35</td>
<td>13</td>
</tr>
<tr>
<td>Cardiac (16)</td>
<td>4</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Respiratory (24)</td>
<td>2</td>
<td>22</td>
<td>5</td>
</tr>
<tr>
<td>Total (130)</td>
<td>9 (7%)</td>
<td>121 (93%)</td>
<td>45 (35%)</td>
</tr>
</tbody>
</table>

**Figure 1** Indicators of deteriorating health in Supportive and Palliative Care Indicators Tool (SPICT)-identified patients.
about when to put patients on their palliative care reg-
isters or open discussions about future care goals.\textsuperscript{5, 25}
29 The SPICT indicators offer guidance on which
patients are at risk of deteriorating, and describe
changes in health status and care needs that can be
used as a starting point for these discussions. The
SPICT has been developed and refined in partnership
with clinicians working in hospitals, general practice
and other community settings with the specific aim of
producing a common set of clinical indicators that can
support effective communication, shared care and a
range of palliative care service developments for
patients who transition frequently between care set-
tings.\textsuperscript{27} Additionally, it identifies patients with
advanced liver disease, a rapidly rising cause of mortal-
ity among people under 70 years in the UK,\textsuperscript{30} as well
as the many patients with multiple advanced condi-
tions including frailty and dementia. Future work
could address the value of combining the SPICT with
established needs assessment tools designed to help
clinicians who provide generalist palliative care to iden-
tify patients who have more complex needs.\textsuperscript{31, 32}
Some of these patients and families will benefit from referral
for specialist palliative care, as indicated in the SPICT
section on assessment and planning.\textsuperscript{33}

Although the hospital ward staff told the research
team that they were aware of a group of patients with
advanced illness who were often readmitted with an
acute or chronic deterioration, and who might well
die in the next year, a substantial number of the
SPICT-identified patients were still for cardiopulmon-
ary resuscitation despite having a very low chance of a
medically successful outcome. Identification is only
the first step in addressing the multiple, complex bar-
riers that hinder successful introduction of earlier pal-
liative care in acute hospital settings.\textsuperscript{12, 16} Primary care
clinicians have said they prefer an individualised,
needs-driven approach to introducing palliative care,
and often use triggers such as poorly controlled pain
or a requirement for increased support from the
multidisciplinary team.\textsuperscript{29, 34} Combining population
and service-based screening with individual patient
assessments by clinicians, undertaken as part of
routine care, could be the most effective way to inte-
grate public health and patient-focused approaches to
earlier identification.

Strengths and limitations
The SPICT has been developed from the available evi-
dence base and subject to thorough peer review by a
wide range of clinicians who see the need for a prag-
matic tool to improve clinical practice. We conducted
a case study in one urban area in SE Scotland with
relatively small numbers of patients and few from
black or minority ethnic groups. We faced the chal-
lenge of clinical research in busy care settings, and this
limited our ability to survey all admissions in some
wards. We did not collect data on outcomes for the
patients who were screened but not identified as this
was not feasible. Future studies could evaluate the sen-
sitivity and specificity of the SPICT in larger popula-
tions. However, it is the identification of individual
patients at sufficient risk of deteriorating and dying to
prompt a review of their care that is important. The
effectiveness of the SPICT in clinical practice needs to
be evaluated more extensively in different settings and
with a wider range of patients. Although our peer
reviewers came from diverse professions, settings and
countries, they were a self-selected sample of inter-
ested professionals and policy makers. Ongoing peer
review and comment via the website should ensure
further refinements are made to the tool over time by a
wider group of participants.

CONCLUSIONS
Key components of effective palliative and end-of-life
care are patient identification, assessment and care
planning. Unless screening patients with advanced
conditions becomes routine practice in all care set-
tings, many patients will not benefit from the
improvements being made to the care of people who are
at risk of deteriorating and dying. A simple tool to
support better identification of patients with unmet
general palliative care needs is essential, and the
SPICT addresses this gap. Shifting the emphasis to a
focus on quality of life as the main goal of care is
challenging. The SPICT provides clear indicators
which clinicians can use to initiate conversations with
patients and families about their preferences for dif-
ferent treatment and care options. Additionally, adopt-
ing a common, shared tool promotes effective
communication and coordination between primary
and secondary care teams.

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Contributors KB and SM designed the study and KB was the
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collection supported by KB and DC; KB designed the SPICT
project website; KB, GH, DC and SM were involved in data
analysis and interpretation. The final manuscript was written by
KB with contributions from the other authors. All the authors
read and approved the submitted version.

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Provenance and peer review Not commissioned; externally
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Data sharing statement The project Excel database has been
retained by the principal investigator and contains no patient
identifiable data. Further information can be obtained from the
Corresponding author.

Research
REFERENCES


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